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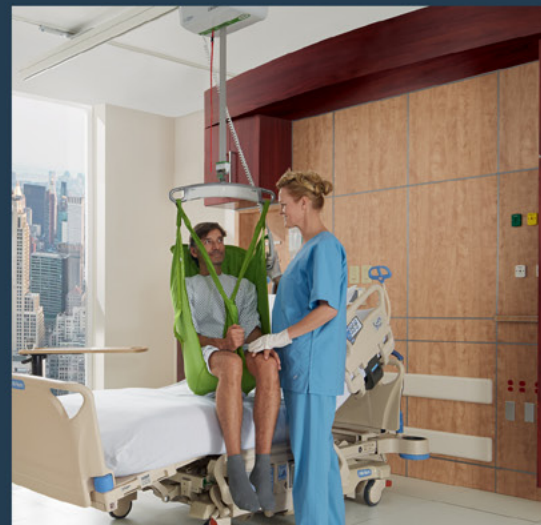
The Facility Guidelines Institute

Patient Handling and Mobility Assessments

SECOND EDITION

Updated by

Mary W. Matz, MSPH, CPE, CSPHP



with support from



Hillrom™

Patient Handling and Mobility Assessments: A White Paper

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The Facility Guidelines Institute (FGI) is a not-for-profit corporation founded in 1998 to provide leadership and continuity to the revision process for the *Guidelines for Design and Construction* documents. FGI functions as the coordinating entity for development of the *Guidelines* series of documents using a multidisciplinary, consensus-based process and for provision of ancillary services that encourage and improve their application and use. FGI invests revenue from sales of the *Guidelines* documents to fund the activities of the next revision cycle as well as research that can inform the *Guidelines* development process.

FGI seeks to gather perspectives on challenges facing patients and clinicians in clinical spaces from which ideas can be gleaned to focus further research and support efforts to keep FGI's *Guidelines for Design and Construction* documents current with operations in the field. The process of collecting this information also provides an avenue to explore the implications of current *Guidelines* requirements and to assess the need for potential changes in future editions.

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Preface

When the first edition of this white paper was published nine years ago, the concept of safe patient handling and mobility (SPHM) and the patient handling and movement assessment (PHAMA) requirement had just been introduced to FGI's *Guidelines for Design and Construction of Health Care Facilities* in the 2010 edition. At that time, safe patient handling and mobility was just beginning to gain attention as an important aspect of patient care that could benefit both patients and staff.

During the 2010 *Guidelines* revision cycle, the Health Guidelines Revision Committee (HGRC), the body responsible for updating the content of the FGI *Guidelines*, formed the Specialty Subcommittee on Patient Movement to assess how the health care industry was handling the issue and to investigate how this important topic could be addressed in the *Guidelines*. In the process, the subcommittee found there to be “an abysmal lack of knowledge and information on [the] subject throughout the architecture and design professions and only a slowly growing recognition in regulatory agencies and in the health care industry itself.”

To help counteract this dearth of information, the Specialty Subcommittee agreed to supplement the new *Guidelines* content they had drafted, which required preparation of a PHAMA as part of health and residential care facility project planning, with a white paper that would provide explanatory information about patient handling and mobility equipment and its uses and benefits, how to prepare a business plan for implementation of a SPHM program, and ways to implement and promote such a program. This white paper was made available as a free download from the FGI website.

In the years since publication of the first edition, interest in safe patient handling and mobility has grown exponentially. Previously, an emphasis on workplace safety was the most prevalent reason given for considering implementation of a SPHM program, ignoring the many other potential benefits. Now, improved safety and quality of life for both patients and caregivers, improved patient outcomes from early mobilization, and economic benefits from avoiding adverse events related to manual patient handling are commonly recognized benefits of SPHM programs. This change in point of view is reflected in the second edition of the white paper, not least in its title, which replaces “movement” with “mobility” to emphasize the correlation between patients’ recovery and mobilizing them early and often.

The authors of the original white paper trusted that this white paper coupled with the *Guidelines* requirement to conduct a PHAMA for every new construction or major renovation health or residential care project would serve as catalysts: to encourage innovative designs based on SPHM equipment research and development and to promote the realization of safe patient handling and mobility throughout the nation’s health and residential care sectors. Their faith was well-placed as the PHAMA has had a significant impact on the design of facilities, and SPHM acceptance and support are light years ahead of where they were in 2010.

Nonetheless, there is still much work to be done to achieve universal acceptance of the PHAMA, including routine consideration of SPHM issues such as facilitating patient mobilization and accommodating individuals of size during planning and design of

health and residential care facility projects. FGI is pleased to present the second edition of this white paper to support this goal, and we are grateful to Mary Matz for her dedication in making it a reality.

Thanks also to Hillrom for their sponsorship of this work, which allows us to make the second edition of the white paper available via free download from the FGI website.

It is now your opportunity to use this white paper to facilitate use of the PHAMA in your projects and, in doing so, to increase patient and staff safety and improve the quality of patient care.

Douglas S. Erickson, FASHE, CHFM, HFDP, CHC
Chief Executive Officer
Facility Guidelines Institute

Introduction

Manually handling, moving, and mobilizing patients and residents is hazardous work. By the late 1990s, evidence of the efficacy of safe patient handling and mobility (SPHM) practices in mitigating these hazards was mounting abroad and interested parties in the United States began to recognize that the science behind safe patient handling and mobility had become too strong to ignore. Organizations such as the Department of Veterans Affairs (VA) and the National Institute for Occupational Safety and Health (NIOSH)—in addition to several researchers in ergonomics and nursing with the foresight to recognize the seriousness of the issue—led the way in conducting research that would confirm the use of assistive devices when performing patient handling and mobility tasks decreases the risk of injury to patient and caregivers. Their research found that the most important assistive devices for this purpose were patient lifts, available as either floor-based or overhead fixed patient lift systems. The gold standard then, and now, is the overhead lift system.

When the U.S. Department of Veterans Affairs (VA) began its push to install overhead lifts in response to the data, their construction and facility management staff had no resources other than equipment manufacturers for information about proper application, installation, and use of this equipment. For this reason, the VA developed, with assistance from lift manufacturers, the first SPHM design document. This document then introduced safe patient handling and mobility to the Facility Guidelines Institute (FGI).

As SPHM programs continued to grow and purchase of overhead lifts and other technologies increased, it became apparent to FGI that national design standards were necessary to support use of this equipment. The Steering Committee of the 2010 Health Guidelines Revision Committee (HGRC) commissioned the Specialty Subcommittee on Patient Movement to develop guidance for incorporating safe patient handling and mobility into the planning and design requirements for health and residential care facilities. The resulting language in the 2010 FGI *Guidelines for Design and Construction of Health Care Facilities* was titled “Patient Handling and Movement Assessment,” or PHAMA, as was the white paper released in conjunction with that edition.

Over the years, the PHAMA white paper has become an integral resource for design professionals and organizations initiating and continuing SPHM programs. National conferences on safety, design, geriatrics, safe patient handling and mobility, and related topics have requested presentations to inform their participants of the research and tools available for SPHM implementation. I and others with SPHM expertise have used the white paper as a resource and guide for many health care organizations initiating and rebooting a SPHM program. The white paper not only speaks to construction and design, but also to the rationale behind safe patient handling and mobility, means for conducting cost-benefit analyses and implementing SPHM programs, and projections on the future of safe patient handling and mobility. Everything needed to institute an SPHM program was discussed in the first PHAMA white paper, and in this second edition this information has been updated and expanded.

Many factors led to the decision to develop a second edition of the PHAMA white paper. Over the years, changes have taken place in both the medical and patient handling arenas. The medical and physical characteristics of patients and residents receiving care have changed over time, with hospitals today providing more acute care and serving a greater number of individuals of size and residential facilities also seeing greater resident acuity and size. An increased focus on patient mobilization, especially early mobilization, has changed the care of patients and the role of caregivers. Previously, patient care fostered a sedentary status. Now, patient mobilization is key in the provision of care for many medical conditions. Providing this mobilization manually puts caregivers at risk of injury, but use of SPHM equipment, including new and redesigned technology, has been found to facilitate safe mobilization of patients. With more hospitals and health care organizations recognizing the benefits of instituting SPHM programs and technology, FGI realized this new and often innovative information needed to be communicated to design professionals and health care organizations.

As I and my colleagues reviewed the information in the original PHAMA white paper in preparation for developing the second edition, we found much material that was still current along with many topics with exciting changes to relay. Mobilization was an important topic in the first edition, and it seems the practice of health care has finally caught up with that outlook. Overhead lifts are still the SPHM equipment of choice, but the importance of having all beds covered by an overhead lift is now based on experience in the field. Overhead lifts are available with new features that improve their functionality and lower the risk of injury.

In addition, the information in the white paper on conducting a cost-benefit analysis has been updated with current knowledge on the subject and evidence for the benefits of using SPHM technology. We've included new tools to help caregivers accurately assess a patient's ability to mobilize and added detail on one of the most important areas of new information—the safe provision of care for individuals of size. Providing appropriate dimensions and clearances to guide design affects the quality of patient and resident care as well as staff, patient, and resident safety.

We hope you find the second edition of this white paper helpful as you strive to support safe patient handling and mobility in your projects and organizations.

Mary W. Matz, MSPH, CPE, CSPHP

Acknowledgments

I am grateful to the many experts who have worked, sometimes tirelessly, to generate this second edition of the patient handling and mobility assessment (PHAMA) white paper as well as those who helped craft the first edition. Without them, this white paper would not have been possible.

First, going back to the original authors, I note the passing of a few exceptional people whose passion and knowledge contributed significantly to the first edition of this white paper: Martin Cohen, architect and lead of the 2010 Specialty Subcommittee on Patient Movement; David Green, whose ideas were always far ahead of his time; and Judene Bartley, who provided infection prevention-related information for the first edition. Their contributions laid the groundwork and have been instrumental to the increased use of patient handling and mobility equipment that we've seen over the last decade.

I thank all the authors, who were always accessible and generous in their support, in particular, Gaius Nelson, architect and co-author,

from the design side, who continually supported my efforts; Roger Leib, architect and visionary; and John Celona, another visionary but in fiscal matters.

New to our group and exceptional in their knowledge of and passion for safe patient handling and mobility are Kelsey McCoskey, ergonomist for the Department of Defense, who has a wealth of knowledge regarding safe patient handling and mobility and design and whom I have been fortunate enough to collaborate with since 2001; and Marie Martin, VA SPHM facility coordinator and SPHM lead for development of the new VA design guide, who also has a wealth of SPHM design knowledge. Marie was my right hand for many years at the VA and now, as ever, fully supportive in this effort to increase knowledge and awareness of SPHM practices. Marie and Kelsey were instrumental in providing new information for the second edition. Other original authors made sure the information relayed regarding their areas of expertise were current; these include James Harrell, Lisa Murphy, Jane Rohde, and David Sine. Thank you to them for their continuing support.

FGI staff who made this second edition possible are Pamela James Blumgart, lead editor, and Heather Livingston, Yvonne Chiarelli, and Bridget McDougall, who all pitched in to help with editing. Last, but definitely not least, I'd like to thank Douglas S. Erickson, CEO of the Facility Guidelines Institute, who beginning during his role as chair of the 2010 Health Guidelines Revision Committee has believed in the importance of including safe patient handling and mobility concepts in FGI's *Guidelines for Design and Construction* documents as well as in our many efforts to ensure SPHM design criteria and elements are sound.

A number of individuals kindly reviewed portions of the manuscript for the second edition. Thanks to Dee Kumpar, MBA, BSN, RN, CSPHP, at Hillrom; Patricia Mehan, PT, DPT, MPH, at Guldman, Inc.; Michael Odum and Wayne Bailey at Arjo; and Timothy Buchanan, RN-BC, MSN, CSPHP, SPHM facility coordinator at the St. Louis VA Health Care.

For this second edition of the white paper, I also thank Hillrom for their generous sponsorship as a Keystone Partner, which allows FGI to make the paper available free of charge. This support stems from Hillrom's long-term involvement in developing and supporting the inclusion of patient handling and mobility in the design process, which began as early as the 2000s when they assisted me in reviewing and revising the original Veterans Health Administration document that was the basis for the PHAMA. Later, Hillrom staff were with me when I first provided information on patient handling and mobility to the Health Guidelines Revision Committee (HGRC), who ultimately approved inclusion of the PHAMA in the 2010 FGI *Guidelines*. Through Dee Kumpar and others, notably Neal Wiggerman, Hillrom has continued to support efforts to ensure design criteria related to the PHAMA remain current. I am grateful for Dee's involvement in countless ways, the most recent in conducting simulation exercises at the Hillrom Customer Experience Center to provide the HGRC with evidence for minimum floor area and clearance standards for safe use of lifts for all patients, including individuals of size.

Thank you, as well, to all the patient handling and mobility equipment manufacturers who provided illustrations of their products to include in this white paper.

Mary W. Matz, MSPH, CPE, CSPHP

Illustration Credits

Illustrations throughout the white paper are tagged with the names of their manufacturers, which are cited in the following list. (Inclusion of these products in this white paper does not represent an endorsement by the authors or the Facility Guidelines Institute.)

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Amico Corporation	Medical manufacture of safe patient handling products such as the GoLift Ceiling lift and the GoLift Portable Ceiling Lift (www.amico.com)
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Biodex Medical Systems, Inc.	Uses science and technology to drive treatment innovation across physical medicine, nuclear medicine, and medical imaging categories (www.biodex.com)
Dane Industries	Manufacturer of medical devices for safe patient handling (www.danetechnologies.com)
Ergolet (WinnCare Nordic)	WinnCare Nordic, manufacturer of the Ergolet brand overhead patient lifting and transfer systems, mobile floor lifts, and hygiene solutions (www.winncare.com)
EZ Way, Inc.	Manufacturer and distributor of a full line of safe patient handling products (www.ezlifts.com)
Gaius Nelson	Nelson Tremain Partnership – Architecture and Design for Aging, focused on creating living environments for elders and special needs populations (www.ntp.cc)
Guldmann, Inc.	Manufacturer of patient lifts, slings, and solutions for safe patient handling and mobility (https://www.guldmann.com/us/)
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Marie Martin, PhD	Safe patient handling and mobility facility coordinator, Dallas VA Medical Center

Midmark Corporation	Manufacturer of Barrier-Free® Examination Chairs™ that promote proper patient positioning to help improve the patient and provider experience (Midmark.com)
Pressalit Care, Inc.	Manufacturer of flexible bathroom solutions and adult changing/showering tables (www.pressalit.com)
Stryker Corporation	Manufacturer of patient care and handling equipment (www.stryker.com)
Tollos, Inc.	Manufacturer and distributor of safe patient handling equipment, devices, and supplies (www.tollos.com)
VA	Images courtesy of the U.S. Department of Veterans Affairs
VitalGo Systems Ltd.	Manufacturer of medical devices focused on mobility (www.vitalgosystems.com/)
Winco Mfg., LLC	Manufacturer of Stretcher-chairs with motorized One Patient, One Surface™ positioning for safer patient handling from admission to discharge (https://wincomfg.com)
Wright Products Inc.	Manufacturer of Slipp®, the Patient Mover for safe patient handling (www.wrightproductsinc.com)

Glossary

Air-assisted lateral transfer and positioning device: A patient transfer mattress that uses the force of air to decrease friction and ease movement of patients from one flat surface to another. It decreases shear forces on the patient's skin during a lateral transfer. This device can be used to position patients side-to-side and up in bed.

Air-assisted lifting device: A device composed of several layers of mattresses and a motor that uses the force of air to inflate each mattress from the floor up. The device lifts patients to a height where they can be moved to a flat surface (e.g., table, stretcher) using a lateral transfer device.

Ambulate: To walk or move from place to place with or without assistance.

Bariatric patient: *See* Individual of size.

Bathroom equipment, adjustable: Adjustable bathroom equipment meets the needs of patients with varying body sizes, shapes, heights,

and strengths. Height-adjustable sinks, shower chairs, and toilets facilitate safe patient handling as well as patient safety. Bathroom equipment such as grab bars and sinks move along a wall-mounted horizontal rail to assist in accommodating various widths of patients as well as caregivers, when required.

Bed mover: A transport assistive device that attaches to the back of a bed and helps caregivers move beds. Prior to purchase, it must be determined if the device is compatible with the beds to be used and if there is clear space to accommodate use of the equipment, including maneuvering it in patient rooms, hallways, elevators, and other facility spaces.

Biomechanics: The study of the application of the laws of physics and engineering to define and describe movement of the body and forces that act upon the musculoskeletal system.

Body mass index (BMI): A patient's weight (in kilograms) divided by the square of a patient's height (in meters).

Caregiver: Any person who provides direct patient care including moving, handling, and mobilizing patients. Caregivers are of varying clinical disciplines and educational levels and may work in any area where patient handling and mobility occur including long-term care, acute care, home-based care, dental or radiology/diagnostics practices, therapies, and a morgue.

Ceiling-mounted lift: A type of overhead lift system mounted above the ceiling. *See* Overhead lift.

Ceiling track: A ceiling lift track or rail that is mounted within, on, or suspended from the ceiling.

Changing table, adult/height adjustable: A height-adjustable table that lowers to the height needed for seated transfers from a wheelchair onto the table. The table can then be raised to a height that is comfortable for diapering or providing necessary care for children or adults who require assistance.

Client: A recipient of care; a consumer of care services.

Cumulative trauma disorder: The outcome of repeated damage, or an accumulation of damage over time, to a specific area of the musculoskeletal system. This damage includes micro-injuries such as micro-tears to muscles and micro-fractures to the vertebral endplates of the spine. When uncontrolled, such micro-injuries result in more significant injuries, which often can become debilitating. Usually, cumulative trauma injuries are thought to be acute injuries.

Drawsheet: A sheet, smaller than a bottom or top bedsheet, that is usually placed over the middle of the bottom sheet to keep the mattress and bottom linens dry. The drawsheet is often improperly used to manually turn or move a patient in bed.

Ergonomics: The scientific study of the relationship between work being performed, the physical environment in which the work is performed, and the tools used to help perform the work. The goal of ergonomics is to provide a workplace designed to ensure the biomechanical, physiological, and psychosocial limits of people are not exceeded.

Exam table, height-adjustable: An exam table that lowers to allow a patient in a wheelchair to transfer onto an exam table and then rises to a height that is ergonomically safe for caregivers to examine and treat patients.

Exoskeletal suit: Device worn by caregivers to increase muscle (lift and carry) capacity and absorb skeletal stresses.

Facility coordinator, SPHM: The person(s) responsible for facility SPHM program management and education, who serves as the facility subject matter expert for design and any other activity and/or project that involves patient handling and mobility. As referenced in this white paper, the SPHM facility coordinator is an integral contributor to the facility process that results in the appropriate selection, application, and use of SPHM technologies.

Floor-based lift: A lift that has a wheeled base that roll on the floor and can be moved from room to room or area to area. These lifts include full-body sling lifts and sit-to-stand lifts (powered and non-powered). Caregivers usually must push these lifts; however, a motorized design relatively new to the market allows staff to move the lift without manually pushing the lift and patient.

Floor-based full-body sling lift: A lift that consists of a C-shaped or U-shaped support base with casters, a vertical mast, a pivoting boom, a swivel bar, a seat (sling or rigid), and the lifting mechanism. These lifts are manually, electrically, or battery operated using hydraulic or screw jack lifting mechanisms. They are used for dependent patients and patients requiring extensive assistance. The lift motor functions to raise or lower the patient in a sling, but caregivers must manually push the lift and patient to the desired location.

Friction-reducing device (FRD): A device made of slippery materials that reduce friction during sliding movements, making it easier to move a patient from one surface to another, facilitate sling insertion, and reposition a patient in a bed or chair.

Gantry lift: A portable, wheeled overhead lift that is placed over a patient bed and functions similarly to an overhead lift. This lift is for use only in a single-patient room or similar area. It is often leased for situations when a lift is not available but required, as for admission of an individual of size.

High-risk patient handling task: A patient care activity that can result in musculoskeletal injuries in caregivers. These tasks are considered high risk based on frequency of repetitive motions, duration of stress, and the degree of musculoskeletal stress imposed by the task.

Individual of size: A person overweight by more than 100 lbs., with a body weight greater than 300 lbs. or a body mass index (BMI) greater than 40. For safe patient handling purposes, a BMI of 30 is considered the threshold. This term replaces the previously used term “bariatric patient.” Individuals of size also include people who are tall and/or muscular and not necessarily obese.

Lateral transfer: Horizontal movement of a patient in a supine position from one flat surface to another (e.g., from a bed to a stretcher or bathing trolley).

Lateral transfer device: A patient transfer aid designed to laterally transfer patients without lifting them. These devices are used to move patients between two contiguous surfaces (e.g., bed and stretcher) of similar height. A variety of devices are available, including mats, mattresses, and sheets that are inserted under the patient or strapped to the patient and then pulled to transfer the patient. Some devices use the force of air to move a patient on a mattress.

Lift (noun): The generic term for a mechanical device used to transfer, lift, move, ambulate, and provide other assistance during patient handling and mobility. Includes overhead (ceiling, wall-mounted) lifts, full-body sling lifts, sit-to-stand lifts, and similar lifting devices.

Lift (verb): A generic term that includes many aspects of lifting, moving, shoving, carrying, sliding, supporting, and transferring a patient.

Lift motor: The component of a lift system that provides the pull force to lift a patient or body part. It is connected to a retractable/extendible cord/cable that connects to a hanger bar and patient sling. When mounted in a track, it also provides movement along the track.

Manual patient handling: Lifting, moving, sliding, transferring, or otherwise caring for a patient without mechanical assistance.

Minimal lift policy: A policy that prohibits or minimizes manual lifting; similar to an SPHM policy.

Mobilize: To facilitate physical movement, either of the patient from one place or position to another or of a patient's limb. Mobilization can engage the patient's own capabilities or be passively induced by a caregiver and/or technology. For example, a patient who is dependent or requires extensive assistance can be mobilized in bed (turned, moved to head of bed) or a patient with partial weight-bearing capability can be assisted in ambulation using a lift. Mobilizing

patients has been found to decrease negative patient outcomes such as pressure injuries, overall weakness, hospital-acquired pneumonia, and urinary tract infections.

Motorized bed: A bed with motorization capabilities that reduces the force required when a caregiver pushes the bed. These beds are longer than non-motorized beds. Prior to purchase, confirm that at least one facility elevator has the required length to accommodate the motorized bed.

Motorized stretcher: A stretcher with motorization capabilities that reduces the force required when a caregiver pushes the stretcher.

Musculoskeletal disorder (MSD) or musculoskeletal injury (MSI): A disorder of or injury to the musculoskeletal system, including muscles, bones, joints, tendons, ligaments, nerves, cartilage, and spine. Most patient handling-related MSDs develop over time. MSDs typically affect the back, neck, shoulders, and upper limbs.

No-lift or zero-lift policy: A policy that prohibits or minimizes manual lifting. This term is no longer in use.

Overhead lift: A patient lift system that includes a console containing the motor and pulleys; a strap that extends out of the console; a hanger bar that attaches to the strap and to which a sling or seat attaches; a hand-held control unit for patient lift and movement regulation; and fixed ceiling-mounted or wall-mounted tracks unless the unit is freestanding. Overhead lifts are used for many patient handling activities in health care facilities, including moving patients in a patient room or bathroom, repositioning patients in bed, lifting appendages, ambulating patients, and others.

Patient: A recipient of care; often used in this white paper to refer to clients and residents in residential care facilities.

Patient handling and mobility assessment (PHAMA): A multidisciplinary, documented process conducted to direct and assist a design team as they incorporate and accommodate appropriate patient handling and mobility equipment in the health care environment.

Patient handling task: A task performed by caregivers when caring for patients including bathing, transferring, repositioning, feeding, wound care, and similar activities. Tasks considered high risk result in injury when performed manually without assistive devices.

Patient transport device: A device used to move patients from one location to another, including stretchers, gurneys, portable bathing trolleys, and wheelchairs as well as battery-powered devices that assist caregivers in pushing beds, wheelchairs, etc.

Perch: Bed, chair, toilet.

Position/reposition: To adjust a patient's position in bed, chair, or other surface to provide body support. These actions prevent pressure ulcers/injuries, accommodate physiological functioning, support performance of a clinical or hygienic procedure, improve comfort and resting posture, or raise a patient to more equal eye level to facilitate communication.

Resident: A recipient of care in a long-term/residential care facility.

Safe patient handling and mobility (SPHM) program: A program for reducing ergonomic risk for caregivers from high-risk patient handling activities and for facilitating early patient mobilization. These programs include support structures and change management strategies to facilitate use of patient handling equipment, foster a culture of safety in the patient care environment, and improve patient clinical outcomes.

Shower chair (ergonomic): A powered commode/chair with adjustable height and length to allow a patient position that is comfortable for patient and caregiver during bathing and personal care.

Shower trolley (ergonomic): A trolley that is height adjustable to comfortably position a patient for patient and caregiver ease in bathing and personal care.

Side or lateral transfer: Moving or sliding a patient laterally from one support surface (as on a bed) to another (as on a gurney), or the reverse.

Single track: A linear track along which a lift motor travels for horizontal movement of a patient. Lifting and horizontal movement is limited to points along the track.

Sit-to-stand (standing assist) lift: A lift used to raise a patient from a seated position to a standing position and to lower the patient to another seated position. This type of lift is also used to diaper, change clothes, toilet, and perform other patient care tasks. Some of these lifts have a design that allows for patient ambulation. The patient must have some upper body strength, cognitive ability, weight-bearing capability, and the ability to grasp with at least one hand. A protective sling is used with powered sit-to-stand lifts. Non-powered sit-to-stand lifts do not use protective slings, so they are used for higher functioning patients. These lifts consist of a C-shaped or U-shaped support base including casters, a sling that wraps around the patient for security and safety, and the lifting mechanism. The lift motor functions to raise or lower the patient in a sling, but caregivers must manually push the lift and patient to the desired location.

Sling: A fabric device used with mechanical lifts to temporarily lift or suspend a patient or body part to allow a caregiver to perform a patient handling task (e.g., reposition/position a patient in a bed, chair, or other surface) or to provide support when a patient is ambulating. Sling styles include seated, standing, ambulation, repositioning, limb support/strap, supine, toileting, and bathing.

Stretcher/chair: A portable device that can be converted from stretcher to chair and back to stretcher. In the stretcher position, the device facilitates lateral transfers. Some of these stretchers can be folded or hinged for compact storage and/or include two or four wheels to facilitate patient transport.

Toilet seat, assistive: A powered toilet seat that lifts and lowers a patient to a toilet seat.

Therapy surface, height-adjustable: A table/mat that lowers and rises to allow a patient to safely transfer to and from the table/mat surface and allows staff to work at a height that is ergonomically safe.

Transfer: Movement of a patient from one position or surface to another. A vertical transfer is from a seated-to-seated position (wheelchair to toilet) or supine-to-seated position (stretcher to wheelchair). A horizontal or lateral transfer moves a patient from one flat surface to another (bed to stretcher).

Transport: To move a patient in or on a transport device from a starting point to a destination in or between facilities.

Transport device: A stretcher/gurney, transport chair, wheelchair, or bathing trolley.

Wheelchair mover: A transport assistive device that attaches to a wheelchair to help caregivers move the wheelchair. Prior to purchase, it must be determined if the devices are compatible with the equipment they are intended for and—once the mover has been attached—that there is clear space to accommodate the use and maneuvering of the equipment in patient rooms, hallways, elevators, and other facility spaces.

Traverse track system: A ceiling or wall track configuration that provides the most flexible area coverage, typically for “whole room” coverage. The lift motor is mounted on a perpendicular moving rail attached to two parallel fixed rails, allowing the lift to travel in four directions (i.e., side-to-side and front-to-back). This is the preferred track system design.

Wall-mounted lift: A type of overhead lift system mounted on a wall. *See* Overhead lift.

Acronyms

ANA: American Nurses Association

APTA: American Physical Therapy Association

CCU: Critical care unit

CNA: Certified nursing assistant

HAPU: Hospital-acquired pressure ulcer

HGRC: Health Guidelines Revision Committee

ICRA: Infection control risk assessment

ICRMR: Infection control risk mitigation recommendations

IP: Infection preventionist

LOS: Length of stay

LPN: Licensed practical nurse

NIOSH: National Institute of Occupational Safety and Health

NPV: Net present value

OSHA: Occupational Safety and Health Administration

PCE: Patient care ergonomic evaluation

PHAMA: Patient handling and mobility assessment

PT: Physical therapist

PTA: Physical therapist assistant

RN: Registered nurse

ROI: Return on investment

SOP: Standard operating procedure

SPH: Safe patient handling

SPHM: Safe patient handling and mobility

VA: Department of Veterans Affairs

VHA: Veterans Health Administration

Rationale for Including the PHAMA in the FGI *Guidelines*

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A significant impediment to providing safe and therapeutic environments of care for patients and residents is the practice of manual patient handling. Manual patient handling—lifting, transferring, positioning, mobilizing, and sliding patients without assistive technology—has been the norm in health care facilities for decades. Nonetheless, it is an unsafe practice for both caregivers and patients.

Manual patient handling puts caregivers at considerable risk for musculoskeletal injury: Researchers have found that more than 80 percent¹ of nurses are injured at some point in their career because, in the most basic terms, there is no safe way to manually lift or move an adult patient without mechanical assistance. The increasing number of significantly heavier and sicker (and thus more dependent) patients who must be moved for various caregiving tasks adds to the stress on caregivers' bodies. Little imagination is required to realize that caregiver injury has effects on staffing, organizational costs from lost time and workers' compensation claims, and—significantly—on the quality of patient care.

Manual patient handling also increases the risk to patients of injury, pain, and negative health outcomes, in part because of the dangers and disincentives posed to caregivers by performance of these vital tasks. Further, manual patient handling combined with infrequent use of assistive technology may restrict opportunities for patient movement, mobilization, and weight-bearing activities, which can compromise patients' recuperation, rehabilitation, and overall health. Again, the costs of ignoring risks caused by manual patient handling go beyond the financial to the health and, ultimately, the quality of life of patients.

The primary solution to the problems of manual patient handling lies in assistive patient handling and mobility technology. Some countries have national policies that ban manual lifting. In the United States, federal legislation is pending, and several states have adopted such legislation. Government, professional, and industry groups strongly support ergonomic interventions in the form of assistive technology to keep caregivers and patients safe. However, to facilitate acceptance and use of assistive technology by caregivers, programmatic and organizational structures must be put in place that encourage and support such use. Safe patient handling and mobility (SPHM) programs as described in Chapter 4 of this document promote the use of such technology and also facilitate organizational change by fostering values essential to an effective culture of safety.

The fact that SPHM technology is not more widely employed is partly a function of the constraints of the built environment. Space must be adequate for equipment use and storage; structural weight capacities sufficient for mounted objects; and flooring surfaces, slopes, and clearances conducive to smooth movement of rolling equipment. For such factors to be addressed as a necessary part of project planning, architects and other designers must understand the issues a health care organization faces and be able to identify possible solutions.

The patient handling and mobility assessment (PHAMA) is a tool that can help designers make these connections. The PHAMA is intended to facilitate the incorporation of assistive technology into facility design to ensure safe and positive health outcomes for

patients and residents as well as safe and positive work environments for caregivers. It is also used to provide guidance for accommodating individuals of size and for eliminating common design elements that disincentivize or increase risks in patient mobility.

Manual Patient Handling Tasks That Cause Concern

Every day, caregivers transfer, position, mobilize, and support the ambulation of patients. Providing this assistance manually, in the traditional manner, can involve excessive physical effort, which is further complicated when tubes and other devices tether a patient to fixed outlets and utilities. To be done safely, handling and moving adult patients of any size must be performed with the aid of special equipment designed for that purpose.

Optimally, patients mobilize and ambulate themselves or, for the sake of patient dignity, at least assist in the process. Therefore, the equipment and protocols caregivers use must remove as much risk of physical injury from the physical environment and care process as possible.

Following are descriptions of the types of assistance caregivers typically provide. These are intended to serve as a basis for understanding what constitutes patient handling and mobility, the associated need for assistive devices, and how use of these devices affects the physical care environment.

Transferring

There are two general categories of transfers—movement of a patient (1) from one flat surface to another flat surface and (2) from perch to perch (from one seated position to another seated position or to/from a seated position from/to a supine position).

From one flat surface to another (lateral transfer). Although increasing numbers of procedures are performed patient-side, dependent patients must still be transported throughout a care facility and often they must be moved from the surface on which they are lying to another flat surface in order to be transported. Such “lateral” or “slide” transfers are also commonly performed when moving dependent patients onto treatment, diagnostic, and procedure tables/surfaces. When performed manually in a location where no rails or armrests interfere, such lateral

transfers generally include these movements: The caregiver brings the destination surface (bed, gurney, etc.) to the location where the transfer is to be performed and aligns it longitudinally alongside the originating surface. When performed manually, in a conventional fashion, one, two, or more caregivers, standing on the open sides of both the origination and destination surfaces, grab the drawsheet and either pull or push it—and thus the patient—to the destination surface.

From perch to perch. “Perch” refers to a bed, chair/sofa, toilet or toileting chair, dependency chair, or wheelchair—the key furnishings on which a patient sits in the patient room.

Given conventional furnishings, there is frequent need for movement between perches (from a sitting position in one location to a sitting position in another location). In long-term care environments, care instructions and protocols typically demand that residents spend as much of the day out of bed as possible. In hospital settings, patients must often be “up in a chair” beginning as early and for as long as possible. Respecting patient dignity also implies minimal use of bedpans in favor of a toilet or bedside commode. As well, patients are frequently transported upright throughout a care facility for a variety of diagnostic, treatment, and other procedures.

For manual transfers from a flat or reclined position, the caregiver usually helps the patient to a sitting position and rotates the patient’s body while lifting or assisting movement of the patient’s legs over the side of the bed. From such a seated position, the caregiver lifts the patient up from the perch, pivots the patient a “quarter-turn,” and then lowers the patient onto the new perch. When transferring from a seated position onto a bed or other flat surface, the caregiver may use a twisting motion to lay the patient down. More independent patients can use transfer aids/devices to move themselves to/from a bed and wheelchair when arms or rails do not impede such a move.

Positioning/Repositioning

Patients are moved or repositioned for a number of reasons:

To accomplish patient care tasks. Patients may be moved to facilitate performance of a clinical procedure or patient care task, such as those listed below. In all these cases, the entire body, an upper or lower portion of the body, the head, or a single limb may need to be moved or brought into and maintained in a particular position.

- Examining a patient
- Performing a procedure, from minor surgery to re-bandaging, catheterizing, intubating, etc.
- Performing personal hygiene tasks
- Grooming and feeding
- Providing emergency or “code”-response care. Not infrequently, due to extenuating circumstances or the need for a flat or rigid support surface, these procedures are carried out with the patient on the floor.

To prevent bedsores and other position-related adverse outcomes. A patient’s position should be changed at least every two hours, even at night, to prevent bedsores by alternating skin areas that bear weight and/or to minimize pooling of upper-respiratory fluids and optimize infusion of oxygen into the lungs. This activity involves rolling patients from one side onto the other and placing pillows or other cushioned supportive devices next to the patient to temporarily hold that position. It is one of the most frequent manual moves performed by caregivers.

To reposition patients for their comfort and safety. Returning a patient who has slid down in bed to the head of the bed is also a frequent manual move performed by caregivers to facilitate breathing, digestive processes, and comfort. A patient who slumps down in a chair, wheelchair, or dependency chair similarly needs to be pulled up. Caregivers attending a conference in 2008 anecdotally reported as much as 50 percent of their time with patients was spent repositioning them. These moves typically are among the highest-risk tasks performed by caregivers.

To address a clinical condition:

- Patients are positioned/repositioned in bed to ease breathing and/or reduce nausea.
- The upper bodies of patients with compromised breathing function—commonly including individuals of size—must be raised, usually to a standard minimum angle.
- Hypotensive patients are historically positioned with the head lower than the body.

- During feeding of debilitated patients, swallowing raises the risk of aspirating fluids or solids into the lungs and developing aspiration pneumonia, so it is important to maintain a vertical upper body position.

To enhance communication. Communicating with patients at eye level supports patient dignity and enhances the quality of communication.

Mobilization and Ambulation

When the human body is immobile, it deteriorates after a short period. Early and frequent mobilization of a patient or resident is thus crucial to maintaining or regaining health. Many studies show that the earlier a patient is mobilized (particularly getting the patient up on his or her feet and walking), the better the outcome. Conversely, many immobility-related adverse events, some with long-lasting consequences, are linked to late or insufficient mobilization.

As it relates to safe patient handling and mobility, mobilization includes the following:

- *Moving the limbs of dependent, non-weight-bearing patients to preserve joint flexibility.* This involves taking limbs through their full range of motion.
- *Ambulating patients as early and as often as possible to maintain mobility and bone density.* Recent evidence suggests the need for early or immediate and frequent ambulation applies to some of the highest acuity patients, such as ventilator-bound patients in the ICU, and even those on heart-lung bypass machines and ECMO (extra-corporeal membrane oxygenation machines), who in the past were left immobile. Patient ambulation involves a caregiver(s) supporting a patient on one or both sides, with the risk of suddenly having to prevent a fall.

Lifting Off the Floor

Manually lifting patients who have fallen is another task that is high-risk for both caregivers and patients. A concern particular to this activity is ensuring the patient is stable and has not been injured; thus, examination and caregiving must be provided in an awkward position from the floor. As well, lifting a patient who cannot help from the floor is

undoubtedly one of the most difficult patient handling tasks caregivers perform.

Transportation

Transporting patients for long distances and/or up and down inclines can be very difficult for caregivers and dangerous for patients. Transport devices used to take a patient from one area of a facility to another (e.g., to imaging or a special treatment or procedure area) include stretchers, gurneys, beds, transport chairs, wheelchairs, and (less frequently) portable bathing trolleys.

The fact that patients may need to be transferred onto these transport devices from less mobile or less maneuverable perches (see the section on transferring above) creates risk for both patients and caregivers in these situations. Additional challenges and risks arise from having to push, pull, shove, and maneuver the devices to reach a destination at the same time overcoming difficulties presented by soft floor coverings, ramps, thresholds, inadequate clearances and turning radii, and so on.

Perhaps the greatest risks occur in emergency situations when there is no time to transfer a patient from a hospital bed onto a more specialized transport device and caregivers undertake to use the already-heavy beds as patient transport vehicles. This practice has caused lifelong and career-ending injuries.

Wound Care

In performing wound care, caregivers must lift patients' heavy limbs and hold them in place throughout what can be lengthy procedures. Additional difficulties result when a wound is located on a part of the body that is difficult to access.

Toileting

Assisting a patient in toileting is potentially one of the most difficult caregiver tasks. The difficulty of trying to suspend a patient over a toilet while performing personal hygiene for them is rarely discussed. And patient falls, often serious, occur most frequently between bed and toilet.

Most institutions and caregivers subscribe to the value of maintaining patient dignity by helping patients to relieve themselves in/on a built-

in toilet within a private enclosure. However, patient size, weight, dependency level, intubation, and hour of need often shortcut these aspirations with the following, less-desirable alternatives:

- Bedpans (a sometimes humiliating, if necessary, default of choice)
- In-cabinet toilets (built into cabinetry), which lack a sense of privacy
- Portable bedside commodes

Enabling patients to safely reach the toilet is a major concern of caregivers. It is sufficiently difficult when patients signal their intentions, but even more so when patients do not. Confusion, compromised balance, poor lighting, unfamiliarity with environmental obstacles, and inadequate room and door clearance for caregiver-assisted visits to the toilet all exacerbate these concerns.

Showering/Bathing

Safely getting a dependent patient into and out of a shower (or tub, where still used) represents significant difficulties and dangers for caregivers and for patients. Bathing commonly takes place in these venues:

- In bed
- In an in-room shower (within the patient bathroom), often on a wheeled shower chair
- In a shared bathing room with or without adequate clearances for maneuverability and necessary patient transfers
- On a portable bathing trolley wheeled from the patient room to the shower room

Showering/bathing a dependent patient presents a unique set of difficulties:

- The patient is in a highly vulnerable emotional (and physical) state.
- All areas of the patient's body must be reached, including the perineal area. To accomplish this, patients and limbs

must be lifted and turned and, depending on the position of the patient, caregivers must reach or stoop as necessary, sometimes for extended periods.

- Working conditions can be wet and slippery, and floors are sloped for drainage.
- Patients are at greatly increased risk of falls.

Surgery

Transferring patients onto and off of a surgical table presents all the usual difficulties inherent in performing lateral transfers, along with others stemming from location in the surgical suite rather than the patient room.

Vehicle Extraction

Patients arrive at health care facilities in varying states of consciousness, physical and emotional fragility, and pain; they are also of different sizes and weights. Some are able to leave their car independently, but many cannot exit and lift themselves to a standing position. Helping these patients from a vehicle, often from the back seat, frequently requires contortions on the part of caregivers. The task is further complicated by the urgency of emergent situations.

Patients Presenting Special Challenges

Care of individuals of size and combative patients takes patient handling and mobility challenges to another level. Considering all the patient handling activities noted above, risk of injury to both caregiver and patient is compounded when individuals of size or combative patients are involved. Therefore, careful consideration must be given to all details of the special challenges such patients present. Those suffering with dementia often become combative if they feel frightened or frustrated by something or someone. This problem is not confined to special Alzheimer's care units, since many long-term nursing facility administrators report that up to 80 percent of their general patient populations may manifest at least some degree of dementia. [For further information on one specific aspect of this problem, see A. L. Barrick et al. (ed.), *Bathing Without a Battle: Personal Care of Individuals with Dementia* (New York: Springer Publishing Company, 2002).]

One can see there are an infinite variety of situations that arise, often suddenly and requiring immediate response, in the care, handling, and mobilization of patients. Thus, an ongoing curiosity about and understanding of these challenges is a critical design and planning prerequisite to realizing a safe and effective care environment.

Roger Leib, AIA, ACHA

Hazards of Manual Patient Handling

Always unsafe, manual patient handling has become even more so as patient acuity levels and weights commonly found in clinical settings have risen. At the same time, the benefits of patient mobilization are increasingly being recognized. The consequent demand for mobilization of increasingly dependent and larger patients brings additional risk of injury for both caregivers and patients.

Despite these trends, most health care facilities are not equipped to manage the handling and mobility needs of the growing population of high-acuity patients as well as the increasing number of individuals of size. This fact is a contributor to the global nursing shortage. The impact of manual patient handling can be seen in injuries to the aging caregiver workforce, the difficulty organizations have recruiting and retaining qualified nurses, and the number of injured nurses of all ages.

Risk of Caregiver Injury

For more than 30 years, training in body mechanics and “proper” lifting techniques was the control measure of choice for decreasing injuries related to manual patient handling. Yet during this time, injuries from manual patient handling continued to rise.² The reason for this? Lifting patients has been found to exceed caregivers’ biomechanical capabilities.^{3, 4, 5, 6, 7, 8} It has been determined that 35 lbs. is the maximum weight a caregiver should manually lift under the best of circumstances (e.g., no tubes, contractures, combative

behavior, etc.).⁹ No amount of training in proper body positioning or lifting will prevent injury when the load exceeds what the body can tolerate. We may all be aware of the potential for transmission of infection and disease from patients to caregivers, but many of us do not consider the ergonomic hazards caregivers face from manually lifting, moving, and handling patients.¹⁰

Biomechanics of Patient Handling Injuries

Carrying out an activity that exceeds a person's biomechanical capabilities causes damage to the musculoskeletal system. Manually lifting patients who weigh more than 35 lbs. (even under optimal circumstances) is such an activity and, consequently, caregivers are injured.¹¹ In acute injuries, damage occurs when one event results in an injury: For instance, six caregivers attempt to manually move a 500-lb. patient and the excessive load results in a serious muscle tear to one or more caregivers. However, most patient handling injuries come from cumulative traumas.

A cumulative trauma injury results from the accumulation of micro-injuries over time and often manifests itself in what would seem to be an acute injury. These cumulative traumas are not only the more common but the more insidious of musculoskeletal injuries. Such micro-injuries, in the form of micro-tears in the muscles or micro-fractures on the end plates of spinal vertebrae, often progress silently over time until severe damage occurs.¹² While the focus here is on damage to the muscles and spine, joints and bones can also be compromised. Most patient handling injuries are located in the lower back, but injuries also occur in the middle and upper back, shoulders, neck, arms, wrists, and even the hands and knees.

When muscle exertion occurs often or over an extended period without adequate time for recovery, the muscle becomes fatigued and is no longer able to produce energy for contraction. Muscle fibers can also be damaged from excessive loading or repetitive actions without sufficient recovery periods.¹³ With continued lifting and moving of excessive loads (i.e., patients), micro-tears eventually progress to a major tear,¹⁴ and a person may be surprised when—in the simple motion of bending over to pick up a pencil—his or her “back goes out.”

Excessive spinal loading is a consequence of lifting heavy loads and even light loads over a long period. Such lifting results in compressive forces on the spine. Twisting, reaching, bending, pulling, and similar motions

produce shear forces on the spine that also add to spinal loading.¹⁵ When a person's spinal load capacity is surpassed, vertebral endplate microfractures occur and scar tissue is formed. Normally, nutrients easily diffuse through a healthy vertebral endplate into the adjacent disc, but endplate scar tissue impedes the flow of these vital nutrients. (Discs lack a blood supply and must gain their nutrients by means of diffusion through adjacent vertebral endplates.) Without adequate nutrient flow, a disc degenerates until nerve impingement results in pain and decreased work capacity. The frightening aspect of this insidious injury cascade is that the discs have no nerve supply to warn of the degeneration so caregivers are most likely unaware that such a cumulative trauma injury is progressing until damage has been done.¹⁶

Mary Matz, MSPH, CPE, CSPHP

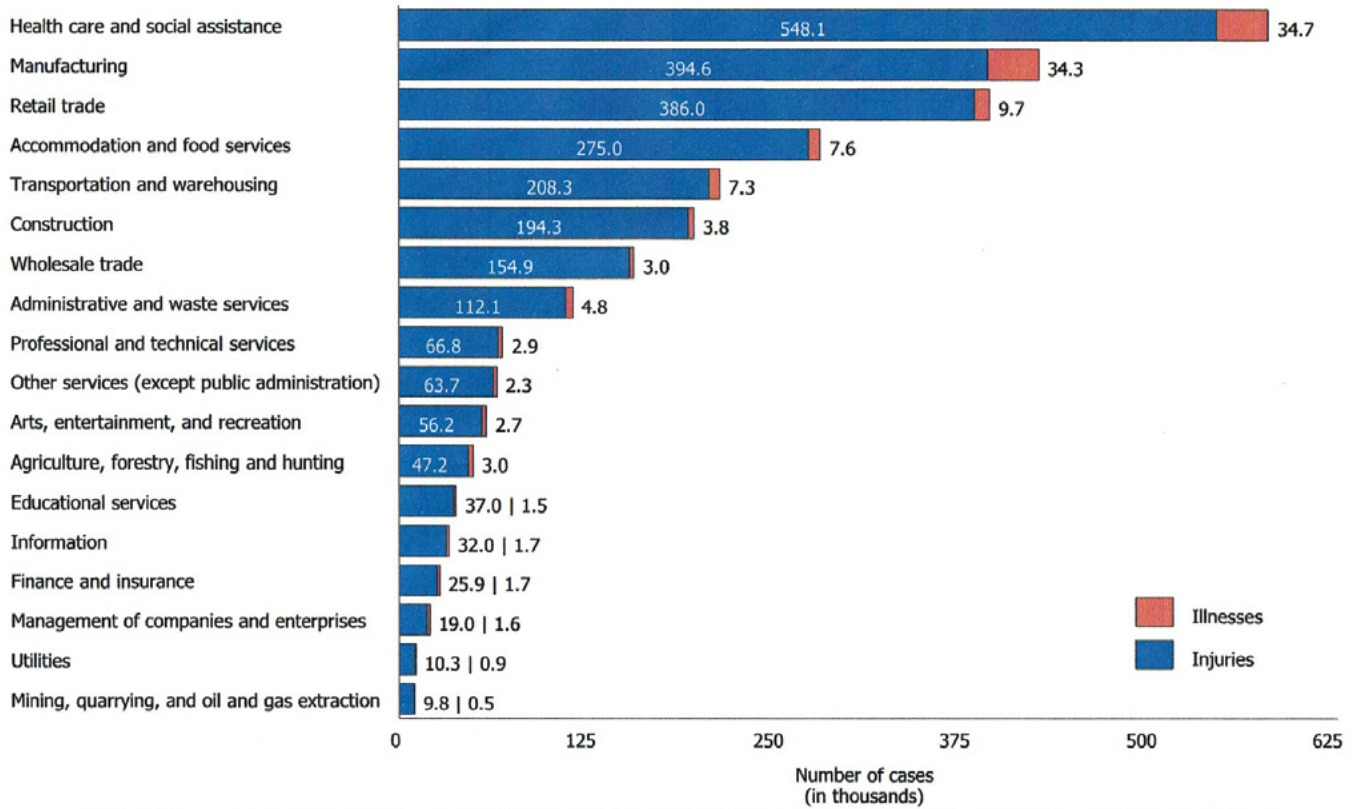
Health care providers are at high risk for musculoskeletal injuries. In fact, they are one of the highest risk groups of any industry, and the Occupational Safety and Health Administration (OSHA) targets manual patient handling as the reason.¹⁷ As well, researchers who analyzed worker compensation data found that overexertion from manually lifting and moving patients was largely responsible for the musculoskeletal injuries found in caregivers¹⁸. In 2016 the rate of injuries from overexertion was 62 per 10,000 full-time workers in hospitals, compared to 31 per 10,000 workers in all U.S. occupations¹⁹. In 2017, as usual, the most frequent “national, nonfatal occupational injuries and illnesses by private industry sector” were found in the health care and social assistance industry, with 548,100 injuries and 34,700 illnesses.^{20 21}

As seen in Figure 1-1: Distribution of Nonfatal Occupational Injuries and Illnesses by Private Industry Sector, health care and social assistance far outnumbered other industries. Nursing assistants have consistently been in the top ranks of the injured, often the first. In 2017 that occupation was second to laborers and freight, stock, and material movers in “number of cases of musculoskeletal disorders” (MSDs) (18,090 and 24,800 respectively).

As seen in Figure 1-2: Nonfatal Occupational Injuries and Illnesses Incidence Rates and Number of Cases of Musculoskeletal Disorders by

Selected Occupations, nursing assistants were fourth in “rates of injury and illness related to MSDs” (166.3 per 10,000 full-time workers).

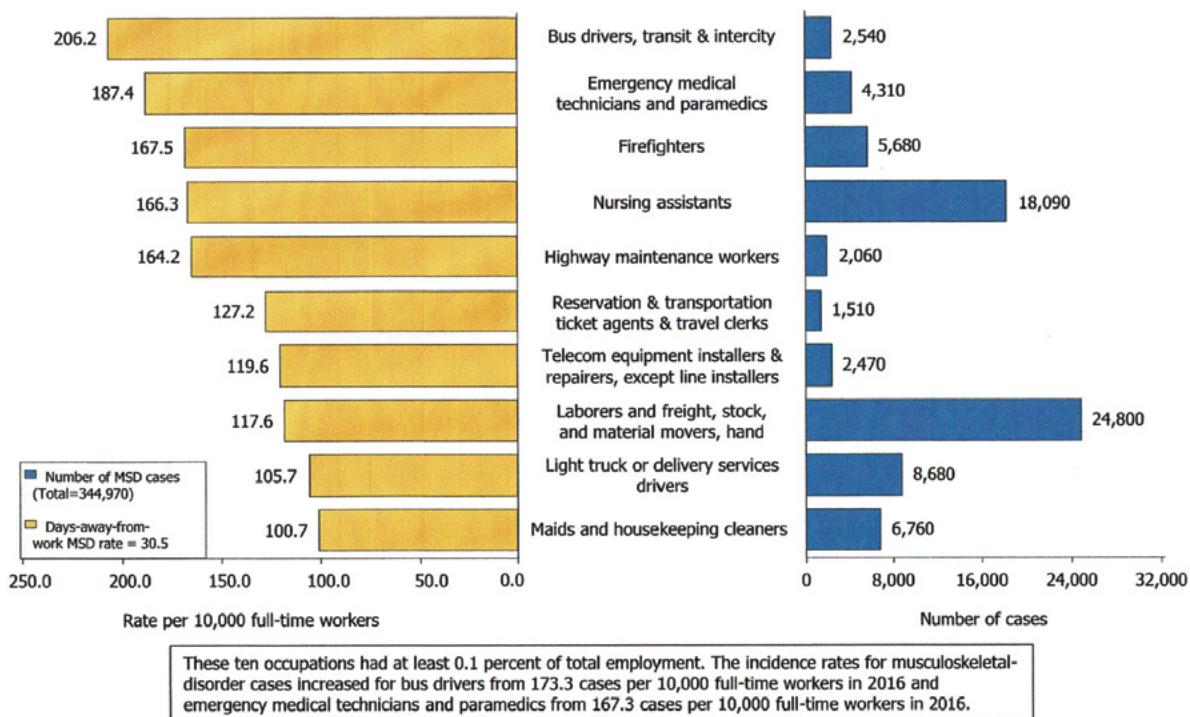
Figure 1-1: Distribution of Nonfatal Occupational Injuries and Illnesses by Private Industry Sector, 2017.



Injuries accounted for 95 percent of cases reported among all private industry workplaces combined in 2017, as well as the majority of cases reported among individual industry sectors. Illnesses accounted for only a small fraction of cases reported in each industry sector.

Source: U.S. Bureau of Labor Statistics, U.S. Department of Labor, November 2018

Figure 1-2: Nonfatal Occupational Injuries and Illnesses Incidence Rates and Number of Cases of Musculoskeletal Disorders by Selected Occupations, All Ownerships, 2017



Source: U.S. Bureau of Labor Statistics, U.S. Department of Labor, November 2018

National Occupational Research Agenda (NORA) SPHM Research Objectives

The National Occupational Research Agenda (NORA) for Healthcare and Social Assistance (HCSA) released a new research agenda in early February 2019. The agenda was developed to identify knowledge and actions most urgently needed to improve occupational safety and health in this industry sector. Council participants, all experts in their fields, were provided a venue to describe the most relevant issues, research gaps, and needs for the HCSA workforce. To develop the agenda, the participants identified priorities, which were compiled into a comprehensive list organized into six topic areas. A work group was formed for each topic to pare down the list.

Safe patient handling and mobility was included as a topic area in the 2019 agenda, which includes three related objectives: Objectives, 8, 9, and 10. Note that Objective 8 mentions conducting research related to safe patient handling and mobility in health care workplace design. This indicates that experts in the SPHM field are aware of the connection between safe patient handling and mobility and patient and staff safety, quality of patient care, and design of health care facilities.

Objective 8: Facilitate safe patient handling and mobility in health care systems by conducting research to develop and assess cost-benefit tools, workplace design and equipment management protocols, and strategies to improve sustained support of safe patient handling and mobility programs by workers, managers, and executives.

Objective 9: Conduct special topics research to improve safety in areas with distinct safe patient handling and mobility needs and explore the potential use of new, non-traditional assistive devices.

Objective 10: Develop and evaluate updated safe patient handling and mobility education in nursing schools and health care workplaces, and initiate new research to address gaps in safe patient handling and mobility education.

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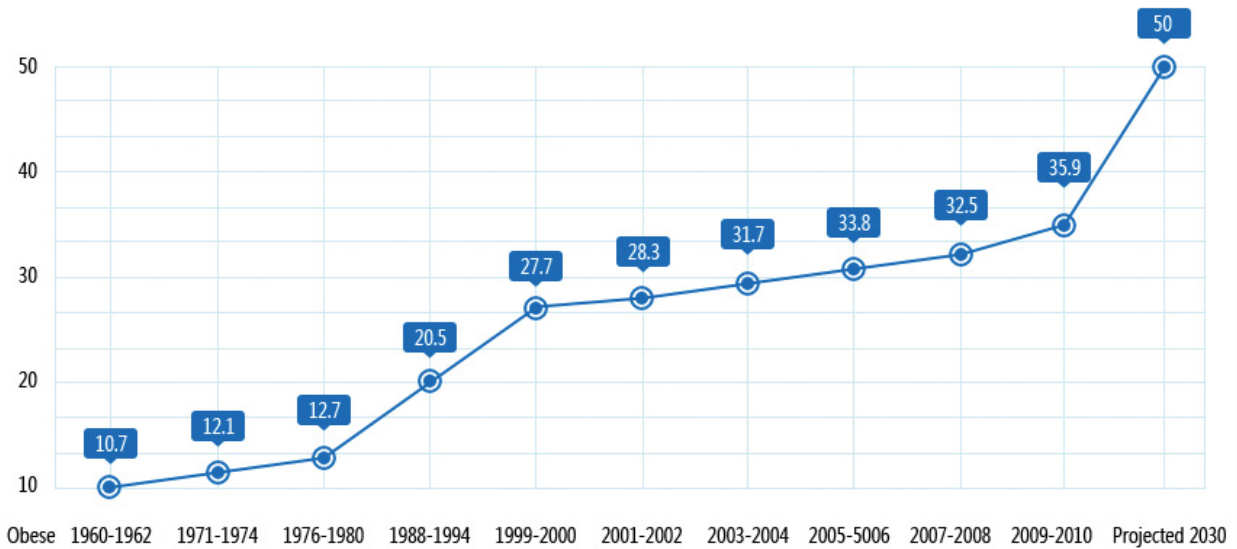
Source: U. S. Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, "National Occupational Research Agenda for Healthcare and Social Assistance" (February 2019) Available from <https://www.cdc.gov/nora/councils/hcsa/agenda.html>.

Caring for individuals of size, those we have termed bariatric, morbidly obese, and obese or who are very tall, muscular, and/or large-boned, complicates and adds significant risk to the tasks of handling, moving, and mobilizing patients. An individual's weight, the distribution of the patient's weight throughout the body, and the patient's height are involved in identifying an individual of size who requires additional assistance, expanded-capacity equipment, and larger space for patient care, moving, handling, and mobilization.

Little research has been done on moving and handling obese patients even though obesity in the U.S. population increased 65 percent (from 13.4 to 37.9 percent between 1960 and 2014) and continues to increase.^{22, 23} It has been projected that half the U.S. population will be obese by 2030^{24, 25} (see Figure 1-3: Prevalence of Obesity Among U.S. Adults). The number of individuals of size has impacted and will continue to impact the U.S. health care system.

Obesity was the primary or secondary diagnosis for 2.8 million hospitalizations in the United States in 2009. Such hospital admissions tripled from 1996 to 2009.²⁶

Figure 1-3: Prevalence of Obesity Among U.S. Adults Aged 20–74



Derived from NHANES data (http://www.cdc.gov/nchs/data/hestat/obesity_adult_09_10/obesity_adult_09_10.html#table1)

In a recent National Institute for Occupational Safety and Health (NIOSH) study,²⁷ the benefits of using SPHM technology for individuals of size was confirmed. Caregivers who reported more frequent moving and handling of individuals of size were more likely to experience back pain. Caregivers who found it easy to follow SPHM procedures (using equipment) reported less back pain. Less upper-extremity pain was associated with the availability of sufficient expanded-capacity patient handling equipment. Allowing sufficient time to use SPHM equipment reduced the chance of musculoskeletal injuries.

A review of one facility's OSHA 300 Log showed a relationship between obesity and staff injuries. The study found that although patients with a body mass index (BMI) greater than or equal to 35 kilograms per meters squared (kg/m²) made up less than 10 percent

of the patient population, these individuals accounted for 29.8 percent of injuries related to patient handling. Patient handling of individuals of size was related to 27.9 percent of all lost time and 37.2 percent of all modified duty days. Eighty percent of the injuries related to handling and mobility of individuals of size was seen in registered nurses and nursing assistants.²⁸

As significant as the existing injury data appears for caregivers, many musculoskeletal patient handling injuries are not reported²⁹—at least 50 percent according to some estimates.³⁰ Because of this, we are not aware of the true extent of caregiver injury or its consequences for patient care. Because nurses often continue to work when injured, the risk of further injury and, in turn, the likelihood they will have to take leave or retire because of injuries increases.

Research has been conducted in various patient care environments^{31, 32, 33, 34, 35} to identify manual patient handling tasks that put caregivers at most risk for injury. Findings confirm that these high-risk patient handling tasks place excessive biomechanical and postural stress on the musculoskeletal system of caregivers.³⁶ Listed in the accompanying sidebar are some, but certainly not all, patient handling tasks that are high risk when performed manually.

The tasks on this list are included in the Veterans Health Administration (VHA) algorithms used to support patient assessment and care planning for safe patient handling and mobility.³⁷ The structured, consistent approach to determining safe patient handling techniques presented in this tool helps caregivers determine which patient handling equipment and techniques are appropriate for the medical and physical characteristics of each patient.

High-Risk Manual Patient Handling Tasks that Can Be Made Safer with Use of Patient Handling and Mobility Equipment

The tasks on this list have been identified as high-risk when performed manually. Safe patient handling equipment is available for these tasks

and functions to mitigate the risks to caregivers when undertaking them. Technology is not available for other high-risk tasks.

- Transfer to/from seated positions: bed to chair, chair to chair, chair to exam table
- Lateral transfer to/from supine positions: bed, stretcher, trolley, procedure table
- Repositioning in bed
- Repositioning in wheelchair, dependency chair, or other chair
- Transport in bed/stretcher/wheelchair
- Toileting
- Showering and bathing
- Floor/fall recovery
- Transfer between vehicle and wheelchair, powered wheelchair, or stretcher
- Ambulation
- Patient handling task requiring lifting of extremities
- Individual of size patient handling task requiring access to abdominal area
- Individual of size patient handling task requiring access to perineal area

Source: Chapter 5, "Patient Assessment, Care Planning, and Algorithms for Safe Patient Handling and Mobility," in Veterans Health Administration, Center for Engineering and Occupational Safety and Health, *Safe Patient Handling and Mobility Guidebook* (January 2016). Available from <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.

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In addition to the VHA algorithms, the National Association of Orthopaedic Nurses (NAON) and the Association of periOperative Registered Nurses (AORN) also convened task forces to develop ergonomic tools and/or algorithms specific to the high-risk tasks found in their areas of specialty. The Bedside Mobility Assessment Tool (BMAT), a validated nursing assessment tool designed to identify patient weakness and prompt selection of the most appropriate equipment to safely mobilize patients earlier and often, has become the patient assessment of choice over the last few years.³⁸ See Appendix Q: SPHM Program Elements for further information

on the BMAT. For a comprehensive list of high-risk tasks by clinical area, see Appendix A: High-Risk Manual Patient Handling Tasks by Patient Care Area.

The level of risk in already high-risk tasks can be further impacted by these factors:

- Frequency and duration with which the task is executed
- Patient size, weight, level of cooperation, and unpredictability
- Transfer distance
- Space constraints
- Awkward positions
- Availability of technology to reduce the risk³⁹
- Physical and medical condition of the patient (For example, in the behavioral health setting, constraints on use of patient handling and mobility equipment are necessary to provide a safe environment for suicide-risk patients.)

Safe Patient Handling and Mobility Guidelines, Legislation, and Regulations

Over the past two decades, a variety of entities have turned their attention to the issue of safe patient handling and mobility.

Professional health care groups, labor organizations, the health care industry, regulatory agencies, and the scientific community have converged in attempts to arrive at effective solutions to protect direct patient caregivers from the ergonomic hazards of manual patient handling.

Regulating entities have taken stands against manual lifting and promoted safe patient handling techniques. Of all industries the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) targeted for development of an ergonomic guideline, the health care industry was the first to receive one—“Guidelines for Nursing Homes: Ergonomics for the prevention of musculoskeletal disorders.”⁴⁰ In addition, OSHA identified “manual” patient handling as the primary cause of musculoskeletal disorders among patient caregivers. As a

result, the OSHA guidelines explicitly recommend the use of assistive technology and note the guidelines can be applied to other health care settings where patient care occurs.⁴¹

The Joint Commission addresses safe patient handling in health care design through its Environment of Care standard: EC.02.06.05 #1. Although this standard does not provide criteria specific to safe patient handling and mobility, it does require organizations that are building new facilities or undergoing major renovations to follow the FGI health care design and construction guidelines or their state construction guidelines, which often are the FGI *Guidelines*. Since the FGI *Guidelines* documents include the PHAMA and other design criteria related to safe patient and resident handling, projects required to meet these standards must be designed and built to facilitate safe patient handling.

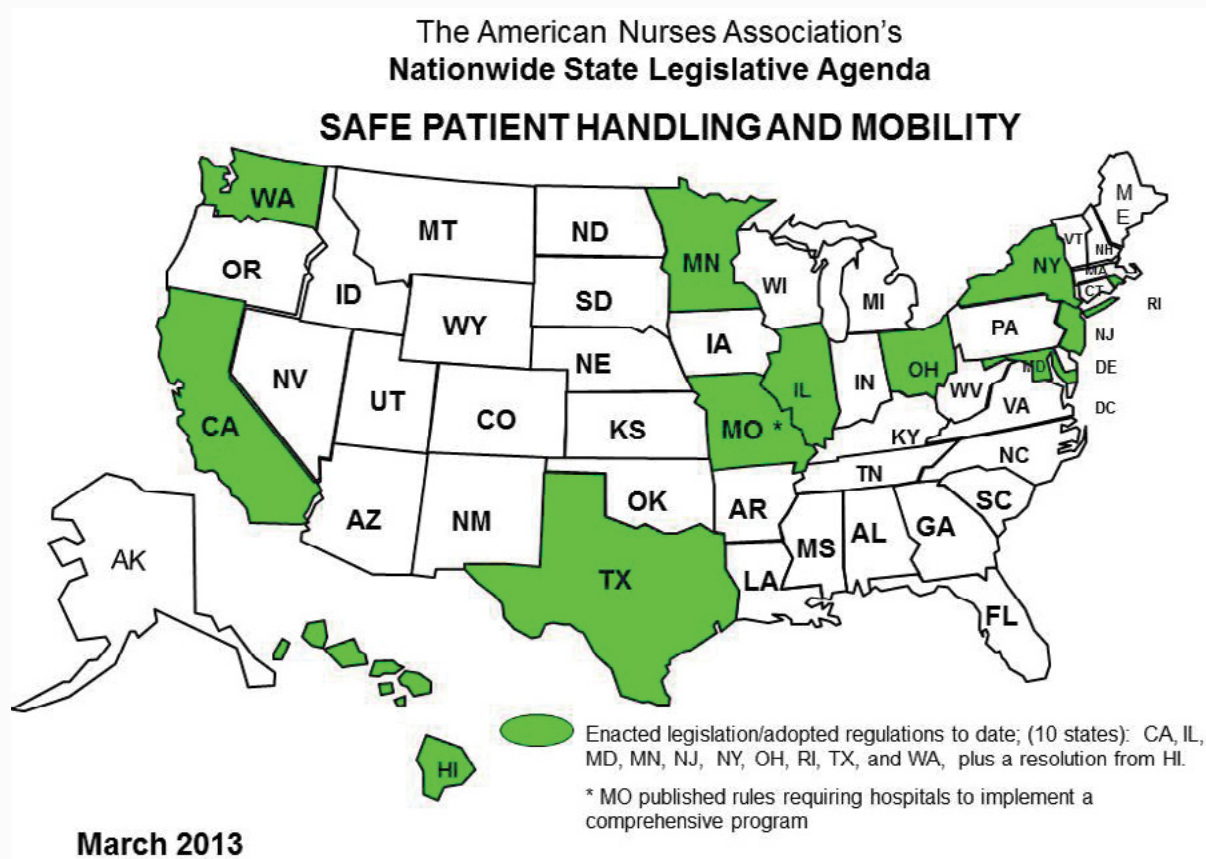
The United Kingdom, Australia, and Canada have instituted national “no lift” policies that ban the manual patient handling techniques many still embrace in the United States, instead mandating the use of assistive devices to move and lift patients.⁴² As of this writing, 10 U.S. states (Washington, Texas, Minnesota, Illinois, Rhode Island, Maryland, Ohio, New York, New Jersey, and California) have adopted legislation, while two—Missouri and Hawaii—have passed a rule or a resolution . (See Figure 1-4: Safe Patient Handling and Mobility Legislation by State for details.) Legislation has been proposed at the national level several times, but other issues took precedence.

The American Nurses Association (ANA) keeps a close eye on federal and state SPHM legislation. Most every year new federal legislation is planned. The ANA legislation page is found at <https://ana.aristotle.com/sitepages/homepage.aspx>.

Studies of the impact of these SPHM laws have shown great promise. When 31 rural community hospitals in Washington state implemented SPHM programs, patient handling injury claims decreased by 43 percent.⁴³ Implementation of New Jersey’s SPHM program resulted in a 57 percent reduction in patient handling injuries and 80 percent reduction in lost-time days after two years.⁴⁴

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Figure 1-4: Safe Patient Handling and Mobility Legislation by State



Impact on the Quality of Patient Care

The weight of evidence supports the positive effect of movement and mobilization on the quality and speed of a patient's recovery and on the patient's ability to preserve current levels of physical capability. Caregivers know that manual patient handling affects the quality of care provided, but only limited hospital data is available that directly connects manual handling to adverse patient events.

It is also known that early mobilization is crucial to positive patient outcomes^{45, 46} and, conversely, that insufficient movement and mobilization put patients at high risk of immobility-related adverse events.⁴⁷ As well, loss of mobility during acute illnesses and hospitalizations in the elderly is associated with greater negative outcomes than in younger people. Immobility can reduce muscle

Some Complications of Patient Immobility

A large number of patient complications are attributable to insufficient movement during the recovery process. Examples are listed here:

Respiratory: pneumonia

Cardiovascular: deep vein thrombosis (DVT), hypotension

Gastrointestinal: constipation

Genitourinary: urinary infection, incontinence

Endocrine: hyperglycemia, insulin resistance

Metabolic: altered pharmacokinetics (what the body does to a drug)

Musculoskeletal: deconditioning, bone demineralization, osteoporosis

Renal: renal calculi, urinary stasis

Skin: pressure ulcers (bedsores)

Psychosocial: depression, decreased functional capacity, increased dependency

Source: Robert L. Kane et al., *Essentials of Clinical Geriatrics*, 5th ed. (New York: McGraw-Hill, 2004): 245–48; and Rosemary A. Timmerman, “A mobility protocol for critically ill adults,” *Dimensions of Critical Care Nursing* 26, no. 5 (Sept.–Oct. 2007): 175–79.

strength in the elderly by 5 to 10 percent per week during bed rest while hospitalized.⁴⁸

More than a third of adults 70 years old and older leave a hospital stay with a major disability not present prior to admission.⁴⁹ Mobility loss is associated with more days on a ventilator, longer hospital stays, and negative outcomes such as falls and nursing home placement.^{50, 51} Mobility loss leads to patient/resident dependency⁵² and affects caregiver health,⁵³ increasing acute and post-acute care costs.^{54, 55}

Patient mobilization efforts are affected negatively when manual means are the only or primary method for accomplishing these critical activities. SPHM technology facilitates mobilization, both mobilization of dependent patients in bed and ambulation of those rehabilitating. In a study of physical therapists using patient handling equipment during rehabilitation of patients, the conclusion was that SPHM equipment has therapeutic applications, especially for individuals

of size and medically complex patients.⁵⁶ Early mobilization is also found to decrease incidences of pneumonia, urinary tract infections, falls, skin tears, and length of stay in ICU and acute care settings.⁵⁷ See the sidebar describing some patient complications caused by immobility for further information.

Patients may also be affected indirectly when staff members work in pain and discomfort and/or under medication due to injuries incurred while manually handling patients. Unintentional errors may adversely affect patient care, and personnel shortages as a result of

injuries affect the quality of care provided. In addition, caring for patients with higher weights and acuity levels or patients who are very tall or muscular makes it even more difficult for overextended caregivers to find time to mobilize and transfer patients—activities that, as mentioned above, are critical to the healing process and prevention of patient deterioration.

Financial Impact on Provider Organizations

As noted in the sidebar titled “Safe Patient Handling and Mobility Guidelines, Legislation, and Regulations,” studies have demonstrated that SPHM programs decrease staff injuries from patient handling and lost-time days, resulting in significant financial savings.^{58, 59, 60} As well, many studies have shown that capital investments in patient handling programs can be recovered in less than five years even though technology purchase and program implementation costs are significant.⁶¹

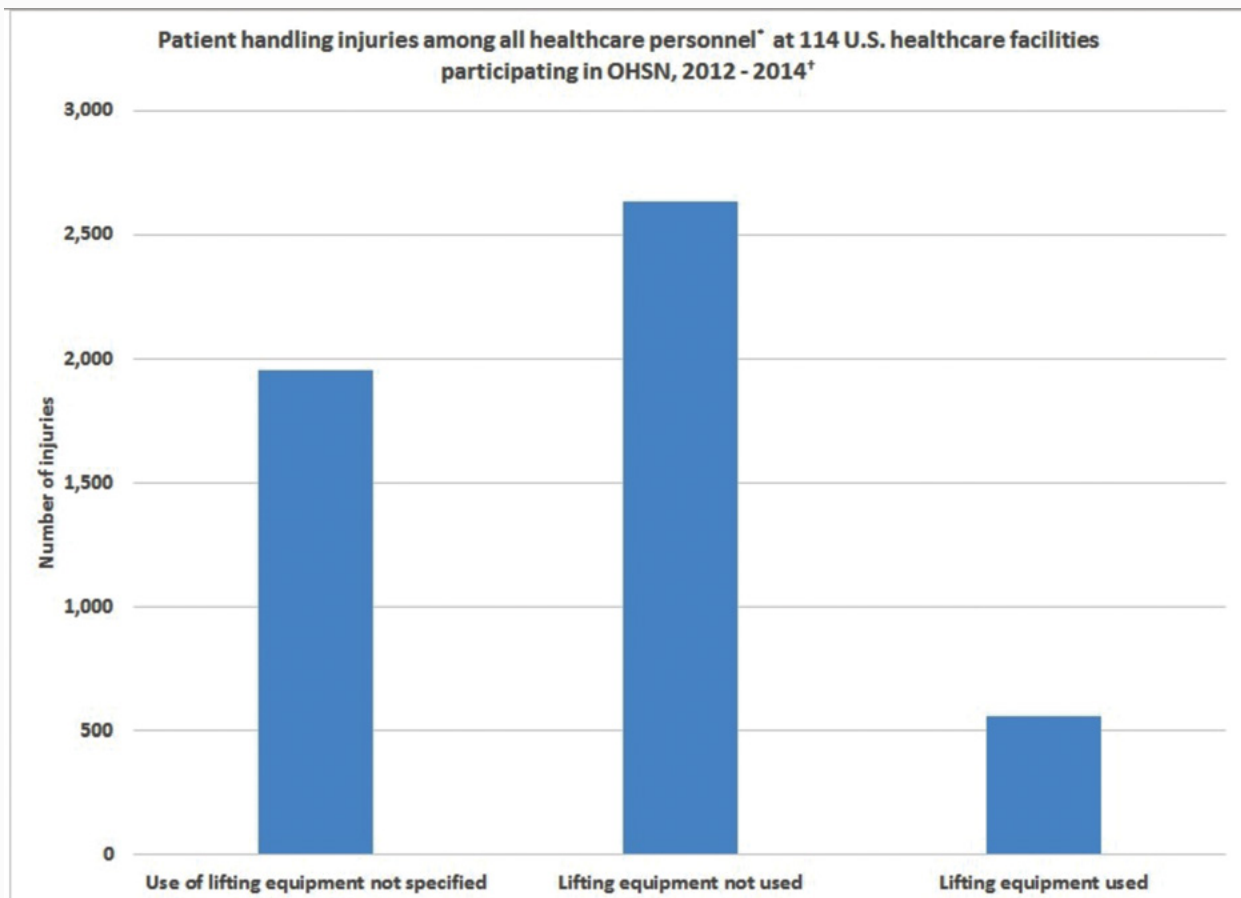
After implementing SPHM legislation, New York has seen many positive SPHM program outcomes. One health care provider that initially invested \$2 million in an SPHM program saw their return on investment in just three years. Over seven years, they saved \$6 million in patient handling injuries. Another New York hospital experienced a 56 percent decrease in injuries related to patient handling five years after implementation of an SPHM program. A New York State veterans’ home experienced a 93 percent reduction in lost workdays due to resident handling injuries after only three years of implementation. Also, the facility turnover rate decreased from 17 to 3 percent. Between 2004, prior to implementation of the program, and 2009, costs related to staff turnover decreased 63.7 percent.⁶²

See Chapter 3 for information related to developing an SPHM business case.

Patient Handling and Mobility Equipment

Fortunately, ergonomic interventions in the form of mechanical assistive technology are available to decrease the risks of manual patient handling and mobility for both patients and caregivers. This is shown in data gathered on 5,140 patient handling and movement injuries between January 1, 2012, and December 31, 2014, through the NIOSH Occupational Health Safety Network (OHSN). The study found that, of the 62 percent of injuries that included data on lifting equipment, almost 83 percent of the injuries occurred when lifting equipment was *not* used, while only 18 percent of the injuries occurred when equipment was used. (See Figure 1-5: Patient Handling Injuries by Use of Lifting Equipment.)

Figure 1-5: Patient Handling Injuries by Use of Lifting Equipment



The patient handling equipment categories listed in Table 1-1: Common Safe Patient Handling and Mobility Equipment by Category are commonly available as of this writing. Although not all of this equipment has marked effects on design decisions, the patient handling devices identified with an asterisk (*) must be stored in accessible and appropriate locations, requiring thoughtful storage space specifications. Furthermore, during use, this equipment takes up additional space in patient rooms and/or toilet rooms. To accommodate the equipment, adequate space must be provided for its use by one or more caregivers (including a sufficient turning radius) in patient rooms, toilet rooms and bathing facilities, and hallway. Importantly, use of larger, expanded-capacity variations of patient handling equipment is essential for protecting caregivers and patients where individuals of size receive care.

Table 1-1: Common Safe Patient Handling and Mobility Equipment by Category

Patient Lift Equipment		
Full-body sling lifts	Overhead	Ceiling-mounted
		Wall-mounted
		*Floor-bearing (or freestanding)
	*Floor-based	
	*Gantry	
Sit-to-stand (standing assist) lifts	*Powered sit-to-stand	
	—Non-ambulatory	
	—Ambulation capable	
	*Non-powered standing aids	
Air-assisted lifting devices		

Table 1-1: Common Safe Patient Handling and Mobility Equipment by Category (*continued*)

Lateral Transfer/Positioning Devices
Air-assisted lateral transfer and positioning devices
Friction-reducing devices (sliding boards, roller boards, slippery sheets, etc.)
*Transfer (stretcher) chairs
Sliding boards
Stretchers/Gurneys/Beds
*Motorized
*Wheel system
*Head raising/lowering system
Transport Assistive Devices
*Bed movers
*Wheelchair movers
*Transfer/stretchers chairs
Assistive Hygiene Devices
*Ergonomic shower chairs
*Adjustable shower trolleys
*Toilet assist devices
Adjustable bathroom equipment
Other Devices
Transfer boards/devices for independent transfer
Bed mattresses
*Height-adjustable exam tables
*Height-adjustable therapy surfaces

For detailed descriptions of patient handling and mobility equipment, including photographs, refer to Appendix B: SPHM Equipment Categories. Appendix C: Lift System Components/Sling Selection, Use, and Care⁶³ can be used to match patient handling

tasks with appropriate slings used with powered patient lifting equipment.

Although use of patient handling technology is evidence-based and known to be beneficial for both patients and staff, a number of issues surround its use, especially the use of lifting devices. The most significant of these is injuries to caregivers and/or patients during improper use, when fixed equipment is not properly installed or maintained, or when any type of equipment is not maintained appropriately. To ensure proper and safe installation and maintenance of overhead lifts, the U.S. Department of Veterans Affairs (VA) developed two checklists that must be completed when these activities take place. See Appendix L: Checklists for Installation and Maintenance of Ceiling-Mounted Patient Lifts for copies of these checklists.

The key strategy for reducing the risk of staff injury and improving the quality of patient care and mobilization is elimination of manual patient handling and use of assistive patient handling equipment. However, for this strategy to be successful, organizational and programmatic support structures must be in place to foster equipment use.⁶⁴ Expecting caregivers to totally change the way they perform their work without such support structures often results in frustration and costly mistakes.

SPHM programs that include knowledge transfer mechanisms and change strategies foster caregiver compliance with equipment use and ultimately improve not only the workplace for caregivers but the quality of patient care.⁶⁵ Chapter 4 provides a detailed discussion of SPHM programs and implementation strategies for reducing manual patient handling.

Benefits of Patient Handling and Mobility Technology

Use of SPHM technology positively influences the quality of patient/resident care, mobilization, rehabilitation, and daily life. In addition,

SPHM technology use reduces the risks to staff and patients from patient handling and movement. For this reason, design solutions that accommodate use of and provide storage allotments for patient handling equipment will foster improved patient care and outcomes as well as safer and more professionally satisfying work environments.

Reduced Risk of Injury and Improved Staff Outlook

The development and use of SPHM equipment have substantially reduced manual patient handling as an essential function of patient care. To better understand how using such equipment can reduce the risk of caregiver musculoskeletal injury, note that patient handling equipment modifies the source or reduces the amount of a hazard.⁶⁶ The hazard of concern in patient handling is the excessive force imposed on the musculoskeletal system of the caregiver while performing these tasks.⁶⁷

Here, the concept of ergonomics comes into play. Tasks that exceed the biomechanical capabilities of workers are ergonomic hazards, and they result in musculoskeletal injuries (acute and cumulative trauma). The goal of ergonomics is to modify the work environment and/or process to eliminate or decrease the injurious force or any other adverse impact on the musculoskeletal system from performing a task. SPHM equipment takes the ergonomic load off caregivers, keeping the work they do within their biomechanical limits. (See the sidebar on the biomechanics of patient handling injuries.)

Numerous researchers have conducted trials using safe patient handling programs that include patient handling equipment as the key risk reduction element. The results of their studies have shown great success in reducing staff injuries and resultant lost work time and modified-duty days.^{68, 69, 70, 71} Data on job satisfaction showed increased feelings of professional status and impressions that the physical effort required to perform tasks was decreased. Such positive outcomes were thought to improve nursing retention and have a positive effect on nursing recruitment.⁷²

Improved Quality of Patient Care

Use of assistive SPHM technology has raised the quality of nursing care provided in comparison to care provided using manual lifting techniques. Mechanical lifting equipment and other assistive devices provide a more secure process for lifting, transferring, repositioning, and mobilization tasks, particularly for geriatric populations. This may be why caregivers comment that use of SPHM technology lessens patient anxiety and enhances patient dignity and autonomy. In addition, the potential for patient injury (e.g., skin tears, joint dislocations, falls) caused by manual patient handling is reduced.⁷³ As noted previously, a study by physical therapists found that when SPHM equipment was used therapeutically, especially for more serious medical cases and individuals of size, it was beneficial.⁷⁴ The American Physical Therapy Association (APTA) supports the use of SPHM technology to decrease risk for both staff and patients.⁷⁵

Research on patient outcomes related to use of safe patient handling techniques and technology is limited: A multitude of variables in a health care environment (e.g., unique patient characteristics and medical conditions, patient care environment factors, and staffing levels) make a direct causal relationship difficult if not impossible to establish. However, hospital-based clinical trials have shown connections between use of certain types of patient handling equipment and improvements in patient outcomes. For instance, a hospital-based study comparing skin tears before and after implementation of ceiling lifts with repositioning sheets/slings found reduced risks for tissue viability and cross-infection.⁷⁶

Another study found a relationship between the use of SPHM equipment and lowered depression scores, improved urinary continence, decreased likelihood of falling, more engagement in activities, and greater alertness during the day among residents in long-term care settings.⁷⁷ Researchers have also observed a link between the use of lifting equipment and decreases in the combative behavior of residents with dementia.^{78, 79, 80} In addition, much anecdotal information directly ties use of patient handling equipment to increases in the quality of care and quality of life in residential

settings. Many stories relate positive outcomes such as decreased pain, increased dignity, and improved continence when SPHM equipment is used.⁸¹

Caregiver Stories from the Field

These stories were collected by Lisa Murphy, RN, BA, BSN, SPHM Facility Coordinator at Jesse Brown VA Medical Center in Chicago.

Rehab medicine. A physical therapist used an ambulation sling with ceiling lift for a patient who was rehabilitating after a stroke. The sling removed the fear factor for gait training, and the patient progressed much faster and, in fact, did not want to stop his therapy. This patient, who was initially not walking, eventually went home climbing stairs with a cane.

Oncology unit. A patient came in so weak that a full-body sling lift was required to place him in a chair. After a couple of days, he asked staff to stand him up, so they used a sit-to-stand lift, after which the patient refused the full-body sling lift and requested the sit-to-stand lift often because he liked being up out of the wheelchair. He eventually went home with a walker because he was able to gain strength using the sit-to-stand lift.

Surgery unit. During an equipment trial, a non-powered sit-to-stand lift was used to help a patient move around his room and into a wheelchair. He said it helped him build strength in his arms and legs and asked if he could help train other staff in its use while he was there.

Surgery unit. An individual of size asked to use the sit-to-stand lift for ambulation as it gave him a greater sense of security when he first got up after surgery.

Oncology unit. An air-assisted lateral transfer mattress was used to take an older, frail, very tall patient for a CT scan. When the CT was done and the patient returned to the unit, he asked if he could use the air mattress again. (Patients and staff really like the air mattresses, which feel much better to patients than being pulled on something thin over bumps in procedural tables.)

Nursing home. A nursing home resident had severe contractures, making it extremely difficult for staff to place him in a chair; consequently, this resident was rarely moved out of bed, worsening not only his physical condition but also his quality of life. The situation

improved after ceiling lifts were installed—almost every day thereafter the resident was moved into a chair.

Lisa Murphy, RN, BA, BSN

Design Considerations for the Provision of Safe Patient Care Environments

As we have seen, the use of patient handling technology can positively influence the quality of patient care, degree of patient mobilization and rehabilitation, patient and resident quality of life, and level of risk to staff and patients from patient moving and handling. Design that takes into account the space needed to safely use patient handling equipment and the storage allowances needed for equipment will foster improved patient care and outcomes as well as safer and more professionally satisfying work environments for staff. By extension, functional spaces that do not take these factors into account make it much more difficult for health care organizations to implement safe patient handling measures.

Prior to the release of the 2010 FGI *Guidelines for Design and Construction of Health Care Facilities* and the first edition of this white paper, design professionals were at a disadvantage that the original white paper aimed to address—a lack of knowledge about SPHM technology and how it could affect design as well as how design affects patient handling and mobility. Previously, there were no consensus standards or master specifications to follow and design professionals depended on the word and expertise of manufacturers and the limited design recommendations then available.^{82, 83, 84, 85} FGI has now included the PHAMA in three editions of its *Guidelines for Design and Construction* documents (2010, 2014, and 2018) and will continue to do so.

Unfortunately, SPHM equipment and its design parameters are still new to many design professionals in the United States. Thus, FGI will continue to update this white paper to educate and assist design

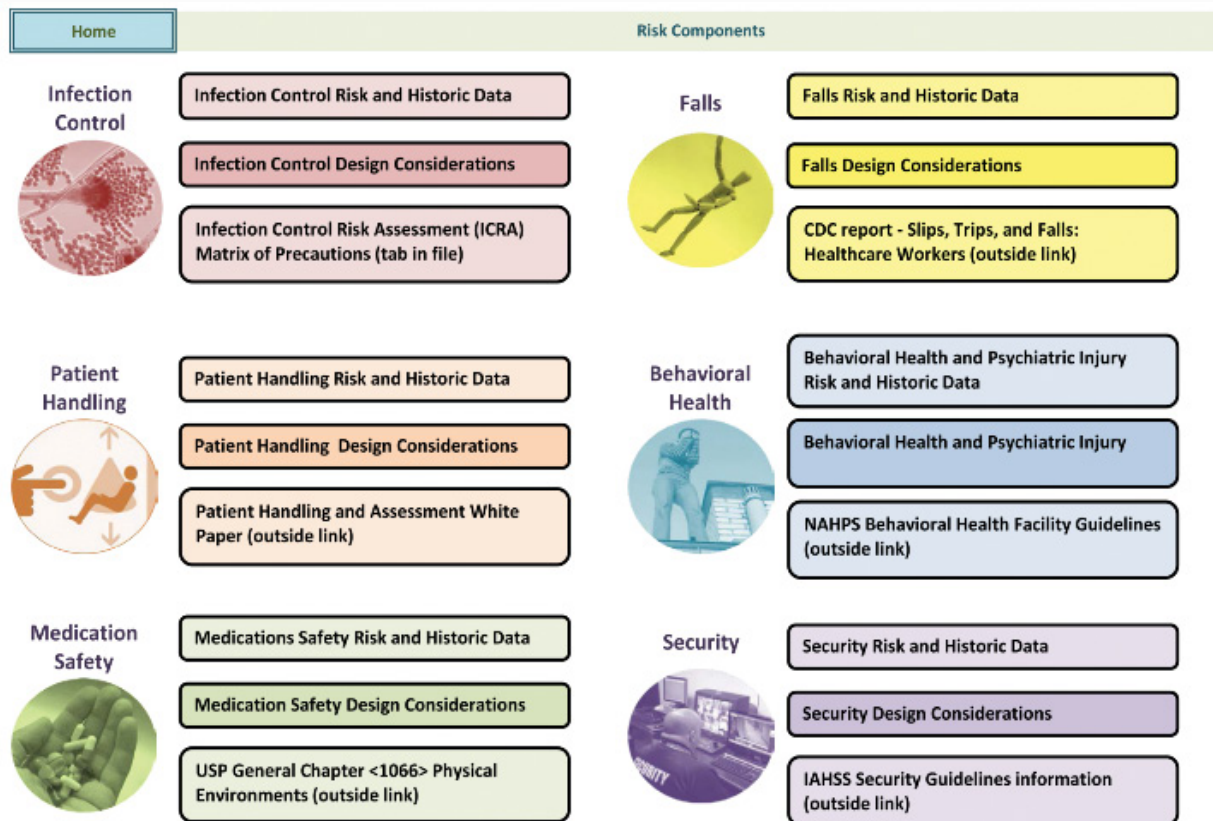
professionals as well as health care providers and owners of health care facilities.

Information complementary to that provided here is available from the VA, which has consistently been a front runner not only in implementing SPHM programs, but also in facilitating inclusion of ergonomics and patient handling technology in facility design and construction. Information related to design that incorporates patient handling technology can be found in the *VA Principles of Safe Patient Handling and Mobility: Criteria for Design and Construction*, part of the VA Technical Information Library (TIL) (<https://www.cfm.va.gov/til>).

The 2014 and 2018 editions of the FGI *Guidelines* include a health care risk umbrella—the safety risk assessment (SRA). The concept, developed through a grant from the Agency for Healthcare Research and Quality, funds from FGI, and support from the Center for Health Design, is intended to provide design professionals and health care facility owners with a means to identify potential underlying unsafe conditions of the built environment to ensure positive safety outcomes related to risks in the health care environment. Identifying these risks fosters improvement in the quality and safety of the health care environment for both patients/residents and care providers.

The goal of using the SRA is to “design out” as many risks as possible. The SRA focuses on these health care risks: infection control, patient handling, medication safety, falls, behavioral health, and security (see Figure 1-6: Health Care Risks Covered by the Safety Risk Assessment). The patient handling portions of the SRA are the patient handling and mobility assessment, or PHAMA, and—for hospitals—the patient immobility assessment.

Figure 1-6: Health Care Risks Covered by the Safety Risk Assessment



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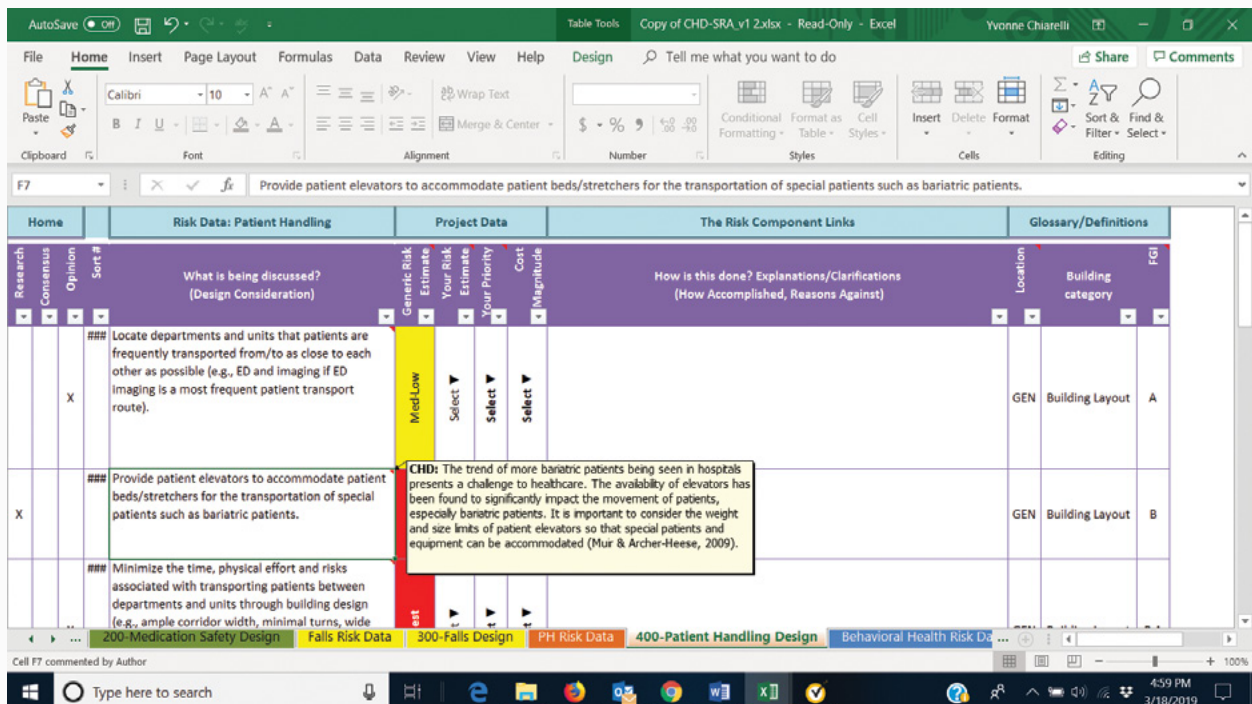
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The SRA process is meant to be a team effort, and the SRA developers designed an interactive web-based system that poses questions pertinent to each area of risk for facility and design professionals to answer. This can be found on the Center for Health Design website at <https://www.healthdesign.org/sra>.

When using the SRA toolkit, facility staff and design professionals consider topics related to safe patient handling and mobility to determine their relative risk, identify their priority compared to other risks, and estimate their financial impact. An interactive spreadsheet collects the information and generates scores for each topic to help organizations and designers determine its risk and priority compared to other topic areas. (See Figure 1-7: Sample of Safety Risk

Assessment Elements in the Interactive Online SRA Tool for a screenshot from the SRA toolkit and the sidebar “SRA Patient Handling Design Considerations” for more information.)

Figure 1-7: Sample of Safety Risk Assessment (SRA) Elements in the Interactive Online SRA Tool



Source: Center for Health Design Safety Risk Assessment Toolkit (<https://www.healthdesign.org/sra>)

SRA Patient Handling Design Considerations

The actions listed here should be reviewed and evaluated before, during, and after the design process to track the level of safety related to patient handling a project design supports.

- Locate departments and units between which patients are frequently transported as close together as possible (e.g., the emergency department and imaging if that is a frequent patient transport route).
- Provide patient elevators that can accommodate patient beds/stretchers for the transportation of patients such as individuals of size.

- Use building design to minimize the time, physical effort, and risks associated with transporting patients between departments and units (e.g., ample corridor width, minimal turns, wide doorways without thresholds, open layout, elevators with ample space for expanded-capacity beds, etc.).
- Consider flexibility and adaptability in room design (e.g., bariatric patient room, universal room, emergency department treatment room with space for portable CT scanners) to reduce the need for patient transport.
- Select patient handling assistive devices for specific units or areas according to the following considerations and criteria:
 - Patient dependency
 - Patient weight and size
 - Projected patient population
 - Patient handling tasks
 - Transfer time
 - Risk of injury
 - Ease of use
 - Space/structural/other requirements
- Provide adequate clearance in both width and ceiling height in unit corridors and patient rooms to accommodate use of patient handling and mobility assistive equipment.
- Designate enough conveniently located storage spaces for patient handling equipment and accessory supplies (e.g., slings, lateral transfer devices, slide boards) in each area where patient handling occurs, including rooms for patient care.
- Optimize locations of electrical supply for charging and/or using patient handling equipment so they are easily accessible for users.
- Provide space to allow for the safe and easy movement and use of patient handling and mobility equipment (e.g., patient rooms and diagnostic/operating/holding area/rehabilitation rooms) in the room layout for all areas where patient care is provided.

- Lay out patient bathrooms to facilitate safe and effective use of patient handling and mobility equipment.
- Provide patient room and bathroom doors wide and tall enough for the use of patient handling and mobility devices.
- Designate enough conveniently located storage space in each patient room for patient-specific patient handling accessory supplies (e.g., slings, lateral transfer devices, slide boards).
- Provide ambient and task lighting for patient handling and mobility tasks.
- Position lighting fixtures to accommodate clinical needs as well as to allow installation of patient handling assistive devices/equipment such as ceiling lifts wherever possible.
- Create structural designs that support current and anticipated requirements for using ceiling- and/or wall-mounted overhead patient lifts.
- Design ceilings to support the use of ceiling lifts or walkway devices in applicable rooms and units.
- Specify flooring materials suitable for moving and maneuvering wheeled devices in spaces where patient handling and mobility tasks are performed.
- Minimize thresholds, ramps, or other potential barriers on flooring in patient care areas (or building entryways) that may hinder safe and effective use of patient handling and mobility equipment.

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In the past, designers moderately familiar with safe patient handling were reluctant to suggest inclusion of patient handling technology to their clients because of the associated initial costs. They no longer need hesitate, however, as new data proves that implementing SPHM programs significantly reduces injuries from patient handling tasks,⁸⁶ thus reducing organizational costs associated with injuries, and provides sizable financial benefits related to improvements in patient outcomes.⁸⁷

Notably, staff efficiency improves when using patient handling equipment. In particular, using ceiling lifts rather than floor-based lifts improves caregiver efficiency due to the reduced time required to use a ceiling lift. A 2009 study compared transfer times while performing bed-to-chair and chair-to-bed transfers using ceiling lifts, floor-based lifts, and manual methods. Data on patient comfort and staff perceptions were also collected. The preparation time, actual transfer time, and total time it took to transfer using floor-based lifts were statistically greater than the times it took using ceiling lifts. Additionally, comfort scores were much better for ceiling lifts than for floor-based lifts.⁸⁸

On the other hand, some designers may be encouraged to suggest use of lift technology due to the increasing focus on minimal-manual-lift patient care environments, which is reflected in state and federal legislative efforts. Government agencies such as the Veterans Health Administration (VHA), the Occupational Safety and Health Administration (OSHA), and the National Institute for Occupational Safety and Health (NIOSH) have made significant strides related to safe patient handling and mobility. As well, support continues to come from the American Nurses Association (ANA), American Physical Therapy Association, Association of periOperative Registered Nurses, National Association of Orthopaedic Nurses, and other clinical organizations.

Since the first FGI PHAMA white paper was released, experts in the field have come together to found the Association of Safe Patient Handling Professionals (ASPHP), to provide caregivers with access to SPHM resources and professional expertise. Significantly, through the ASPHP Certification Program, caregivers are given the opportunity to be recognized for having the specialized skills, knowledge, and experience needed to make safe patient handling and mobility programs successful and sustainable.

The ANA consistently follows and tracks SPHM status. In 2012 the ANA pulled together a group of SPHM experts and stakeholders to develop standards for safe patient handling and mobility. The overarching goals were to provide health care organizations with a roadmap for implementing a facility SPHM program and a

framework for developing legislation. At a later time, the ANA released an implementation guide to facilitate use of this information by health care organizations. Eight SPHM standards were developed and are listed in the accompanying sidebar “Benchmarks for Implementing an SPHM Program.”

Two ANA standards are of particular significance to the PHAMA: #3—Incorporating ergonomic design into the environment of care and #4—Selecting, installing, and maintaining SPHM technology. An ANA task group has been formed to update the SPHM standards to include current resources and further information on implementation, early mobility, and fall prevention.

Benchmarks for Implementing an SPHM Program: The ANA SPHM Standards

In 2013 the American Nurses Association (ANA) published *Safe Patient Handling and Mobility: Interprofessional National Standards Across the Care Continuum*. This publication covers eight benchmarks (listed below) that should be addressed by health care organizations when implementing SPHM programs and practices. Note item 3 focuses on design and item 4 relates to installation in the physical environment.

1. Establishing a culture of safety
2. Implementing and sustaining an SPHM program
3. Incorporating ergonomic design into the environment of care
4. Selecting, installing, and maintaining SPHM technology
5. Establishing an education system and ensuring competence
6. Utilizing patient-centered assessment tools, plan of care, and technology
7. Providing a means to accommodate the injured employee post-injury
8. Establishing a system to evaluate the SPHM program

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Source: American Nurses Association, *Safe Patient Handling and Mobility: Interprofessional National Standards Across the Care Continuum* (2013). This document and other SPHM-related materials are available through <https://www.nursingworld.org/search/?q=Safe+pateint+handling+and+mobility>.

Endnotes

- 1 P. French et al., "The prevalence and cause of occupational back pain in Hong Kong registered nurses," *Journal of Advanced Nursing* 26 (1997):380–88.
- 2 U.S. Department of Labor, Bureau of Labor Statistics, "Survey of occupational inquiries and illnesses, 2001" (Washington, D.C.: Bureau of Labor Statistics, December 19, 2002).
- 3 B. D. Owen, "Preventing injuries using an ergonomic approach," *Association of periOperative Registered Nurses Journal* 72, no. 6 (2000):1031–36.
- 4 B. D. Owen and A. Garg, "Reducing back stress through an ergonomic approach: Weighing a patient," *International Journal of Nursing Studies* 31, no. 6 (1994):511–19.
- 5 A. Garg and B. Owen., "Prevention of back injuries in healthcare workers," *International Journal of Industrial Ergonomics* 14 (1994):315–31.
- 6 M. S. Rice, S. M. Woolley, and T. R. Waters, "Comparison of required operating forces between floor-based and overhead-mounted patient lifting devices," *Ergonomics* 52, no. 1 (2009):112–20.
- 7 W. S. Marras, G. G. Knapik, and S. Ferguson, "Lumbar spine forces during manoeuvring of ceiling-based and floor-based patient transfer devices," *Ergonomics* 52, no. 3 (2009): 384–97.
- 8 A. L. Nelson et al., "Preventing nursing back injuries: Redesigning patient handling tasks," *AAOHN Journal* 51, no. 3 (2003): 126–34.
- 9 T. R. Waters, "When is it safe to manually lift a patient?" *American Journal of Nursing* 107, no. 6 (2007): 40–45.
- 10 M. Matz, "Understanding hazards and controls in health care," in D. Fell-Carlson, ed., *Working Safely in Health Care: A Practical Guide* (New York: Delmar Thomson Learning Publishing Company, 2007).
- 11 Waters, "When is it safe to manually lift a patient?"
- 12 W. S. Marras, "Occupational low back disorder causation and control," *Ergonomics* 43, no. 7 (2000):880–902.
- 13 T. Waters, "Science to support specific limits on lifting, pushing, and pulling and static postures" (Presentation at the 8th Annual Safe Patient Handling Conference, Lake Buena Vista, Florida, March 2008).
- 14 Marras, "Occupational low back disorder causation."
- 15 Ibid.
- 16 Ibid.
- 17 U.S. Department of Labor, Occupational Safety and Health Administration, "Ergonomic Guidelines for Nursing Homes: Ergonomics for the Prevention of

- Musculoskeletal Disorders” (OSHA 3182-3R: March 2009). (http://www.osha.gov/ergonomics/guidelines/nursinghome/final_nh_guidelines.html)
- 18 H. Kim et al., “Patient handling and musculoskeletal disorders among hospital workers: Analysis of 7 years of institutional workers’ compensation claims data,” *American Journal of Industrial Medicine* 55, no. 8 (January 2012): 683–90.
 - 19 U.S. Department of Labor, Bureau of Labor Statistics, “Resource Table R8: Incidence rates for nonfatal occupational injuries and illness involving days away from work per 10,000 full-time workers by industry and selected events or exposures leading to injury or illness, private industry, 2008–16” (2018). (<https://www.bls.gov/iif/oshcdnew2016.htm>)
 - 20 U.S. Department of Labor, U.S. Bureau of Labor Statistics (BLS), “2017 Distribution of nonfatal occupational injury and illness by private industry sector (2018), p.2. (<https://www.bls.gov/iif/osch0060.pdf>)
 - 21 U.S. Department of Labor, U.S. Bureau of Labor Statistics (BLS), “2017 Nonfatal occupational injury and illness incidence rates and number of cases of musculoskeletal disorders by selected occupations, all ownerships (2018), p.19. (<https://www.bls.gov/iif/osch0060.pdf>)
 - 22 R. Sturm and A. Hattori. “Morbid obesity rates continue to rise rapidly in the United States,” *International Journal of Obesity*, 37 (June 2013), 889–91.
 - 23 C. D. Fryar et al., “Anthropometric reference data for children and adults: United States, 2011-2014,” National Center for Health Statistics, *Vital and Health Statistics* 3(39) (2016).
 - 24 U.S. Centers for Disease Control and Prevention (CDC), “National Health and Nutrition Examination Survey” (NHNES). 1960–2010. (<https://www.cdc.gov/nchs/nhanes>)
 - 25 M. Matz and J. Strauss, “Accommodations for Care of Patients of Size,” Facility Guidelines Institute webinar series on the 2018 *Guidelines for Design and Construction* documents (2018).
 - 26 A. J. Weiss and A. Elixhauser, “Obesity-Related Hospitalizations, 2004 versus 2009,” Statistical Brief #137 (Healthcare Cost and Utilization Project, July 2012).
 - 27 T. Galinsky, et al., “A NIOSH-VA Study of Bariatric Patient Handling: Study Methods and Preliminary Findings,” presented at the 2018 Safe Patient Handling and Mobility Conference, Orlando, Florida (April 18, 2018).
 - 28 S. B. Randall et al., “Expanded Occupational Safety and Health Administration 300 log as metric for bariatric patient-handling staff injuries,” *Surgery for Obesity and Related Diseases* 5, no. 4 (2009): 463–68.
 - 29 Occupational Health and Safety Agency for Healthcare (OHSAH) in British Columbia, “Ceiling lifts as an intervention to reduce the risk of patient handling injuries: A literature review” (Vancouver, BC: OHSAH, 2006). (<https://pdfs>.

semanticsscholar.org/9741/e0e150a3b6133c69fff29468c5e0ce46acd0.pdf)

- 30 K. Siddharthan et al., "Under-reporting of work-related musculoskeletal disorders in the Veterans Administration," *International Journal of Health Care Quality Assurance Incorporating Leadership in Health Services* 19, nos. 6–7 (2006): 463–76.
- 31 A. Nelson, unpublished research data from pilot study (Tampa: James A. Haley VA Medical Center, 1996).
- 32 A. L. Nelson and G. Fragala, "Equipment for safe patient handling and movement" in W. Charney and A. Hudson, eds., *Back Injury among Healthcare Workers* (Washington, D.C.: Lewis Publishers, 2004), 121–35.
- 33 B. Owen and A. Garg, "Assistive devices for use with patient handling tasks" in B. Das, ed., *Advances in Industrial Ergonomics and Safety* (Philadelphia: Taylor & Francis, 1990).
- 34 C. A. Sedlak et al., "Development of the National Association of Orthopaedic Nurses guidance statement on safe patient handling and movement in the orthopaedic setting," *Orthopaedic Nursing*, Supplement to 28, no. 25 (2009): 2–8.
- 35 AORN Workplace Safety Taskforce, *Safe Patient Handling and Movement in the Perioperative Setting* (Denver: Association of periOperative Registered Nurses, 2007).
- 36 Nelson et al., "Preventing nursing back injuries.
- 37 M. Martin, et al., "New and Improved VA Algorithms/New SPHM App," a webinar for the Association of Safe Patient Handling Professionals (www.asphp.org).
- 38 T. Boynton, L. Kelly, and A. Perez, "Implementing a mobility assessment tool for nurses: A nurse-driven assessment tool reveals the patient's mobility level and guides SPHM technology choices" in "Current Topics in Safe Patient Handling and Mobility," a supplement to *American Nurse Today* 9, no. 9 (2014).
- 39 Ibid.
- 40 U.S. Department of Labor, Occupational Safety & Health Administration, *Guidelines for Nursing Homes* (Washington, D.C.: OSHA, 2002). (http://www.osha.gov/ergonomics/guidelines/nursinghome/final_nh_guidelines.html)
- 41 Ibid.
- 42 J. Collins, "Safe lifting policies" in A. L. Nelson (ed.), *Handle with Care: Safe Patient Handling and Movement* (New York: Springer Publishing Company, 2006).
- 43 W. Charney et al., "Zero lift programs in small rural hospitals in Washington state: reducing back injuries among health care workers," *AAOHN Journal* 54, no. 8 (2006): 355–58.

- 44 E. Cadmus, P. Brigley, and M. Pearson, "Safe patient handling: is your facility ready for a culture change?" *Nursing Management* 42, no. 11 (2011): 12-15.
- 45 National Public Radio, "People with Brain Injuries Heal Faster If They Get Up and Get Moving" on *Your Health*, Gretchen Cuda Kroen, July 6, 2015. (https://www.npr.org/sections/health-shots/2015/07/06/419519145/people-with-brain-injuries-heal-faster-if-they-get-up-and-get-moving?utm_campaign=storyshare&utm_source=twitter.com&utm_medium=social)
- 46 Association of Safe Patient Handling Professionals and American Nurses Association, "Advancing the Science and Technology of Progressive Mobility" (2013). (http://www.asphp.org/wp-content/uploads/2011/05/1400387-ASPHP-ANA_Whitepaper-HR.pdf)
- 47 R. L. Kane, J. G. Ouslander, and I. B. Abrass, *Essentials of Clinical Geriatrics*, 5th ed. (New York: McGraw-Hill, 2004), 245–48; and Rosemary A. Timmerman, "A mobility protocol for critically ill adults," *Dimensions of Critical Care Nursing* 26, no. 5 (Sept.-Oct. 2007): 175–79.
- 48 H. L. Wald et al., "The Case for Mobility Assessment in Hospitalized Older Adults, A White Paper from the American Geriatrics Society," *Journal of the American Geriatric Society* 67, no. 1 (2019): 11–16.
- 49 K. E. Covinsky, E. Pierluissi, and C. B. Johnston, "Hospitalization-associated disability: 'She was probably able to ambulate, but I'm not sure,'" *Journal of the American Medical Association* 306 (2011):1782–93.
- 50 C. J. Brown, R. J. Friedkin, and S. K. Inouye, "Prevalence and outcomes of low mobility in hospitalized older patients," *Journal of the American Geriatric Society* 52 (2004): 1263–70.
- 51 R. K. Lord et al., "ICU early physical rehabilitation programs: Financial modeling of cost savings," *Critical Care Medicine* 41 (2013):717–24.
- 52 C. Graf, "Functional decline in hospitalized older adults," *The American Journal of Nursing* 106 (2006):58–67 (quiz 67–68).
- 53 H. Li et al., "Creating avenues for relative empowerment (CARE): A pilot test of an intervention to improve outcomes of hospitalized elders and family caregivers," *Research in Nursing and Health* 26 (2003): 284–99.
- 54 R. H. Fortinsky et al., "Effects of functional status changes before and during hospitalization on nursing home admission of older adults," *The Journals of Gerontology: Series A* , 54, no. 10 (Oct. 1999): M521–26.
- 55 D. B. Reuben et al., "The effect of self-reported and performance-based functional impairment on future hospital costs of community-dwelling older persons," *Gerontologist* 44 (2004): 401–07.
- 56 A. Darragh et al., "Safe-Patient-Handling Equipment in Therapy Practice: Implications for Rehabilitation," *The American Journal of Occupational Therapy* 67, no 1 (Jan.–Feb. 2013):45–53.

- 57 Association of Safe Patient Handling Professionals/American Nurses Association, "Advancing the Science and Technology of Progressive Mobility."
- 58 R. Weinmeyer, "Safe Patient Handling Laws and Programs for Health Care Workers," *AMA Journal of Ethics* 18, no. 4 (2016):416-21.
- 59 K. Siddharthan, A. Nelson, H. Tiesman, and F. Chen, "Cost effectiveness of a multi-faceted program for safe patient handling," *Advances in Patient Safety* 3 (2006): 347-58.
- 60 M. O. Brophy, L. Achimore, and J. Moore-Dawson, "Reducing incidence of low back injuries reduces cost," *AIHA Journal* 62 2001: 508-11.
- 61 Occupational Safety and Health Administration, "Safe patient handling programs: effectiveness and cost savings." (<https://www.osha.gov/Publications/OSHA3279.pdf>)
- 62 R. Lancman, K. L. T. Wright, and R. N. Gottfried, "Safe Patient Handling in New York: Short Term Costs Yield Long Term Results" (New York State Assembly Subcommittee on Workplace Safety, May 2011. (<http://assembly.state.ny.us/comm/WorkPlaceSafe/20110527a/index.pdf>))
- 63 A. Baptiste et al., "Evaluation of sling use for patient safety," *Rehabilitation Nursing* (Jan.–Feb. 2008).
- 64 A. L. Nelson et al., "Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks," *Journal of International Nursing Studies* 43 (2006): 717–33.
- 65 Nelson et al., "Development and evaluation of a multifaceted ergonomics program."
- 66 B. Plog, J. Niland, and P. Quinlan, eds., *Fundamentals of Industrial Hygiene*, 4th ed. (Itasca, Ill.: National Safety Council, 1996).
- 67 A. B. de Castro, "Handle with care: The American Nurses Association's Campaign to address work-related musculoskeletal disorders," *Online Journal of Issues in Nursing* 9, no. 3 (2004): 3.
- 68 Nelson et al., "Development and evaluation of a multifaceted ergonomics program."
- 69 J. W. Collins, L. Wolf, J. Bell, and B. Evanoff, "An evaluation of a 'best practices' musculoskeletal injury prevention program in nursing homes," *Injury Prevention* 10 (2004): 206–11.
- 70 B. Evanoff et al., "Reduction in injury rates in nursing personnel through introduction of mechanical lifts in the workplace," *American Journal of Industrial Medicine* 44 (2003): 451–57.
- 71 A. Nelson and A. Baptiste, "Evidence-based practices for safe patient handling and movement," *Nursing World/Online Journal of Issues in Nursing*, 9, no. 3 (2004): 4.

- 72 Nelson et al., "Development and evaluation of a multifaceted ergonomics program."
- 73 de Castro, "Handle with care."
- 74 A. Darragh et al., "Safe-Patient-Handling Equipment in Therapy Practice: Implications for Rehabilitation," *The American Journal of Occupational Therapy* 67, no 1 (Jan-Feb 2013): 45-53.
- 75 American Physical Therapy Association, "Physical Therapists and Physical Therapist Assistants in Safe Patient Handling and Mobility" (a position paper), August 2012. (https://www.apta.org/uploadedFiles/APTAorg/About_Us/Policies/Practice/SafePatientHandling.pdf)
- 76 Heather Kirton, "Helping make 1:1 care mean 1:1 care!" (Poster presentation at the 8th Safe Patient Handling and Movement Conference, Lake Buena Vista, Florida, March 11–13, 2008).
- 77 A. L. Nelson et al., "Link between safe patient handling and quality of care," *Rehabilitation Nursing* 33, no. 1 (2008): 33–41.
- 78 Collins et al., "An evaluation of a 'best practices' musculoskeletal injury prevention program."
- 89 B. Owen and A. Garg, "Reducing risk for back pain in nursing personnel," *AAOHN Journal* 39, no. 1 (1991): 24–33.
- 80 T. Galinsky et al., "NIOSH-VA Study of Bariatric Patient Handling."
- 81 Nelson et al., "Development and evaluation of a multifaceted ergonomics program."
- 82 ARJO, *Guidebook for Architects and Planners*, 2nd ed. (ARJO Hospital Equipment AB, 2005).
- 83 S. Hignett, "Determining the space needed to operate a mobile and an overhead patient hoist," *Professional Nurse* 20, no. 7 (2005): 39–42.
- 84 M. Muir and L. Haney, "Designing space for the bariatric resident," *Nursing Homes/Long Term Care Management* (November 2004): 25–28.
- 85 J. Villeneuve, "Physical Environment for Provision of Nursing Care: Design for Safe Patient Handling" in A. L. Nelson (ed.), *Handle with Care: Safe Patient Handling and Movement* (New York: Springer Publishing Company, 2006).
- 86 M. Hodgson, M. Matz, and A. Nelson, (2013) "Patient Handling in the Veterans Health Administration: Facilitating Change in the Health Care Industry," *Journal of Occupational and Environmental Medicine* 55, no. 10 (2013): 1230–37.
- 87 John N. Celona, "Applying Decision Analysis to Program Management and Leadership Issues at the U.S. Veterans Health Administration" in J. I. Kantola et al. (eds.), *Advances in Human Factors, Business Management and Leadership:*

Proceedings of the AHFE 2017 International Conferences on Human Factors in Management and Leadership, and Business Management and Society, July 17–21, 2017 (Switzerland: Springer International Publishing, 2017), 362–73.

- 88 H. Alamgir et al., "Evaluation of ceiling lifts: Transfer time, patient comfort and staff perceptions," *Injury* 40, no. 9 (2009):987–92.

Planning, Design, and Construction Guidance

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Incorporation and use of safe patient handling and mobility (SPHM) technology and techniques are critical to the quality of patient/resident care and safety and staff safety in health and residential care facilities.

SPHM programs that support use of patient handling equipment interact with nearly every department in a health care facility, including construction and facility management departments. However, staff in departments that don't directly care for patients and residents as well as many health care design professionals are new to SPHM concepts and their design ramifications.

To help designers and health care personnel understand the importance of assessments of patient/resident handling and mobility needs, this chapter relays basic explanations of these assessments and relevant text from the 2018 Facility Guidelines Institute's (FGI) *Guidelines for Design and Construction of Hospitals*, *Guidelines for Design and Construction of Outpatient Facilities*, and *Guidelines for Design and Construction of Residential Health, Care, and Support Facilities*. Included are design criteria that support delivery of care for

individuals of size, design considerations related to preventing patient immobility, and guidance on how to incorporate these concepts into health and residential care design and construction projects.

Components of an Assessment of Patient/Resident Handling and Mobility Needs

The assessment of handling and mobility needs in the Hospital and Outpatient *Guidelines* documents is called the patient handling and movement assessment (the PHAMA). In the Residential *Guidelines*, the assessment is termed the resident mobility and transfer risk assessment, emphasizing the importance of supporting resident mobility in long-term care environments. Both assessments are included under the umbrella of a multi-component safety risk assessment.

Use of SPHM equipment serves to increase or maintain patient or resident mobility, independent functioning, and strength as well as to provide a safe environment of care for staff and patients or residents during performance of high-risk patient handling and mobility tasks. At the beginning of a project—whether new construction or renovation—an assessment of patient or resident handling and mobility needs is conducted to help the design team incorporate appropriate SPHM equipment (e.g., overhead lifts, expanded-capacity commodes) and design features (e.g., clearances needed for use of SPHM equipment, larger door openings to accommodate expanded-capacity beds) into the care environment. Delivery of care for both standard-sized patients and individuals of size is addressed in such an assessment.

Recommendations gathered when performing such assessments contribute to the development of criteria for the functional program for a project, which in turn inform development of the space program. Together, the functional and space programs guide space planning and design, then construction, and ultimately the commissioning of a project. For more information on the risk

assessment and functional and space programming, see Chapter 1.2, Planning, Design, Construction, and Commissioning, in the edition in both the 2018 Hospital *Guidelines* and the 2018 Outpatient *Guidelines* and chapters 1.2, Planning/Predesign Process, and 1.4, Design, Construction, and Commissioning Considerations and Requirements, in the 2018 FGI Residential *Guidelines*.

The PHAMA and resident transfer and mobility risk assessment do not provide direction for conducting a full patient care ergonomic (PCE) evaluation, which is important to determine what SPHM technology is needed to implement a true “minimal lift” policy and to identify other issues affecting equipment introduction and use. Rather, the information gathered in the assessment focuses on design and storage requirements for SPHM equipment that have significant implications for building design and construction (e.g., overhead lifts, floor-based lifts, beds, and gurneys). Performance of a thorough PCE evaluation to identify other relevant SPHM technology and programmatic issues is highly recommended. See Appendix E: Patient Care Ergonomic Evaluation Process for steps in conducting a comprehensive PCE evaluation.

Further information on designing care environments in which patient handling technology is used can be found in Chapter 1 of the *VA Principles of Safe Patient Handling and Mobility: Criteria for Design and Construction* in the Department of Veterans Affairs (VA) Technical Information Library (coming in late 2019 to <https://www.cfm.va.gov/til/>).

Patient Handling and Mobility Assessments in Hospitals and Outpatient Facilities

The shaded text in italics that follows is taken from Chapter 2.1, Planning, Design, Construction, and Commissioning, in the 2018 edition of the FGI *Guidelines for Design and Construction of Hospitals*. It is the PHAMA requirements found in Section 1.2-4.3 (Patient Handling and Movement Assessment) and its related appendices. The remaining text in this section discusses and expands on the FGI PHAMA material.

A “minimal lift” policy is one in which manual patient handling is used only in an emergency. In all other instances, staff should assess the task and employ SPHM equipment that will allow them to perform tasks safely.

Identical language to that shown here, with the same numbering, appears in the 2018 FGI *Guidelines for Design and Construction of Outpatient Facilities* with one exception—the information on patient mobilization and the negative consequences of immobility during a hospital stay are not included in the *Outpatient Guidelines*.

The indented *Guidelines* text paragraphs, which begin with A, are appendix material, that is, application guidance and further information—not requirements. Lettered appendices referenced in the main body of this white paper text can be found at the back of the paper.

“Movement” will be replaced with “mobility” in the PHAMA requirements in the 2022 edition of the FGI *Guidelines*.

***1.2–4.3 Patient Handling and Movement Assessment (PHAMA)**

***A1.2–4.3 PHAMA.** A patient handling and movement assessment is a multidisciplinary, documented assessment process conducted to direct/assist the design team in incorporating appropriate patient handling and movement equipment into the health care environment. The purpose of this equipment is to increase or maintain patient mobility, independent functioning, and strength as well as to provide a safe environment for staff and patients during performance of high-risk patient handling tasks. See Section 1.2–4.7 (Patient Immobility Assessment) for more details on the impact of equipment on patient mobility.*

a. The PHAMA has two distinct, yet interdependent, phases:

Phase 1: A patient handling, movement, and mobility needs assessment is performed to identify appropriate patient-handling and movement equipment for each patient care area.

Phase 2: The space, structural, and other design requirements needed to accommodate patient handling and movement equipment and to facilitate patients’ weight-bearing and physical activity are determined.

b. Information and guidance for conducting a PHAMA can be found in the FGI white paper titled “Patient Handling and Movement Assessment: A White Paper,” prepared by the 2010 Health Guidelines Revision Committee Specialty Subgroup on Patient Movement and posted at www.fgiguideines.org [Editor’s note: This white paper has been replaced with this second edition, published by FGI in 2019]. The white paper also explains the rationale for considering patient-

handling equipment during the design and construction process, information (including illustrations) about various types of patient-handling equipment, the business case for implementing patient-handling and movement programs, and strategies for implementing such programs.

c. Caregivers repositioning and transferring patients cannot lift more than 35 pounds manually without putting themselves at risk for back injuries. As a consequence, caregivers are one of the groups at highest risk for injury of any industry, and manual patient handling and moving are the primary causes. If caregivers are not equipped to perform these necessary physical tasks safely, patients may not receive adequate care and may remain inappropriately immobile. Increasing evidence shows that early and frequent patient mobilization and movement is vital to the health of patients and is integral to quality care. See Section 1.2–4.7 (Patient Immobility Assessment) for more details about immobility prevention.

Equipment is now available to facilitate necessary clinical work while significantly reducing the risk of caregiver and patient injury from patient handling, moving, transfer, transport, and mobilization activities. Equipment is also available to provide a viable support alternative to bedstay; see appendix sections A1.2–4.3.2.2 (8) (Storage for patient-handling and movement equipment and accessories) and A2.1–2.2.2 (Space considerations for patient mobility) for more details about accommodations needed for equipment used to improve patient mobility. By better supporting appropriate levels of care and reducing risk of injury to caregivers, use of such equipment and related architectural accommodations will improve outcomes and reduce the overall cost of care.

d. The following definitions apply to text in Section 1.2–4.3 (Patient Handling and Movement Assessment):

—Whenever the term “equipment” is used, it refers to patient handling and movement equipment.

—“Fixed” equipment refers to equipment with track systems attached at some point within the room. Fixed equipment includes overhead (ceiling-mounted or wall-mounted) lifts and other lifting devices with fixed tracking. An alternative would be a demountable track that may be fully or partially disassembled and removed from the space.

—“Portable” or “mobile” equipment is floor-based equipment that moves on the floor surface, such as floor-based sling lifts and sit-to-stand lifts. These may be moved horizontally manually or with the assistance of motorized wheels. When the term “portable” is used in connection with ceiling lifts, it may also refer to a lift motor and hoist that can be removed from the track system in one room and attached to the track system in another room.

1.2-4.3.1 General

1.2-4.3.1.1 PHAMA requirement

- *(1) The governing body of the hospital shall provide the project design team with a PHAMA that addresses the specific patient handling and movement needs of all areas affected by a project.*
- (2) The governing body shall incorporate the findings and recommendations of the PHAMA into the safety risk assessment.*

A1.2-4.3.1.1 (1) PHAMA team. *In addition to those listed in appendix table A1.2-a (Safety Risk Assessment Team Member Expertise), the unit/area nurse manager/supervisor, physical therapy/rehabilitation staff, and those with expertise in risk management should contribute their expertise related to patient handling, movement, and mobility to development of the PHAMA. In cases in which the patient population may present specific risks (e.g., a higher-than-normal patient of size population), the design team may seek guidance from an expert (e.g., an ergonomist) to facilitate development of solutions during the preliminary phase of a project.*

In the 2022 edition of the Guidelines, the term “patient of size” will be replaced with “individual of size.”

The medical and physical characteristics of patient populations vary from one care environment to another, as do the environmental and space characteristics of different locations. For this reason, SPHM equipment recommendations should be developed for each distinct location in a project. This will ensure the type, size, weight capacity, and quantity of equipment available in each space are optimal for that location and that sufficient storage for the equipment is allocated close to its point of use.

The PHAMA should cover all areas where patient handling, movement, and mobilization occur and for any associated toileting, bathing, and showering areas. These areas include, but are not limited to:

- Patient entrances, ambulance bays, reception areas, and admitting units
- Medical/surgical units
- Rehabilitation units
- Critical care units
- Pediatric units
- Spinal cord injury/traumatic brain injury units
- Labor/delivery, antepartum, postpartum units
- Emergency department/urgent care
- Perioperative areas
- Dialysis facilities
- Outpatient/primary care clinics
- Behavioral health facilities
- Diagnostic areas
- Treatment areas
- Procedure areas
- Morgue

The PHAMA should be conducted by a multidisciplinary team that, at minimum, includes those listed here. Other members may include infection prevention, environmental services, and maintenance staff.

- Patient care area SPHM peer leaders
- Frontline staff
- Nurse managers and supervisors
- Risk management, safety, and/or ergonomics staff
- Facility design/construction staff
- Rehabilitation therapy staff
- Design team representative

Nurse managers/supervisors are critical participants as they provide on-the-ground information related to patient or resident handling in their patient care areas. In addition to their own knowledge, these leaders recruit frontline staff to complete surveys and participate in interviews during site visits, giving designers further access to direct information about patient handling and mobility needs that can be addressed during project design.

From the beginning of the planning process, infection preventionists should be included in the equipment selection process to ensure that chosen equipment promotes ease in cleaning and infection control. Manufacturers' instructions provide guidance on appropriate cleaning techniques, but the organization's infection prevention team should develop infection control procedures based on recognized government and health care organization standards.

1.2-4.3.1.2 Design recommendations

**(1) PHAMA results and recommendations shall be specific to each patient care area where patient handling and movement occur.*

A1.2-4.3.1.2 (1) Areas to be included in PHAMA design recommendations. *Examples of areas to be covered in the PHAMA include clinical units, along with associated toileting, bathing, and showering areas; procedure areas; diagnostic areas; pre- and post-procedure patient care areas; the morgue; ambulance bays; dining and recreation areas; and the routes connecting them. Because different areas serve patient populations with varying characteristics,*

equipment recommendations will also vary. For this reason, recommendations should be developed for each unit or other area that is part of a new construction or renovation project. The objective is to assure that equipment of the correct type, size, weight capacity, and quantity is available in each area and that sufficient storage is allocated for this equipment.

- (2) *The findings and recommendations of the PHAMA shall include consideration of the patient care requirements for all patients, including patients of size.*

1.2–4.3.2 Patient Handling and Movement Elements for the Safety Risk Assessment

1.2–4.3.2.1 Phase 1: Patient handling and movement needs assessment.

Evaluation of patient handling and movement needs shall include at minimum the following considerations:

- *(1) Patient handling, movement, and mobility equipment recommendations, based on the following:*

A1.2–4.3.2.1 (1) Patient handling, movement, and mobility equipment recommendations

a. In addition to the factors listed in the main text, recommendations for patient handling, movement, and mobility equipment are also based on the following:

- Patient dependency levels. This information is critical in determining patient handling and movement needs. To simplify determination of dependency levels, patients are usually grouped into categories based on physical limitations (not clinical acuity). Recommended categories include total dependence/extensive assistance, partial assistance, and independent.*
- Consideration of the weight and size of patients of size. This is important to assure equipment with appropriate capacities is provided.*

—*Patient handling, movement, and mobility tasks for which equipment is used to minimize risk. These should include the following:*

- *Vertical and lateral transfers (from/to a bed, stretcher, gurney, chair, commode, toilet, or wheelchair)*
- *Positioning/repositioning in bed (side to side, up to the head of the bed, raise or lower head or feet)*
- *Repositioning in chair*
- *Showering/bathing*
- *Lifting appendages*
- *Transporting patients*
- *Assisting patient ambulation*
- *Weighing patients on bed scales*

b. To correctly identify all high-risk patient handling tasks and impediments or hindrances to patient mobility on a unit or in an area, analyze unit injuries for common task involvement, conduct walkthroughs, and interview and/or survey front-line staff (e.g., nursing, rehab, therapists) for their perceptions of high-risk tasks.

c. Many types of patient handling and movement equipment are available, but only those that affect building design need be considered in a PHAMA. New equipment designs will need to be evaluated for building design impact as they become available. Presently, equipment that significantly influences design includes, but is not limited to, bathing/shower chairs, beds/stretchers/trolleys/gurneys, wheelchairs, and lateral transfer devices. Fixed patient lifts (i.e., ceiling- and wall-mounted lifts) and portable patient lifts (e.g., sit-to-stand lifts and floor-based sling lifts) are further described below, as their design impact may be significant. Other transfer devices and accessories in addition to those mentioned above (e.g., slings,

transfer sheets and boards, and trapezes) influence design to the extent that storage is required.

—Sit-to-stand lifts are used to assist a patient who requires partial assistance and who possesses some weight-bearing ability. Sit-to-stand lifts assist in vertical transfers, toileting, dressing, peri-care, and ambulation.

—Floor-based sling lifts and ceiling-mounted lifts are used for patients who are completely or substantially unable to assist caregivers. Patients requiring these levels of care are often described as “dependent” or requiring “extensive assistance.” The utility of these lifts for this population includes— but is not limited to—vertical transfers, lateral transfers, repositioning in bed and chair, lifting appendages, and lifting patients from the floor. These lifts also can be used for assistance with ambulation rehabilitation or mobilization of patients with some weight-bearing capability.

**(a) Characteristics of projected patient populations*

A1.2–4.3.2.1 (1)(a) See appendix section A2.1–2.2.2 (Space considerations for patient mobility) for information about patient mobility considerations.

SPHM equipment recommendations are based on the medical and physical characteristics—current as well as anticipated—of the patient populations of each patient care area. Particularly critical to determining the quantity and types of equipment for each location are the average dependency levels of the patient population. To simplify this determination, patients are grouped into categories based on their physical limitations rather than their clinical acuity. Categories include total dependence, extensive assistance, limited assistance, supervision, and independent¹ (refer to Appendix H: Patient Care Area Characteristics and Ergonomic Issues Survey for definitions). Consideration of the weight, size, and shape of individuals of size is another factor that can help ensure appropriate equipment weight capacities and dimensions are selected.

(b) Types of high-risk patient handling and movement tasks to be performed

Equipment decisions are also based on the types of high-risk patient handling and mobility assistance performed. High-risk patient handling tasks require staff to move and lift patients in ways that, without technology, place excessive biomechanical and postural stress on the musculoskeletal systems of caregivers and pose risk of injury to patients.

Researchers have identified many such high-risk tasks in various patient care environments^{2, 3, 4} (see Chapter 1 for more details), but some of these do not currently have technology solutions to make them less ergonomically stressful. High-risk tasks for which equipment is available to minimize risk include, but are not limited to, the following:

- Vertical lifts/transfers (from/to bed/chair/commode/toilet/wheelchair/car)
- Lateral transfers (from/to bed/stretchers/gurney/trolley)
- Positioning/repositioning in bed (side to side, up to the head of the bed)
- Repositioning in chair/wheelchair/dependency chair
- Showering/bathing
- Toileting
- Dressing/undressing/changing diapers
- Wound care
- Lifting and holding limbs
- Transporting patients
- Mobilization in bed
- Helping patients ambulate

The best source for identifying the high-risk tasks performed in each patient care area is staff members who perform these tasks

on a regular basis. Therefore, the PHAMA process should include interviews with and surveys of frontline staff.

In staff interviews, ask what tasks staff members perceive as presenting a high risk of injury for themselves and/or their patients, what they estimate to be the percentage of patients at each dependency level, what patient handling strategies are in place, what present technology solutions are available and in use, and what technologies should be incorporated to reduce risk of injury. See Appendix F: Patient Care Ergonomic Evaluation Staff Interview Template and Appendix H: Patient Care Area Characteristics and Ergonomic Issues Survey for tools to collect information on staff perceptions of high-risk tasks.

Gathering patient handling injury data for each patient care area can also reveal the high-risk tasks in that location. Tool 2 (Patient Care Area Incident/Injury Profile) in Appendix H offers a template for collection and analysis of patient handling injuries by patient care area. However, this data source should never be used in isolation as injuries often are not reported, which means important information may be missing.

(c) Knowledge of specific technology to enable physical activity by patients and reduce risk for each patient handling and movement task

Many types of patient handling equipment are available to reduce risk from the variety of high-risk tasks encountered in contemporary health care environments. Presently, equipment that influences design includes, but is not limited to, the following.

- Floor-based and overhead (ceiling or wall-mounted) lifts
- Powered and non-powered sit-to-stand devices
- Patient mobilization equipment
- Assistive beds
- Motorized gurneys/beds

- Transport assistive devices for wheelchairs and beds
- Stretchers/gurneys
- Wheelchairs, dependency chairs
- Transfer chairs, stretcher chairs
- Assistive toilet seats
- Ergonomic shower chairs, tubs, and trolleys
- Flexible bathroom fixtures that are horizontally and vertically adjustable
- Height-adjustable exam tables
- Height-adjustable therapy surfaces/tables
- Biodynamic rehabilitation systems

Since most of these devices are movable, planners must recognize the need for sufficient space for proper storage, movement, and use of the equipment and accessories. As new equipment designs become available, they should be evaluated for their impact on building design.

The patient care ergonomic evaluation process, mentioned above, will pull together the preceding information and facilitate accuracy in patient handling equipment purchase decisions, which then affect design decisions. It is important to conduct the PCE evaluation at the onset of design in *all* areas where patient handling occurs.

It is imperative to have staff input in the selection of SPHM technology. Staff members who participate in moving, transferring, and mobilizing activities on a daily basis are the best evaluators of specific solutions and technologies. Not only do they know what equipment will meet the needs of the patients but—as users of the equipment—they can judge best the “user-friendliness” of each variety of assistive technology. This is important because if equipment is difficult to use, it’s less likely staff will incorporate it when providing patient care, thereby increasing risk of injury to both patient and caregiver.

Equipment trials and equipment fairs give staff—including maintenance and environmental services staff—the opportunity to evaluate equipment from their unique perspectives prior to purchase.

During an equipment trial, it is recommended that staff and others complete equipment evaluation surveys. The survey data should then be collated by patient care area to ensure appropriate equipment is selected for each. The survey information should also be used to identify manufacturers for inclusion in the bidding process. For more information, see Appendix G: SPHM Equipment Evaluation and Selection, which covers equipment trials and fairs.

When considering which manufacturers or vendors to use, keep in mind that if all overhead lifts in a facility are purchased from a single manufacturer, staff members are more likely to become competent in their use. In addition to being basic to safety, staff competence increases equipment use. Sourcing from different manufacturers may also affect costs and ancillary equipment needs as most slings, hanger bars, and accessories are not interchangeable from manufacturer to manufacturer, although it is possible to stipulate that competitive equipment have some interfacing features.

Recommendations for locations where overhead lifts should be placed and the type(s) to be installed are found in Appendix I: Overhead Lift Coverage Recommendations by Patient Care Area.

(d) Architectural factors that interfere with use of patient handling equipment or impede mobility

Research has determined that use of SPHM equipment is essential to preventing injuries in health care environments; however, architectural details may impede the use of some such equipment. For instance:

- Patient room configurations with an L-shape may prevent installation of overhead lifts or use of a floor-based lift.
- Low ceiling heights may not allow adequate vertical distance to lift a patient off a bed.
- Structural support above doors in load-bearing walls that cannot be removed prevent installation of a lift track from a patient room into the bathroom.

- The length of a standard elevator cab cannot accommodate expanded-capacity beds or some motorized beds.
- Door widths may not be wide enough to allow expanded-capacity wheelchairs and floor-based lifts to safely enter and exit a patient room, treatment room, procedure room, or other room.
- Narrow hallways impinge on the turning radius needed to maneuver a motorized or expanded-capacity bed into a patient or other room, creating an unsafe situation for staff who must push a heavy bed sideways in order to turn sharply around a corner or into a room.
- Clearances within a room do not facilitate safe maneuvering of floor-based lifts, wheelchairs, and other rolling equipment.
- Items positioned or placed below the ceiling (e.g., A/C diffusers, light fixtures) as well as items above the ceiling (e.g., pipes, A/C ducts) can be obstacles to installation of overhead lifts.
- Poor headwall design interferes with patient care.
- Flooring material, floor transitions, floor slopes, and thresholds do not provide a safe walkway.
- High to medium thresholds make it difficult for staff to use rolling equipment and unsafe for patients moving themselves or being moved.
- Small patient rooms with unusual configurations and small doorways can constrain patient mobility.
- Pushing patients in beds or wheelchairs on inclines has the potential to cause serious injury to patients, caregivers, and visitors.

Although patient mobility has become a critical factor in patient quality of care and recovery, when mobilization is diminished by design features such as those listed, patients suffer the consequences. To avoid this negative outcome, designers and health care organizations can use the patient immobility assessment portion of the safety risk assessment (SRA) in the FGI *Guidelines*.

To learn more about the SRA and the patient immobility assessment in particular see sections 1.2-4 (Safety Risk Assessment) and 1.2-4.7 (Patient Immobility Assessment) in the 2018 FGI Hospital and Outpatient *Guidelines* documents. Information is also available on the Center for Health Design website. The design ramifications of overhead lifting equipment are outlined in appendices I: Overhead Lift Coverage Recommendations by Patient Care Area and K: Design/Layout Considerations for Overhead Lift Systems in this white paper and of floor-based lifting equipment in Appendix J: Floor-Based Lift Coverage Recommendations by Patient Care Area. Storage issues related to use of patient handling equipment are discussed in Appendix M: Storage Requirements for SPHM Equipment.

**(2) Types of patient handling and movement equipment to be used (e.g., manual or power-assisted fixed ceiling or wall-mounted lifts, manual or power-assisted floor-based sling or sit-to-stand lifts, electric height-adjustable beds, or a combination thereof)*

A1.2-4.3.2.1 (2) Equipment that will be used. *Patient care providers who are familiar with the characteristics of their unique patient populations should be included in the design and equipment selection process to assure appropriate equipment decisions are made.*

When conducting an equipment needs assessment, any existing equipment that will be used on the unit should be considered. For each area included in the PHAMA, use a log to collect information on existing equipment, the percentage of time it is used and—if this is not 100 percent—reasons for the percentage of time indicated.

Refer to appendices B: SPHM Equipment Categories and C: Lift System Components/Sling Selection, Use, and Care for a discussion of the characteristics and merits of different SPHM equipment solutions.

After recommendations for specific equipment types have been developed for a patient care area, the unique features required for installing and/or using the recommended equipment should be determined. These features are based on the results of the ergonomic and structural evaluations for the area (see appendices E: Patient Care Ergonomic Evaluation Process and H: Patient Care Area Characteristics and Ergonomic Issues Survey).

Much research identifies ceiling lifts as the current preferred solution for patient care environments^{5, 6, 7, 8, 9, 10, 11, 12, 13} Despite this, existing building configuration and structural issues may necessitate the use of floor-based lifts in some locations. In addition, some clinical areas require special consideration for the type and style of equipment to be used there. For instance, the more homelike environments in long-term care settings encourage consideration of overhead lifts and track systems that blend in with the décor of the room. In behavioral health settings, other critical safety concerns affect equipment selection and storage options, as noted in the accompanying sidebar.

Lift Use in Behavioral Health Settings

Any equipment introduced into the environment of care in a behavioral health unit or a facility where behavioral health patients are expected to be treated must be suitably tamper-resistant and compatible with other design choices intended to reduce or eliminate attachment points for ligature and thus the risk of suicide or self-injury.

The great variation in behavioral health patient populations means the risks from equipment (e.g., non-platform beds) are fewer for some patient populations than for others. Thus, while an overhead lift for an acute adult behavioral health patient population is unacceptable, the risk may be sufficiently offset by the benefits to geri-psych patients and the staff who care for them. Similarly, the use of a standard mechanized hospital bed on a medical psychiatric unit may allow for the use of portable patient lift equipment if the risk from the bed is sufficiently offset by staff monitoring.

Overhead lifts may be present in outpatient settings such as crisis intervention centers; emergency, urgent care, and some clinic settings where an observation bed may be needed; and therapy areas where lifts may be needed to move patients onto or into apparatus such as a tub. When overhead lifts are used in such cases, behavioral health patients must be kept under constant observation.

Provision of portable lifting equipment that is moved in and out of the room when needed and otherwise stored in a secured location is an alternative to the overhead lift for behavioral health patient rooms; however, the platform beds often found in these rooms lie flat on the floor, eliminating the option of using portable lifts with bases that fit under a typical hospital bed. Other types of SPHM equipment, such as inflatable devices that allow patients to be lifted from the floor and then transferred to an appropriate location, have been quite useful in these areas. Use of such equipment requires sufficient space in the patient room, though, making room size an important consideration.

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**(3) Quantity of each type of patient handling and movement equipment needed for each area under consideration*

A1.2-4.3.2.1 (3) The dependency level of the patients should determine the quantity of lifts required.

a. The average percentage of “dependent/extensive assistance” patients should be used to determine the number and placement of fixed lift systems and/or the quantity of floor-based sling lifts.

b. When only floor-based lifts are used, one lift per 8 to 10 patients is a typical planning ratio. When fixed lift systems are used, the location and configuration of track systems will determine potential coverage options. For example, if 70 percent of patients are dependent or require extensive assistance and there are 30 patients on the unit, fixed lift coverage will be needed for 21 patients (70 percent of 30). If the patient rooms are private, 21 rooms will need fixed lifts. If the patient rooms are semi-private, 10 to 11 rooms will need fixed lifts.

c. Installation of fixed lift systems will reduce, but not entirely eliminate, the need for floor-based lifts since most fixed lift systems do not provide complete coverage of patient use areas.

d. The number of patients who need partial assistance should be used to determine the number of sit-to-stand lifts needed. A similar ratio of one lift per 8 to 10 patients may be used.

e. Peak patient handling times may increase the quantity of lifts required.

The patient care ergonomic evaluation process (see Appendix E: Patient Care Ergonomic Evaluation Process) helps determine the quantity of each type of SPHM equipment needed for each area under consideration. Methods for determining appropriate lift coverage for patient care areas are found in appendices I: Overhead Lift Coverage Recommendations by Patient Care Area and J: Floor-Based Lift Coverage Recommendations by Patient Care Area.

For major renovation or new construction projects, consult with staff from existing patient care areas and/or staff who are aware of projected patient population characteristics. Staff members should be able to provide information on the quantity and types of existing equipment that will be transferred, if any, and/or assist in determining the need for new equipment.

When calculating quantities for the types of equipment needed in each patient care area, factor in any existing equipment already in use. An equipment log, such as the one included in Appendix H: Patient Care Area Characteristics and Ergonomic Issues Survey, can be used to track existing equipment as well as new equipment planned for the area. Since the log also captures the estimated percentage of time each piece of equipment is used, it will highlight the need for staff re-training on equipment use and should help with decisions about whether to choose more equipment of the same type.

** (4) Required weight-carrying capacities*

A1.2–4.3.2.1 (4) Lift weight capacities range from approximately 400 lbs. (182 kg) to expanded-capacity lifts of 1,000 lbs. (454 kg) or more. Specification of lifts with a capacity of 500–600 lb. (227–273 kg) will accommodate the greatest range of all patients. The lifts designated for patients of size should support the weights for patients of size defined during the planning phase. See Section 1.2–6.4.1 (Projected Need for Accommodations for Care of Patients of Size).

Determine required weight-carrying capacities for each patient care area by reviewing facility and patient care area trends for individuals of size and by interviewing frontline staff. Lift weight capacities range from around 400 lbs. to 1,000 lbs. or more for expanded-capacity lifts for morbidly obese and larger patients. Even though expanded-capacity floor-based lifts are available, carefully consider their use; pushing/pulling such equipment, combined with considerable patient weight, exerts a significant force on a caregiver's spine and could lead to injury. As well, expanded-capacity floor-based lifts have a substantial footprint that affects size requirements for storage and use in patient rooms.

Alternatives to expanded-capacity floor-based lifts are overhead lifts and gantry lifts (see Appendix B: SPHM Equipment Categories for more information). Overhead lifts with a weight capacity of 500 to 600 lbs. will accommodate most patients. (Some morbidly obese individuals can weigh 1,000 lbs. or more, however.) If review of facility patient weight data and trends by patient care area shows that admissions of individuals of size warrant installation of expanded-capacity overhead lifts in specific areas, include the determined number required for the area under consideration. If no data is available, a minimum of one such lift per identified area should be included, in addition to lifts with a lower weight capacity.

**(5) Locations/rooms/areas where patient handling, movement, and mobility equipment will be used, with installation requirements (if fixed) and storage requirements*

*A1.2-4.3.2.1 (5) Nursing unit staff will be the best resource for determining which rooms on a unit should have fixed lift installations and storage locations for portable lifts. **Note:** A patient care ergonomic (PCE) evaluation is an important step in determining the patient handling technology required to implement a “minimal lift” policy. It is highly recommended that health care organizations conduct a thorough PCE evaluation, which will provide recommendations for other patient handling technology as well as programmatic issues related to safe patient handling. Information about how to conduct a PCE evaluation can be found in “Patient Handling and Movement Assessment: A White Paper” at www.fgiguideguidelines.org.*

Locations/rooms/areas for use: If overhead lifts cannot be provided in every patient room, unit staff can assist with determining which patient rooms provide the best opportunity for installation of overhead lifts based on patient characteristics, location, and census/room assignment trends specific to the unit. Identification and prioritization of rooms for overhead lifts may be based on room configuration and number of beds, acuity and dependency of patients, proximity to nursing stations, and presence of structural features needed to support an overhead lift. The goal is to cover the greatest number of patient beds with the fewest number of overhead lifts.

Installation requirements for fixed-lift systems: A manufacturer’s recommendations and instructions are the best sources for installation requirements; however, facility staff and others responsible for project design and layout should work closely with the lift manufacturer so the latter will be aware of building design factors that may affect installation and safe and easy use of equipment.

Considerations related to the selection and installation of overhead lift tracks (e.g., coverage, power source, charging, design, and fastening) are discussed in Appendix K: Design/Layout Considerations for Overhead Lift Systems.

Storage requirements: Unit staff are best able to identify the most advantageous storage locations for floor-based lifts, lift slings, and other patient handling equipment. A method for calculating storage space needed for floor-based lifts is found in Appendix M: Storage Requirements for SPHM Equipment; these calculations do not include aisle and access considerations or other storage space needs.

In behavioral health facilities where portable lifts and other equipment are moved in and out of patient rooms, storage locations for patient handling devices should be lockable as well as easily accessible.

1.2-4.3.2.2 Phase 2: Design considerations. The impact of patient handling and movement needs on building design shall be addressed in the PHAMA, including consideration of the patient care needs of all patients, including patients of size. These design considerations shall incorporate results from the Phase 1 assessment and shall include, at minimum, the following:

- (1) Structural considerations to accommodate current and/or future use of fixed equipment that supports patient handling and movement*

Building plans should be reviewed by a structural engineer to determine if the structural capacity of the areas where overhead lifts will be mounted is sufficient to support them. Installation/attachment methods for overhead lift tracks are discussed in Appendix K: Design/Layout Considerations for Overhead Lift Systems.

**(2) Electrical and mechanical considerations for current and future use and/or installation of patient handling and movement equipment and associated storage and charging areas*

A1.2–4.3.2.2 (2) Electrical and mechanical considerations

a. For portable lifts. Battery-charging areas with electrical services should be provided in storage rooms for portable, floor-based lifts and other assistive devices.

b. For fixed lifts. Access to both electrical power and emergency control features (often suspended from the motor housing) should be provided for fixed lifts.

Building system design considerations for installation and use of SPHM equipment are of two types: (1) electrical and ventilation needs for charging and storage of patient handling equipment and (2) placement of building system components so they do not interfere with operation and use of the equipment.

Electrical requirements for use and storage of SPHM equipment depend on the equipment type and manufacturer. An electrical connection at a specific location is often all that is required, and usually a simple electrical supply is sufficient for charging ceiling-lift batteries. Some ceiling lift tracks have an electronic charging system (ECS), which charges the lift motor from contact with copper stripping present throughout the length of the track. The locations and types of electrical connections needed for these systems are identified during system design, and this information is then included in the construction documents.

For floor-based lifts and other patient handling equipment powered by batteries, area(s) with adequate electrical power must be provided to store and charge the equipment. Such storage areas or rooms may require HVAC and/or exhaust systems, depending on the types of batteries to be charged and whether noxious fumes are produced during the charging cycle.

The interaction of building system elements (e.g., light fixtures, fire suppression sprinkler heads, HVAC diffusers and equipment), the structural supports, conduits, pipes, and ducts associated with these elements—and other features such as supports for cubicle curtain and IV suspension tracks with SPHM equipment—must be planned, and the space needed to properly install and operate patient handling equipment considered. Careful coordination of these above-ceiling building system components and the structural elements required by lift systems can simplify installation and future maintenance of both. Additional information is provided in Appendix K: Design/Layout Considerations for Overhead Lift Systems.

**(3) Adequate space for provision of patient care and for unhindered maneuvering of patient handling and movement equipment. For clearance requirements to accommodate patients of size, see Section 2.1–2.3.2 (Accommodations for Care of Patients of Size—Patient Room).*

A1.2–4.3.2.2 (3) Space for use of patient handling and movement equipment. See appendix section A2.1–2.2.2 (*Space considerations for patient mobility*) for mobility clearance suggestions.

When high-risk patient handling tasks are performed in spaces that are too small, the risk of injury rises substantially. For this and numerous other reasons, bed space requirements for health care facilities have gradually increased over the years. Recently, five international publications recommended a minimum bed space width of 3.6 meters (11.82 feet).¹⁴

During the 2018 *Guidelines* revision cycle, an FGI topic group worked to develop minimum size and clearance standards for the use of patient lifts. The group collaborated with Hillrom to simulate patient handling tasks using a ceiling lift, floor-based full-body sling lift, sit-to-stand lift, and gurney. The simulated tasks included transportation of a patient to and from a patient room and patient

handling within the room—transferring a patient from gurney to bed, from bed to wheelchair, and lifting/transferring a patient from the bed into the bathroom. The results of these simulations are discussed in Appendix D: Clearances for Safe Use of Patient Handling and Mobility Equipment.

Supplementary to the requirements in the 2018 *Guidelines* documents, the following recommendations are intended to facilitate provision of adequate space for safe patient handling in the patient room and elsewhere in a health care facility:

- Throughout the facility, all open maneuvering areas should accommodate the expanded width of portable/floor-based lifts and other equipment such as standard and motorized beds/gurneys/stretchers.
- Patient rooms and associated toilet rooms used by individuals of size should accommodate the expanded width of floor-based lifts that can support these patients along with space for at least two to three staff members.¹⁵
- Maneuvering clearances for lift equipment should follow recommendations in Appendix D. However, it is important to have equipment manufacturers confirm clear space requirements for their specific equipment.
- Adequate height and above-bed maneuvering clearance must be provided for operation of the lift equipment.

Note: Space provided adjacent to patient toilets in compliance with Americans with Disabilities Act and ANSI A117.1: *Accessible and Usable Buildings and Facilities* requirements may be inadequate for safe patient movement and handling. For further information, see Section 1.1-4.1 (Design Standards for Accessibility) in the 2018 FGI Hospital and Outpatient *Guidelines* documents.

**(4) Destination points for patient ambulation, transfers, and transport*

A1.2–4.3.2.2 (4) Consider various destinations for patient transport using patient-handling equipment (i.e., locations to

and from which patient movement is to be accomplished, such as within the patient room—bed, chair, commode, etc.—and into the associated toilet room). Also consider patient destinations to foster patient ambulation and mobility such as a meditation room or therapeutic garden. Such considerations will aid in selecting appropriate equipment and designing the room and door openings to accommodate portable equipment and related track systems and the patient and caregivers using it.

One of the most significant benefits of lift equipment is its usefulness in transporting patients from one location to another (e.g., from bed to toilet or bedside chair). When planning the track system for overhead lifts, it is important to know the locations of these possible transfer points. When portable lifts will be used, adequate space for equipment and staff assisting with patient transfer must be provided at destination points.

Overhead lifts with tracks that provide full in-room coverage can support rehabilitation, allowing patients modified ambulation in their room. Thus, before undertaking track design and layout, it is important to consult with staff to determine the potential for rehabilitation use as well as the destination points for transfers and transportation. See the sidebar on patient movement destination points for background on patient transport. Further information on track design and layout can be found in Appendix K: Design/Layout Considerations for Overhead Lift Systems.

Patient Movement Destination Points in Hospitals and Outpatient Facilities

Development of a comprehensive SPHM system requires identification of the destination points to which patients will be moved. These destination points are of two types: (1) those used by staff to provide patient care and (2) those chosen by patients to permit their involvement in activities and relationships that are meaningful and important to them.

Determining the reasons for patient movement and the destinations to which patients are moved in a particular health care environment is an essential step in the PHAMA process. The resulting information is used to:

- Ascertain whether appropriate SPHM technology is in place at both ends of a patient's transport route.
- Develop a building design and select movement support technology that will encourage self-mobilization of the patient where appropriate to maintain and improve patient functioning.
- Design a building layout that will increase staff efficiency by reducing turns and travel distances along routes to the most frequent destinations.
- Select floor coverings and position handrails to encourage patient self-mobilization by reducing fear of falling. Include rest areas where gait training will take place and in residential settings.

Patient movement destination points are the endpoints of both patient transport conducted by staff members and patient mobilization without staff assistance (e.g., ambulatory patients walking to a bathroom or restaurant). These activities occur in both acute care and ambulatory care settings. Starting points for acute care include the emergency department and the patient room. The starting point for ambulatory care is commonly the patient examination or intake room.

Emergency Department

After admission to an emergency department, a patient is usually stabilized, placed on a wheeled device, and transported to a destination for treatment. The device is typically a gurney or wheelchair. A patient may be taken to one of the following areas and may remain on the transport device or be transferred to another device at the destination.

- Medical/surgical unit—transferred to a hospital bed or chair
- Critical care unit—transferred to a hospital bed
- Triage—remains on a gurney or in a wheelchair
- Radiology, MRI, CT unit—transferred onto an integral treatment table or remains on a radiolucent gurney

- Lab for blood draw and fluid sampling—likely remains on a gurney or in a wheelchair
- Surgical suites or procedure areas—transferred onto an operating table or special procedure chair

Acute Care Patient Room

In short-stay care facilities such as acute care hospitals and rehabilitation facilities, movement to the following destinations originates from the patient room. Such transport may be by wheelchair, gurney, or lift technology.

- Toilet
- Bathing/showering area
- Higher- or lower-acuity patient room or patient discharge due to a change in acuity
- Diagnostic and testing areas for examination
- Procedural areas, suites, or labs (e.g., cath lab, GI lab, dialysis treatment area)
- Surgical suites
- Encounter room and therapy areas for group support and therapy
- Lobby, cafeteria, vending machines, or outdoors for visiting, exercise, food, change of scenery
- Morgue

Outpatient Facilities

In ambulatory care settings, movement to some of the destinations listed below originates in a reception/waiting area, intake area, or examination/treatment room. Such transport may be by wheelchair, gurney, or lift technology.

- Toilet
- Diagnostic and testing areas

- Procedural areas, suites, or labs (e.g., cath lab, GI lab, dialysis treatment area)
- Surgical suites

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**(5) Sizes and types of door openings through which patient handling and movement equipment and accompanying staff must pass. See Section 2.1–2.3.10.2 (Special Design Elements for Spaces for Care of Patients of Size—Door openings) for additional requirements.*

A1.2–4.3.2.2 (5) See appendix section A2.1–7.2.2.3 (2) (Door openings—general) for more information about door openings and patient mobility.

Insufficient doorway dimensions can prevent use of mobile patient lifts and other rolling equipment. Injured knuckles and abrasions on the upper arms of staff can result from pushing beds and equipment through doorways that are too narrow. Simple entry and exit, especially in emergency situations involving expanded-capacity beds, are problematic in many health care facilities. It is not uncommon for individuals of size to receive treatments and procedures in their rooms rather than in a designated treatment or procedure room because their bed or equipment is too large to pass through the doorway.

Patient room and associated toilet room doors should accommodate the base widths of floor-based lifts (e.g., standard sit-to-stand lifts, standard full-body sling lifts, expanded-capacity floor-based lifts) along with accompanying staff members, unless overhead lifts are installed from the patient bed to the toilet. The width of these room doors should be sized to fit the specific equipment used by the facility. Use of a double door design is recommended.¹⁶

Throughout a health care facility, all other doors through which patients pass should be able to accommodate the expanded width of floor-based lifts and other equipment such as standard and

motorized beds/gurneys. When a population of individuals of size will be served, doors of procedure rooms and other patient care areas should accommodate the greater width of expanded-capacity beds/gurneys/wheelchairs.

Note: Prior to design layout, verify floor-based equipment dimensions, noting the required space for staff to pass through as well, with the existing or projected lift manufacturer.

**(6) Types of floor surfaces and transitions needed to facilitate safe and effective use of patient handling and movement equipment*

A1.2-4.3.2.2 (6) Types of floor surfaces and transitions. See Section 2.1-7.2.3.1 (Flooring and wall bases) and its appendix for more information.

Over the past several years, concern has been growing about work-related musculoskeletal injuries associated with movement of patients and health care-related equipment on carpeted or padded tile surfaces. The pushing and pulling required to move equipment on such surfaces may result in excessive shear forces on the spine, which become particularly problematic when performing turning maneuvers.¹⁷ Increases in these shear forces are attributable to the difficulty in overcoming inertia when beginning to push or pull a wheeled object,¹⁸ surface resistance of the flooring material,¹⁹ wheel design and condition,²¹ and the weight being pushed or pulled.²² Thus, care should be taken in choosing flooring materials for patient care settings in which rolling equipment is frequently used.

From a safe patient handling and movement perspective, the increased difficulty of rolling wheeled equipment over carpeting as compared to low-friction flooring materials is an important factor when specifying flooring materials.²³ When carpeting is chosen for acoustic or other reasons, careful consideration should be given to selection of the carpeting material as well as to its construction and installation specifications and its backing to minimize the difficulty of handling rolled equipment. In addition, the material, diameter, tread width, and suspension and steering systems for the wheels of

rolling equipment should be carefully considered during equipment selection.

To further facilitate safe movement of rolling equipment, thresholds should be flush with adjacent floor surfaces. Transitions between different floor surface types should be designed to eliminate tripping, bumps, and strain on staff pushing or guiding manual or powered equipment.

(7) Coordination of patient handling and movement equipment installations with building mechanical, electrical, communication, and life safety systems

Individuals of size are handled similarly to normal weight patients in a fire situation; they are moved from one fire/smoke compartment to another on the same floor.

At least one facility elevator should be able to simultaneously accommodate motorized patient beds 8 feet in length and expanded-capacity beds and accompanying staff.

**(8) Storage space requirements and locations available or to be provided*

A1.2-4.3.2.2 (8) Storage for patient handling and movement equipment and accessories

a. Accessibility of patient handling equipment is critical to assuring it will be used. Storage needed for the type and quantity of equipment identified during the project planning phase should be incorporated during project design.

b. Storage will be needed for patient handling equipment accessories such as lift slings, hanger bars, and trapezes as well as for other patient handling equipment. Operational considerations when determining storage space requirements include:

- Surplus slings should be stored in the same location as portable lifts.*
- In storage areas, large hooks should be installed for hanging slings or shelving should be provided for storage of folded slings.*
- Slings assigned to a specific patient should be stored in the patient room (e.g., on a hook on the outside of the patient's closet, at the bedside, or somewhere near the entry door) to provide instant accessibility and ensure compliance.*
- Standard shelving should be provided for storage of an assortment of slings for lifts, extra lift hanger bars, and other patient-handling equipment, such as friction-reducing devices and air-assisted lateral transfer aids with motor(s).*
- Storage alternatives: For small units, a centrally located storage area may be provided. For large or small units, storage may be provided in alcoves or storage areas interspersed throughout the unit.*

A method for calculating storage space requirements for floor-based lifts is located in Appendix M: Storage Requirements for SPHM Equipment. Also in Appendix M is information regarding storage for lift accessories (e.g., slings, hanger bars), other patient handling equipment, and infrequently used equipment.

(9) Impact of the installation and use of patient handling and movement equipment on environmental characteristics of the environment of care

When PHAMA recommendations are developed at the outset of a project and considered throughout design and construction, they can be planned into a project rather than added on, facilitating the integration of SPHM equipment into the aesthetic appearance of finished spaces. For this reason, it is important to develop these

recommendations as an aspect of development of the functional program. For more information, see Chapter 1.2, Planning, Design, Construction, and Commissioning in the 2018 Hospital and Outpatient *Guidelines* documents.

Effect of a PHAMA on the Environment of Care

Since programming, planning, and design are iterative processes through which considerations such as the care model, staffing, operations, equipment, space, architectural and interior design details, surfaces, and furnishings are assessed, correlated, and resolved, a PHAMA can have a truly significant impact on the environment of care. Specifically, patient handling needs must be assessed and assistive equipment requirements determined early in the planning process so this information can inform the functional program and ensure that all equipment selections, storage, circulation, and staff access and maneuvering requirements are addressed during its creation.

When developing the functional program, it is advisable to involve a multidisciplinary team so that patient and staff needs can be adequately anticipated and addressed. As well, incorporation of specific equipment (including makes and models) should be considered at this early planning stage so that all physical space requirements and details can be accommodated during the design phase. The goal is to maintain the aesthetic environment of the intended care model while incorporating the required SPHM equipment.

Preparing mock-ups of spaces where SPHM equipment will be used is an excellent way to increase the designers' understanding of the issues and to identify any ramifications from equipment choices made in response to PHAMA recommendations. Develop mock-ups of patient/resident rooms, bathrooms, other patient/resident care areas, and patient care support areas during the design development phase (or even earlier, during the programming and planning phase). Then test them with frontline staff using the proposed equipment and accessories. Caregivers who have participated in preparing a PHAMA's statement of requirements and selecting equipment based on a hands-on consensus response will experience a sense of ownership in the choice of equipment. This familiarity with it will help them train and encourage peers and associates to properly use the equipment.

Staff acceptance and use of SPHM equipment will allow them to provide superior care that increases patients' comfort, dignity, and sense of independence and control; fosters faster and better rehabilitation regimens; and enables patient mobilization as early as possible, at the same time protecting both the patient and the caregiver from injury. Before a facility is opened, it is recommended that staff members who helped prepare the PHAMA recommendations, the functional program, and the design documents participate in developing training materials and sessions for the rest of the staff.

Following is just a sampling of design features that highlight how functional programming in response to PHAMA recommendations may benefit a completed health or residential care project:

- Accessible storage areas that discourage "parking" of devices and equipment in corridors, where they impede circulation and create potential safety issues
- Recessed ceiling lift supports that minimize exposed tracks in a residentially styled, long-term care resident room
- Casework that serves multiple functions (e.g., storage that accommodates a lift and slings as well as linens), all as part of a decentralized nursing station

Many other aspects of patient care and building design may appropriately be improved when patient handling and mobility issues are identified in a PHAMA, addressed in the functional program, and resolved during the planning, design, construction, and commissioning process.

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**(10) Impact of the installation and use of patient-handling and movement equipment on the aesthetics of the patient care space*

A1.2-4.3.2.2 (10) When installing fixed-lift systems, care should be taken to minimize the visual impact of fixed tracks, slings, hanger bars, and motors on the aesthetics of the physical environment. Use of recessed tracks is suggested as well as curving the track away from the center of the patient room.

Other suggestions include enclosing lift motors in decorative cabinets and concealing or masking wall-mounted rails for traveling gantry lifts with crown molding or indirect ceiling light coves.

Creating a successful health care environment depends on consideration of both the visual impact of the individual SPHM equipment elements and the overall aesthetic context of the space in which the equipment will be used. Some design professionals who are just beginning to understand the workings of clinical settings may focus primarily on aesthetics in designing health care projects (it is in part what designers are paid to do, certainly in long-term care facilities, where the aesthetics of the environment have an outsized effect on marketability). On the other hand, most manufacturers of SPHM equipment began by exclusively focusing on engineering and functionality, although many suppliers' products have evolved to an admirable level of design sophistication. Encourage both parties to consider the whole picture.

Aesthetic Conflicts in the Design of Health Care Environments

Aesthetic conflicts that affect the success of design in a health care environment stem from a variety of causes. Primary causes of such conflicts are discussed in this sidebar.

Mixing Traditional and Contemporary/Modern Design Elements

Basically, there are two aesthetic/design camps in health care: "traditional" and "contemporary/modern."

"Traditional" describes design modes and appearance before the advent of modern design in the early 20th century. More than just the evocation of a particular design style (e.g., French Provincial or American Colonial), this approach is distinguished by the appearance of natural materials and detailed architectural trim, textural differentiation, and random-element or non-geometric patterning. It evolved in periods

when hand craftsmanship was the primary method of creating the built environment and more labor was available to meet cleaning and maintenance requirements. Whether true or not, many administrators and developers believe a traditional environment feels more “homey,” especially to an older audience. Thus, traditional design, for better or worse, remains the norm for most residentially focused health care environments.

“Contemporary/modern” describes design modes and appearances that reflect machine manufacture and industrial fabrication techniques. It is characterized primarily by man-made materials, little to no surface detailing, and minimal textural differentiation along surfaces. The mechanical workings of building elements may be shown as an expression of the style, but more commonly they are hidden beneath shrouds or other smooth skins or coverings. Products in this style are inherently easier to clean (depending on the cleaners used and the nature of the surface material).

There are no hard-and-fast rules as to what works and what does not in the aesthetics of health care design. Most conflict, however, results from the contrast between the highly differentiated surfaces of traditional design elements (e.g., patterned wall coverings) and the large, undifferentiated surfaces that characterize contemporary/modern objects, including the new SPHM products currently in use and the mountings that support them.

Inappropriate Scale

While patients and patient furnishings are getting larger and patient handling considerations dictate certain clearances, rooms do not always accommodate these larger elements, either visually or functionally.

Overly Clinical Appearance

The lack of visual (and functional) integration among products in a health care facility, which are sourced from a vast number of health care product manufacturers, means that clinical areas in particular are filled with many technological bits and pieces. When budget allows, efforts are frequently made to hide some technology elements behind special enclosures—especially headwall utilities. But for more acute-level facilities, the amount of equipment that accumulates in a patient environment is often beyond what can conveniently and functionally be hidden or shrouded.

Visually Incongruous Elements

Patient handling equipment, particularly when it is ceiling-mounted, is often visually incongruous with its setting. One of the most common examples of this is traverse-style ceiling tracks. Although the upper track may be recessed, the lower track is suspended below it and tends to conflict with anything else suspended from the ceiling, including lighting fixtures and cubicle curtains—elements that might otherwise soften the institutional appearance of such planar ceilings. A headwall system that conceals a traverse track when it is not in use is one way to address this issue, but other examples of visual and functional incongruity (including gantry-style lifts, wall-mounted lifts, and many portable hoists) await superior solutions from the industry.

What can be done to resolve these aesthetic and functional conflicts?

Manufacturers can add features to primary patient support furnishings to reduce the need for a secondary level of equipment and add textural differentiation to surfaces. In an attempt to fit their products into the aesthetic context of the spaces where they are used, some manufacturers have begun to offer surface treatments that turn what might otherwise be incongruous architectural elements into decorative accents. Such treatments are particularly effective in surface- or wall-mounted or traverse-style ceiling tracks.

Designers can:

1. Stick to contemporary/modern idioms that more readily accept the aesthetics of most industrially produced equipment.
2. Recess ceiling-mounted elements where possible.
3. Treat equipment as design elements rather than foreign invaders.
4. Carefully consider storage and access. The best designs can be destroyed when equipment is stored in unintended locations because inadequate thought was given to their volumetric and storage requirements and the ease with which they can be accessed or brought into use. If storage areas are too far from the point of use, equipment probably will not be used as intended.

5. Share ideas about improving the aesthetics of SPHM equipment with manufacturers. Often, the best ideas come “from the field.” And give your business to companies that are responsive.

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**(11) Infection control risk mitigation recommendations*

A1.2-4.3.2.2 (11) For effective infection control risk mitigation, consult with an infection preventionist during development of and while conducting the PHAMA. Incorporate the facility’s infection control guidelines and manufacturer’s cleaning instructions into planning. Use of lifts in certain areas, such as a surgical suite, may have more stringent requirements.

To ensure that infection control efforts are appropriate and sufficient to protect patients and staff during the overhead lift installation process, refer to information on infection control risk assessments in Appendix N: Infection Control Risk Assessment Matrix of Precautions for Construction and Renovation. Also see the sidebar on the ICRA and the PHAMA.

The ICRA and the PHAMA

Infection control risk mitigation recommendations (ICRMRs) for renovation projects or new construction in existing buildings come into play during preparations for construction. These written plans “describe specific methods by which transmission of airborne and waterborne biological contaminants will be avoided during construction and commissioning.” To achieve effective infection control risk mitigation, team members conducting the PHAMA should consult with an infection preventionist about the facility’s general infection prevention guidelines.

Installation of lift equipment requires input from—and regular interaction with—the facility’s existing infection control risk assessment

(ICRA) team to address protection of patients and workers. Subjects for discussion should include at least the following:

- Patient placement and relocation
- Standards for barriers and other protective measures required to protect adjacent areas and susceptible patients from airborne contaminants
- Temporary provisions or phasing for the process of constructing or modifying HVAC, water supply, or other mechanical and cabling systems
- Protection of adjacent occupied patient areas from demolition
- Measures for educating health care facility staff, visitors, and construction personnel regarding maintenance of interim life safety measures and ICRMRs

Infection prevention measures are required even for projects that seem simple, such as removal of tiles to assess the area above a ceiling for visible dust and mold contamination. When performing this task, staff use equipment generically called a “control cube” (a portable floor-to-ceiling enclosure sealed tightly to the ceiling along with a portable negative air machine, or NAM) to protect patients and staff from infection risk. Even such basic operations require relocation of the patient to another room, given the movement of equipment and risk of unexpected contamination.

Installation of SPHM equipment that requires alteration of the physical fabric of a building will require more complicated infection prevention measures. For example, when ceiling tracks are installed, the entire room will need to be sealed and maintained with airflow into the room (i.e., negative pressure in relation to the corridor). The intent of such measures is to ensure that barriers isolate the room and prevent contamination of adjacent occupied areas during the installation/renovation.

ICRMRs also require provisions for monitoring the infection control activities identified by the ICRA process, including written procedures for emergency suspension of work and for protective measures. These procedures also indicate the responsibilities and limitations of each party (e.g., owner or designer) for making sure procedures are followed.

There is no one best way to conduct an ICRA, comply with ICRMRs, or document the recommendations of the PHAMA team. The ICRA matrix located in Appendix N in this white paper offers one approach and includes a documentation form (infection control construction permit) to help determine the level of precautions required for a particular project, based on the degree of anticipated contamination.

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Resident Mobility and Transfer Risk Assessments in Residential Health, Care, and Support Facilities

The shaded text in italics in this section is from Chapter 1.2, Planning/Predesign Process, in the 2018 edition of the FGI *Guidelines for Design and Construction of Residential Health, Care, and Support Facilities*. It is the requirements found in Section 1.2-3.3 (Resident Mobility and Transfer Risk Assessment) and its related appendices.

The remaining text in this section discusses and expands on this FGI Residential *Guidelines* material.

****1.2-3.3 Resident Mobility and Transfer Risk Assessment***

A1.2-3.3 Resident mobility and transfer risk assessment. The evaluation of resident mobility and transfer risks is intended to proactively identify and mitigate the risk from physical environment features that contribute to resident immobility and to resident and staff injuries associated with resident mobility and transfer. Information and guidance for evaluating resident mobility and transfer risks can be found in “Patient Handling and Movement Assessments: A White Paper,” prepared by the 2010 Health Guidelines Revision Committee Specialty Subgroup on Patient Movement and posted at www.fgi.org.

fgiguideelines.org [**Editor's note:** This white paper has been replaced with this second edition, published by FGI in 2019].

Caregivers repositioning and transferring residents cannot manually lift more than 35 pounds (15.89 kilograms) without putting themselves at risk for back injury. Assisting a resident out of bed and into and out of a chair and supporting an unsteady resident both carry additional risks. As a consequence, caregivers are at high risk for injury as a result of resident handling and moving. If caregivers are not safely equipped to perform these necessary physical tasks, residents may not receive adequate care and may spend more time sedentary in a bed or wheelchair than is clinically advisable or desirable. Increasing evidence shows that early and frequent mobilization and movement is vital to the health of residents and integral to quality care.

Equipment is now available to facilitate necessary transfers, movement, and mobilization while significantly reducing the risk of injury to caregivers and residents from these activities. By better supporting appropriate levels of care and reducing the risk of injury to caregivers, use of such equipment and related architectural accommodations will help maintain functional capabilities and improve outcomes, thus reducing the overall cost of care.

1.2-3.3.1 Locations to Be Assessed

Resident mobility and transfer risk evaluation shall address the specific needs of all areas affected by the project where resident transfers and movement occur, including but not limited to the following:

1.2-3.3.1.1 Resident rooms and toilet rooms

Unit staff are the best resource for determining which resident rooms and toilets require installation of overhead lifts and use of other resident handling equipment. Unless all rooms on a unit will be

fitted with overhead lifts, caregivers should help identify appropriate locations for installing overhead lifts and/or using floor-based lifts.

Often, overhead lift placement is based on the configuration of resident rooms and the number of beds in them with the goal of covering the greatest number of residents with the fewest overhead lifts. Room selection for overhead lifts also may be based on placement of the sickest and most dependent residents, frequently near a nurse station. Appendix I: Overhead Lift Coverage Recommendations by Patient Care Area provides suggestions for overhead lift locations and types; see the “Hospice Facility, Nursing Home, Rehabilitation, and Other Long-Term Care Facilities” heading in Appendix I for residential overhead lift recommendations.

1.2-3.3.1.2 Residential living and community spaces (e.g., dining and recreation areas), including associated toilet and bathing areas

1.2-3.3.1.3 Examination rooms and other diagnostic and treatment areas

1.2-3.3.1.4 Wellness centers

Installation of traverse track systems in day rooms and gyms for senior citizens is gaining in popularity. The ceiling lifts provide support for those with balance and ambulation limitations and empower them to perform exercises they would otherwise not be able to do.

1.2-3.3.1.5 Outdoor areas

1.2-3.3.1.6 Hallways and corridors

Installation of a straight ceiling lift track down certain hallways can be an excellent way to facilitate mobilization, socialization, and rehabilitation of residents.

***1.2-3.3.2 Mobility and Mobilization Concerns**

The following shall be evaluated for all areas where resident mobility and transfers occur:

A1.2-3.3.2 Mitigation for mobility and mobilization concerns. *The types of equipment needed in each residential unit and treatment area are determined by the characteristics of the resident population. Recommendations for mitigating mobility and transfer risks should be developed for all areas in a new construction or renovation project. These recommendations should address the locations where resident transfers and mobilization will occur and the types of resident mobility and transfer tasks relevant to the care population.*

The objective of preparing these recommendations is to assure proper accommodations are provided for resident mobility and for mobilization devices based on their type, size, weight capacity, and quantity. Storage should be sized to accommodate the lift equipment, assistive devices, and resident-operated mobility devices that will actually be used.

Resident handling equipment recommendations are based on the medical and physical characteristics—actual as well as potential—of the resident population of each resident area or unit. Particularly critical to determining the quantity and types of equipment for each location are the average dependency levels of the resident population. To simplify this determination, residents are grouped in categories based on their physical limitations rather than their clinical acuity. Categories include total dependence, extensive assistance, limited assistance, supervision, and independent.²⁴ Refer to Table 1 (Physical Dependency Levels of Patient Population) in Appendix H: Patient Care Area Characteristics and Ergonomics Issues Survey for definitions of these terms.

Consideration of the weight, size, and weight distribution of individuals of size is also important to ensure selection of appropriate equipment weight capacities and dimensions.

***1.2-3.3.2.1 Specific design recommendations to support safe mobility and transfer tasks.** *This shall include accommodations for charging batteries for battery-operated equipment.*

A1.2-3.3.2.1 Design recommendations for safe mobility and transfer. *Technology, equipment, and architectural details can be used to address evaluations of structural, electrical, mechanical, and other design considerations.*

a. Resident mobility and transfer tasks for which risk can be minimized using equipment or other measures include the following:

- Vertical and lateral transfers (from/to a bed, chair, commode, toilet, wheelchair, gurney, or trolley)*
- Positioning/repositioning in bed (side to side, up to the head of the bed, raising or lowering head or feet)*
- Repositioning in chair*
- Showering/bathing*
- Lifting appendages*
- Transporting residents*
- Assistance with resident ambulation*
- Weighing residents on bed scales*
- Exiting furniture or beds (e.g., bedrails, extended chair arm fronts)*
- Supported ambulation extending beyond the resident room (e.g., room-to-hallway ceiling track-supported walkway system), if indicated in the functional program*
- Transfers from resident chairs or other seats (e.g., adequate clearances)*

To correctly identify all resident mobility and transfer tasks and impediments or hindrances to mobility in an area, care

providers and other staff should be interviewed for their perceptions of which tasks carry a high risk.

Equipment decisions are based on the types of high-risk resident handling and mobility assistance performed. High-risk resident handling tasks demand moves, lifts, and other assistance that, without technology, place excessive biomechanical and postural stress on the musculoskeletal systems of caregivers and pose risk of injury to residents. Researchers have identified many such high-risk tasks in various patient/resident care environments;^{25, 26, 27} see Appendix A: High-Risk Manual Patient Handling Tasks by Patient Care Area for more detail. Some high-risk tasks, however, do not currently have technology solutions to make them less ergonomically stressful.

High-risk tasks for which equipment is available to minimize risk include, but are not limited, to the following:

- Vertical lifts/transfers (from/to bed/chair/commode/toilet/wheelchair/car)
- Lateral transfers (from/to bed/stretchers/gurney/trolley)
- Positioning/repositioning in bed (side to side, up to the head of the bed)
- Repositioning in chair/wheelchair/dependency chair
- Showering/bathing
- Toileting
- Dressing/undressing/changing diapers
- Wound care
- Lifting appendages
- Transporting residents
- Patient mobilization in bed
- Helping residents ambulate

The best source for identifying the high-risk tasks performed in each resident care area is staff members who perform these tasks

on a regular basis. Therefore, the resident mobility and transfer risk assessment process should include:

- Interviews of frontline staff: Ask what tasks staff members perceive as presenting a high risk of injury for themselves and/or the residents, what they estimate to be the percentage of residents at each dependency level, what resident handling strategies are in place, and what technology solutions are available and in use. (See Appendix F: Patient Care Ergonomic Evaluation Staff Interview Template.)
- Surveys of frontline staff: Surveys are a useful tool for collecting information on staff perceptions of high-risk tasks. (See the sample survey in Appendix H: Patient Care Area Characteristics and Ergonomic Issues Survey.)

Resident handling injury data for each resident area or unit are also a good source of information for the high-risk tasks in that location. Tool 2 (Patient Care Area Incident/Injury Profile) in Appendix H offers a template for collection and analysis of resident handling injuries by care area. However, this source should never be used in isolation as injuries often are not reported, which means important information may be missing from the data.

b. Types of resident mobility and transfer equipment that may be used to minimize risk include:

- Sit-to-stand lifts. For a resident who requires partial assistance and possesses some weight-bearing ability, sit-to-stand lifts are used to assist in vertical transfers, toileting, dressing, and ambulation.*
- Floor-based sling lifts and ceiling-mounted lifts. Both of these lift types are used for residents who are completely or substantially unable to assist caregivers. Residents requiring these levels of care are often described as “dependent” or requiring “extensive assistance.” The utility of these lifts for this population includes—but is not limited to—vertical transfers, lateral transfers, repositioning in bed and chair,*

lifting appendages, and lifting residents from the floor. These lifts can also be used for assistance with ambulation rehabilitation or mobilization of residents with some weight-bearing capability.

—Resident-operated mobility devices. These are devices residents can use on their own and are intended to foster their independence.

Since most resident transfer and mobility devices are movable, planners must recognize the need for sufficient space for proper storage, movement, and use of the equipment and its accessories. As new equipment designs become available, they should be evaluated for their impact on building design.

The patient/resident care ergonomic evaluation process is used to pull together the preceding information and facilitate accurate equipment purchase decisions, which will affect design decisions. Thus, it is important to conduct this evaluation at the onset of design for *all* areas where resident handling occurs.

It is imperative to have staff input in the selection of resident handling technology. Staff members who assist residents in moving, transferring, and mobilizing activities on a daily basis are the best evaluators of different solutions and technologies. Not only do they know what equipment will meet the needs of the residents, but—as users of the equipment—they can best judge the “user-friendliness” of each variety of assistive technology. The latter point is important because if equipment is difficult to use, it’s less likely staff will incorporate it into the care they provide, thereby increasing risk of injury to both resident and caregiver.

Equipment trials and equipment fairs give staff—including maintenance and environmental services staff—the opportunity to evaluate equipment from their unique perspectives prior to purchase. To learn the most from equipment trials, it is recommended that staff and others complete equipment evaluation surveys. The survey data should be collated by resident care area to ensure the appropriate

equipment is selected for each. The survey information should also be used to identify manufacturers for inclusion in the bidding process. For more information, see Appendix G: SPHM Equipment Evaluation and Selection, which covers equipment trials and fairs.

When considering which manufacturers or vendors to use, keep in mind that purchase of all overhead lifts in a facility from a single manufacturer will make it easier for staff members to become competent in their use. In addition to being basic to safety, staff competence increases equipment use. As well, sourcing from different manufacturers may affect costs and ancillary equipment needs as most slings, hanger bars, and accessories are not interchangeable from manufacturer to manufacturer, although it is possible to stipulate that competitive equipment have some interfacing protocols.

Refer to appendices B: SPHM Equipment Categories and C: Lift System Components/Sling Selection, Use, and Care for a discussion of the characteristics and merits of different solutions for providing resident handling and mobility equipment.

After recommendations for specific equipment types have been developed for a resident care area, the unique features required for installing and/or using the recommended equipment should be determined. These features are based on the results of the ergonomic and structural evaluations for the area (see appendices E: Patient Care Ergonomic Evaluation Process and H: Patient Care Area Characteristics and Ergonomic Issues Survey).

****1.2-3.3.2.2 Types of resident mobility and transfer equipment***

A1.2-3.3.2.2 Identifying resident mobility and transfer equipment for a project. *Resident care providers who are familiar with the characteristics of their unique resident populations should be included in the functional programming process to ensure appropriate equipment is identified for use in the facility. Equipment may include manual or power-assisted fixed ceiling or wall-mounted lifts, manual or power-assisted*

portable/floor-mounted lifts, electric height-adjustable beds, or a combination thereof.

When developing an equipment list, any existing equipment that will be used in the facility should be included. Preparation of a log is suggested to relay information on existing equipment, the percentage of time it is used, and if this is not 100 percent, the reasons for the percentage of time indicated.

- (1) Implementation of any architectural solution that supports ambulation and incentivizes mobility and ambulation using the equipment available on-site shall be considered.*
- (2) Provision of any furnishings that offer usable alternatives to extended bed-stays shall be considered.*

Much research identifies ceiling lifts as the preferred solution for patient/resident care environments;^{28, 29, 30, 31, 32, 33, 34, 35, 36} however, existing building configuration and structural issues may necessitate use of floor-based lifts. In addition, some clinical areas require special consideration as to what type and style of equipment will be introduced. For instance, for the more homelike environments in long-term care settings, use of overhead lifts and track systems that blend in with the décor of the room may be preferred.

****1.2-3.3.2.3 Minimization of physical environment impediments to resident, participant, and outpatient mobility and mobilization.***

Evaluation of cognitive ability of the care population shall be included in determining how impediments can be minimized for a particular facility.

A1.2-3.3.2.3 Minimizing impediments to resident, participant, and outpatient mobility and mobilization supports an active lifestyle during a resident's long-term stay or rehabilitation recovery process.

Consideration of resident weight and size is important to assure that equipment capacities and dimensions for other accommodations are appropriate.

Although research has determined that use of patient/resident handling equipment is essential to preventing injuries in health and residential care environments, architectural details may impede the use of some such equipment. For instance:

- Resident room configurations with an L-shape may prevent installation of overhead lifts or use of a floor-based lift.
- Low ceiling heights may not allow adequate vertical distance to lift a resident off a bed.
- Structural support above doors in load-bearing walls that cannot be removed prevent installation of track for a lift from a resident room into the bathroom.
- Standard elevator cab dimensions cannot accommodate expanded-capacity beds or some motorized beds.
- Door widths may not be wide enough to allow expanded-capacity wheelchairs and floor-based lifts to safely enter and exit a resident room or other resident care or living area.
- Narrow hallways can impinge on the turning radius needed to maneuver a motorized or expanded-capacity bed into a resident or other room, creating an unsafe situation for staff who must push a heavy bed sideways in order to turn sharply around a corner or into a room.
- Clearances within a room do not facilitate safe maneuvering of floor-based lifts, wheelchairs, and other rolling equipment.
- Flooring material, floor transitions, floor slopes, and thresholds do not provide a safe walkway.

See appendices I: Overhead Lift Coverage Recommendations by Patient Care Area, K: Design/Layout Considerations for Overhead Lift Systems, and Appendix J: Floor-Based Lift Coverage Recommendations by Patient Care Area for details on overhead and floor-based lift equipment. Expanded-capacity lifts have a substantial footprint that must be considered when planning space needs for use in resident rooms. Storage issues related to use of resident handling equipment are discussed in Appendix M: Storage Requirements for SPHM Equipment.

Resident mobility has become a critical factor in resident quality of care and rehabilitation. When resident mobilization is diminished by design features, residents suffer the consequences. Mobility is constrained in small resident rooms with unusual configurations and small doorways. The impact on individuals of size, in particular, can be immense. The quality of care is affected, and the emotional impact is great when residents are unable to navigate through a facility due to inadequate door widths or weight capacities of furniture, toilets, and other equipment/items.

****1.2-3.3.2.4 Quantity of each type of resident mobility and transfer equipment***

A1.2-3.3.2.4 The community should have sufficient lifts to meet the needs of the current resident population based on the outcome of the resident safety risk assessment.

The patient/resident care ergonomic (PCE) evaluation process helps determine the quantity of each type of resident handling equipment needed for each area under consideration. Methods for determining appropriate lift coverage for resident units/areas are found in appendices I and J.

When calculating quantities for the different types of equipment needed for each area, factor in any existing equipment already in use. An equipment log, such as the one in Appendix H: Patient Care Area Characteristics and Ergonomic Issues Survey, can be used to track existing equipment as well as new equipment to be introduced. Since the log also captures the estimated percentage of time each piece of equipment is used, it will highlight the need for staff re-training on equipment use and should help with decisions about whether to acquire more equipment of the same type.

For major renovation or new construction projects, consult with staff from existing resident care areas and/or staff who are aware of projected resident population characteristics. Staff members should be able to provide information on the quantity and types of

existing equipment that will be transferred, if any, and/or assist in determining the need for new equipment.

***1.2-3.3.2.5 Weight-carrying capacities**

A1.2-3.3.2.5 Lift weight capacities range from approximately 400 pounds (181.8 kg) to expanded-capacity lifts of 1,000 pounds (454.5 kg) or more. Specification of lifts with a capacity of 500–600 pounds (227.3–272.7 kg) will accommodate the greatest range of residents. If admissions of persons of size warrant, a minimum of one expanded-capacity lift (preferably fixed, ceiling-mounted) per unit should be included, in addition to the lower-weight-capacity lifts.

Determine required weight-carrying capacities for each unit/area by reviewing facility and unit/area trends for individuals of size and by interviewing unit/area staff. Lift weight capacities range from around 400 lbs. to 1,000 lbs. or more for expanded-capacity lifts for morbidly obese and larger residents. Even though expanded-capacity floor-based lifts are available, carefully consider their use; pushing/pulling such equipment, combined with considerable resident weight, exerts a significant force on a caregiver's spine and could lead to injury.

Alternatives to expanded-capacity floor-based lifts are overhead lifts and gantry lifts (see Appendix B: SPHM Equipment Categories for more information). Overhead lifts with a weight capacity of 500 to 600 lbs. will accommodate most residents. (Some morbidly obese individuals can weigh 1,000 lbs. or more, however.) If review of facility resident weight data and trends by care area shows the number of individuals of size warrants installation of expanded-capacity overhead lifts, include the number of lifts determined for the area under consideration. If no data is available, a minimum of one expanded-capacity lift per identified area should be included.

***1.2-3.3.2.6 Storage for mobility devices.** *The need for storage accessible by staff and residents for lift systems and related equipment and for resident-operated mobility devices shall be determined by evaluating equipment use in the facility.*

A1.2-3.3.2.6 Space and electrical services for charging batteries should be included in storage rooms for portable, floor-based lifts and resident-operated mobility devices. Access to electrical power and control services should be provided for fixed lifts and devices. Provision of an eyewash station in these spaces should be considered depending on the types of batteries being charged. Consideration should be given to providing storage space for resident-operated mobility devices in resident rooms or dwelling units as space in common areas may prove inadequate and inconvenient for resident accessibility.

Storage requirements. Frontline staff are best able to determine the most advantageous storage locations for floor-based lifts, slings for lifts, and other resident handling equipment. Information regarding storage for resident handling and mobilization equipment can be found in Appendix M, which includes a method for calculating the storage space needed for floor-based lifts.

***1.2-3.3.2.7 Provision of clearances**

A1.2-3.3.2.7 Maintenance of clearance zones should be included in facility policy.

- (1) Space shall be provided for resident care and for maneuvering in and around areas where staff will use resident mobility or transfer equipment.*
- (2) Resident rooms shall be sized, arranged, and furnished to maximize safe resident mobility, mobilization, weight-bearing, and ambulation potential while minimizing risk to caregivers.*
- (3) Unimpeded clearances shall be provided at the front and at least one*

side of the resident chair. Clearances shall be equal to or greater than those required around the sides and foot of the resident bed.

- (4) Resident units shall be designed to maximize safe resident ambulation opportunities from resident rooms into and through corridors.*

Performing high-risk resident handling tasks in spaces that are too small increases the risk of injury substantially. For this and other reasons, bed space requirements for residential care facilities have gradually increased over the years. Recently, five international publications recommended a minimum bed space width of 3.6 meters (11.82 feet).³⁷

Narrow hallways can add another level of difficulty to moving residents and equipment. An inadequate turning radius in a hallway creates an unsafe situation in which staff must push a heavy bed sideways in order to turn sharply around a corner or into a resident room.

Despite the abundance of rolling equipment used in care environments, high to medium thresholds abound, making it difficult for staff to use rolling equipment and unsafe for residents moving themselves or being moved. Pushing residents on inclines in beds or wheelchairs has the potential for causing serious injury to residents, visitors, and caregivers.

During the 2018 *Guidelines* revision cycle, an FGI topic group worked to develop minimum size and clearance standards for the use of patient lifts. The group collaborated with Hillrom, to simulate patient/resident handling tasks using a ceiling lift, floor-based full-body sling lift, sit-to-stand lift, and gurney. Simulated tasks included transportation of an individual to and from a resident room and resident handling in the resident room. Tasks performed in the room were transferring an individual from gurney to bed and from bed to wheelchair and lifting/transferring a resident from the bed into the bathroom. Results from these simulations are found in Appendix D: Clearances for Safe Use of Patient Handling and Mobility Equipment.

Supplementary to the requirements in the 2018 Residential *Guidelines*, the following recommendations are intended to facilitate provision of adequate space for safe resident handling in the resident room and elsewhere in a residential care facility:

- Throughout the facility, all maneuvering areas (e.g., hallways leading into resident or toilet rooms) should accommodate the expanded width of portable/floor-based lifts and other equipment such as standard and motorized beds/gurneys.
- Resident rooms and associated toilet rooms for individuals of size should accommodate the expanded width of floor-based lifts that can support these patients along with space for at least two to three staff members.³⁸
- Maneuvering clearances for lift equipment should follow the recommendations in Appendix D. However, it is important to confirm with equipment manufacturers the clear space requirements for their specific equipment.
- Adequate height and above-bed maneuvering clearance must be provided for operation of the lift equipment.

Note: Space provided adjacent to resident toilets in compliance Americans with Disabilities Act and ANSI A117.1: *Accessible and Usable Buildings and Facilities* requirements may be inadequate for safe resident movement and handling. For further information, see Section 1.1-4.1 (Design Standards for Accessibility) in the 2018 Residential *Guidelines*.

****1.2-3.3.2.8 Destination points for resident ambulation, transfers, and movement***

A1.2-3.3.2.8 Consider access routes to destination points in the facility that will welcome residents (e.g., community and activity rooms, gift shops, dining rooms, and healing gardens). Evaluate various destinations for residents using resident mobility and transfer equipment (i.e., locations to and from which residents travel, such as between the bed, chair, and

commode in the resident room or into an associated toilet room or bathroom). Such considerations will aid in recognizing appropriate equipment and designing a room and door openings to accommodate portable equipment and the residents and caregivers using it.

- (1) Identified destination points (e.g., resident rooms, bathrooms, community spaces) shall be evaluated for ease of door operation to assure that passage in either direction is not hindered due to door weight or closure pressure.*
- (2) Door openings shall be provided in sizes and types that allow passage of resident mobility and transfer equipment and accompanying staff.*

Insufficient doorway dimensions can prevent use of mobile lifts and other rolling equipment. Injured knuckles and abrasions on the upper arms of staff can result from pushing beds and equipment through doorways that are too narrow. Simple entry and exit, especially in emergency situations involving expanded-capacity beds, are problematic in many facilities.

One of the most significant benefits of lift equipment is its usefulness in transporting residents from one location to another (e.g., from bed to toilet or bedside chair). When determining the track system for overhead lifts, it is important to know the location of possible transfer points, and—when portable lifts will be used—adequate space for their use must be provided at these destination points. For further information, see the sidebar “Resident Movement Destination Points in Long-Term Care Settings.”

Overhead lifts with tracks that provide full in-room coverage can support rehabilitation, allowing residents to ambulate within their room using an overhead lift and ambulation sling. Thus, before undertaking track design and layout, it is important to consult with staff to determine the potential for rehabilitation use as well as destination points for transfers and transportation. Further information on track design and layout is located in Appendix K: Design/Layout Considerations for Overhead Lift Systems.

Resident Movement Destination Points in Long-Term Care Settings

Development of a comprehensive SPHM system requires identification of the destination points to which residents will be moved. These destination points are of two types: (1) those used by staff to provide resident care and (2) those chosen by residents to permit their involvement in activities and relationships that are meaningful and important to them.

Determining the reasons for resident movement and the destinations to which residents are moved in a particular care environment is an essential step in the resident mobility and transfer risk assessment process. The resulting information is used to:

- Ascertain whether appropriate resident handling technology is in place in all areas needed on both ends of a resident's transport.
- Develop a building design and select mobility support technology that will encourage self-mobilization of residents to maintain and improve their functioning.
- Design a building layout that will increase staff efficiency by reducing turns and travel distances along routes to the most frequent destinations.
- Select floor coverings, position handrails, and define rest areas that encourage resident self-mobilization by reducing fear of falling.

Resident mobility involving destination points includes both resident transport carried out by staff members and resident mobilization without staff assistance. The primary starting point for long-term care settings is the resident room.

Long-Term Care Resident Room

In long-term care facilities such as skilled nursing facilities and chronic care hospitals, the following activities may require transport by wheelchair or lift technology to a particular destination:

- Toileting—in a private or shared toilet room adjacent to the resident room

- Bathing/showering—in an adjacent private room or a shared facility
- Dining—in a shared dining area, three times a day
- Special interest activities—craft rooms, outdoors, kitchen, chapel, etc.
- Meetings with residents, family, friends, organizations—various size rooms and spaces
- Exercise—outdoors, exercise equipment room, group exercise space, pool, etc.
- Examination, treatment—special rooms and spaces
- Socialization—café, lounge, outdoors, corridors (by walking or assisted movement)
- Therapy—physical, occupational, speech therapy areas
- Hair and nail care—barber and beauty shop

Roger Leib, AIA, ACHA, and David Green

1.2-3.3.2.9 Floor finishes, surfaces, and transitions to facilitate safe and effective use of resident mobility and transfer equipment

- (1) No raised thresholds or other raised flooring transitions shall be used.*
- (2) No items with parts that all lie below a resident's field of vision shall be used (e.g., built-in planters, benches).*
- (3) See Sections 2.4-2.2 (Architectural Details), 2.4-2.3 (Surfaces), and 2.4-2.4 (Furnishings) for additional requirements.*

Concern has grown about work-related musculoskeletal injuries associated with the movement of residents and care-related equipment on carpeted or padded tile surfaces. The pushing and pulling required to move equipment on such surfaces may result in excessive shear forces on the spine, which become particularly

problematic when performing turning maneuvers.³⁹ Increases in these shear forces are attributable to the difficulty in overcoming inertia when starting to push or pull a wheeled object,⁴⁰ surface resistance of the flooring material,^{41, 42} wheel design and condition,⁴³ and the weight being pushed or pulled.⁴⁴ Thus, care should be taken in choosing flooring materials for resident care settings where rolling equipment is frequently used.

From a safe resident handling and mobility perspective, the increased difficulty of rolling wheeled equipment over carpeting as compared to the effort required over low-friction flooring materials is an important factor when specifying flooring materials.⁴⁵ When carpeting is chosen for acoustic or other reasons, careful consideration should be given to selection of the carpeting material as well as to construction and installation specifications for the carpeting and its backing to minimize the difficulty of handling rolled equipment. In addition, the material, diameter, tread width, and suspension and steering systems for the wheels of rolling equipment should be carefully considered during equipment selection.

Another way to facilitate the movement of rolling equipment is thresholds that are flush with adjacent floor surface(s). Transitions between different floor surface types should be designed to eliminate tripping, bumps, and strain on staff pushing or guiding manual or powered equipment.

1.2-3.3.2.10 Coordination between mobility and transfer equipment and other aspects of the physical environment

(1) Building systems. Resident mobility and transfer equipment installations shall be evaluated for conflict with plumbing, mechanical, electrical, communication, and life safety system equipment installations.

At least one facility elevator should be able to accommodate motorized beds 8 ft. in length and expanded-capacity beds and accompanying staff.

Individuals of size are handled similarly to normal weight residents in a fire situation; they are moved from one fire/smoke compartment to another on the same floor.

(2) *Environment of care characteristics. The effects of the installation and use of resident mobility and transfer equipment on the environment of care characteristics listed in Section 1.2-4.5 (Physical Environment Elements) shall be evaluated.*

For a thoughtful review of this subject, see the sidebar on the “Effect of a PHAMA on the Environment of Care” in this document.

**(3) Aesthetics. The effects of the installation and use of resident mobility and transfer equipment on the aesthetics of the resident care space shall be evaluated.*

***A1.2-3.3.2.10 (3)** Where fixed-lift systems are installed, care should be taken to minimize the visual impact of fixed tracks, slings, hanger bars, and motors on the aesthetics of the physical environment, especially in nursing homes and other long-term care settings where a home-like environment is essential. Use of recessed tracks is suggested. Other suggestions include enclosing lift motors in decorative cabinets and concealing or masking wall-mounted rails for traveling gantry lifts with crown molding or indirect ceiling light coves.*

Creating a successful residential care environment depends on consideration of both the visual impact of individual resident handling and mobility equipment elements and the overall aesthetic context of the space in which the equipment will be used. Some design professionals who are just beginning to understand the workings of residential care settings may focus primarily on aesthetics in designing a project; that is, in part, what designers are paid to do, certainly in long-term care facilities, where the aesthetics of the environment have an outsized effect on marketability. On the other hand, most manufacturers of resident handling and mobility

equipment began by exclusively focusing on engineering and functionality, although many suppliers' products have evolved to an admirable level of design sophistication. Creating a successful care environment depends on consideration of both the visual impact of the individual resident handling equipment elements and the overall aesthetic context of the space in which they will be used. For further discussion, see the sidebar “Aesthetic Conflicts in the Design of Health Care Environments” on page 82 in this chapter.

**(4) Bed safety. The configuration of beds being used shall be evaluated based on the care population to reduce the risk of injury related to bed rails, mattresses, and bed configurations.*

A1.2-3.3.2.10 (4) Bed safety

a. Bed rail safety. Depending on the care population and individual resident needs, the same device may act as a restraint or a supportive aid. For example, someone cognitively intact may use bed rails to safely enter and exit a bed. However, someone who is confused or unsteady may slide between the rails or between the mattress and bed, creating a risk for entrapment, entanglement, or falling. For more information, see “Clinical Guidance for the Assessment and Implementation of Bed Rails in Hospitals, Long Term Care Facilities, and Home Care Settings,” published by the Food and Drug Administration.

b. Other bed safety options. The following environmental adjustments should be considered depending on an individual resident's assessment:

—Use of low beds with adjacent mat on the floor

—Use of electrically adjustable low beds

—Placement of resident's nurse call device within easy reach and visual and verbal cues for use of the device

—Inclusion of bed exiting alarms in the call system

—Use of body pillows/cushions or raised mattress edges to define the edges or borders of the mattress

—*Potential use of a trapeze affixed to the bed to increase a resident's bed mobility*

—*Placement of cues for interdisciplinary care team recommendations regarding each resident's unique needs*

Design Criteria for Individuals of Size

The continual increase in individuals of size in the general population makes it vital to plan for accommodations for care of these individuals when they enter the health care system. Statistics show that obesity was the primary or secondary diagnosis for 2.8 million hospitalizations in 2009.⁴⁶ Caring for individuals of size complicates and adds significant risk to the tasks of handling, moving, and mobilizing patients. Expanded-capacity technology and sufficient space to move and handle such patients are essential, although these needs increase overall space requirements and alter some standard design protocols.

Previous editions of the FGI *Guidelines* included information on design criteria for individuals of size, but the information was found throughout the documents rather than in a central location. Due to the continued upsurge in the population of individuals of size, potential for increased admissions of these individuals, and more common use of expanded-capacity technology, a topic group established during the 2018 FGI *Guidelines* revision period worked to develop a section focused on design criteria for accommodations to support care of individuals of size.

Terminology for Individuals of Size

In FGI *Guidelines* text regarding accommodations for individuals of size, the terms “patient of size,” “resident of size,” “person of size,” and “bariatric” are found in the 2018 and earlier editions. However, the term “individual of size” is used in this publication and will be used in the 2022 edition of the FGI *Guidelines*.

In addition to those who are obese, morbidly obese, or undergoing bariatric surgery, “individual of size” applies to tall, muscular, and large people who may not have medical conditions related to their weight and whose body composition may not have a high percentage of fat. For example, it includes persons who may have the same BMI as a truly obese person but are in good physical shape (e.g., a body builder).

Accommodating Individuals of Size in Hospitals and Outpatient Facilities

The shaded text in italics in this section is from the 2018 edition of the FGI 2018 *Guidelines for Design and Construction of Hospitals*. It presents the requirements and related appendices found in Section 1.2-6.4 (Design Considerations for Accommodation of Patients of Size). The same language—except for the section on patient care (nursing) units—appears in Section 1.2-6.4 (Accommodations for Care of Patients of Size) in the 2018 FGI *Guidelines for Design and Construction of Outpatient Facilities*.

The remaining text in this section discusses and expands on this FGI material.

Planning for care of individuals of size in hospitals and outpatient facilities. This material is from Section 1.2–6 (Planning and Design Considerations and Requirements) in Chapter 1.2, Planning, Design, Construction, and Commissioning, in both the Hospital and Outpatient *Guidelines* documents.

**1.2-6.4 Design Considerations for Accommodation of Patients of Size*

A1.2-6.4 Design considerations for accommodation of patients of size

a. The patient’s weight, the distribution of the patient’s weight throughout the body, and the patient’s height are involved in identifying a patient who requires additional

assistance, expanded-capacity equipment, and larger space for patient care, moving, handling and mobilization. Such patients are not necessarily receiving bariatric care, thus the term “patient of size” often is used. The most commonly accepted method for clinically identifying patients of size is the body mass index (BMI).

When considering ergonomic issues, the focus should be on a patient’s weight, height, and distribution of weight, rather than body mass index (BMI). The terms “bariatric” and “body mass index” (BMI) are clinical terms. For ergonomic, or safe patient handling and mobility purposes, 300 lbs. or greater is used as the threshold for identifying individuals of size. This is the threshold in the FGI *Guidelines* [see appendix section A1.2-6.4.1.1 (Projecting the weight capacities of patients of size to be served)]. However, if BMI is used when identifying ergonomic thresholds, the BMI threshold is 30, as opposed to 40, which is used in clinical practice.

b. Creating health care environments that can accommodate patients of size requires attention to issues that significantly affect design, such as the nature of the clinical unit or area, current codes, and local regulations. Refer to appendix sections A1.2-6.4.1.1 (Projecting the weight capacities of patients of size to be served), A1.2-6.4.1.2 (Projecting the number of spaces required to accommodate patients of size), and A1.2-6.4.1.3 (Projecting the number of expanded-capacity lifts required) to find suggestions for determining the number of rooms per specific unit that should be able to accommodate patients of size and the need for expanded-capacity lifts. Useful information is provided in the Joint Commission monograph “Improving Patient and Worker Safety: Opportunities for Synergy, Collaboration, and Innovation.”

1.2-6.4.1 Projected Need for Accommodations for Care of Patients of Size

The need for accommodations for care of patients of size shall be defined in the planning phase and shall include the following:

***1.2-6.4.1.1** *Projected weight capacities for patients of size in the population to be served*

A1.2-6.4.1.1 Projecting the weight capacities of patients of size to be served. *Projected weight capacities for the population of patients of size are necessary to make appropriate and accurate design decisions. The data and methods described here can be used to project weight capacities for patients of size.*

For new construction, CDC obesity prevalence data and future projections for a specific geographic area may be used to drive estimates for the accommodations—number of rooms; ceiling lift weight capacities; amount and size of expanded-capacity furniture/equipment; additional space in patient, examination/treatment, and other rooms, etc.—needed for patients who weigh more than 300 lbs. However, when planning renovations to existing buildings or designing replacement hospitals, historical facility data should also be used to forecast the accommodations needed for patients of size. Data should be obtained by clinical unit or area as opposed to gathering facility-wide data. Estimates will be more accurate if at least one year's worth of data is used to obtain average figures.

For organizations without historical facility information, CDC prevalence and future projections are helpful. This information can be found on these CDC websites: www.cdc.gov/obesity/data/prevalence-maps.html and http://nccd.cdc.gov/NPAO_DTM.

***1.2-6.4.1.2** *Projected number of spaces required to accommodate patients of size*

A1.2-6.4.1.2 Projecting the number of spaces required to accommodate patients of size. *When forecasting the number of rooms needed to accommodate patients of size, organizations should consider using the following information:*

- Average number of patients heavier than 300 lbs. admitted on a specific patient care unit each week or served in a specific clinical area each week
- Average length of stay on each specific patient care unit for these patients
- CDC obesity prevalence future projections by geographic area

***1.2-6.4.1.3 Projected number of expanded-capacity lifts required**

A1.2-6.4.1.3 Projecting the number of expanded-capacity lifts required. Expanded-capacity ceiling- or wall-mounted lifts are the preferred method used to move patients and should be installed in rooms with the extra space and maneuvering areas needed for these patients. Details for design of such patient rooms are found in Section 2.1-2.3.2 (Accommodations for Care of Patients of Size—Patient Room). Floor and gantry lifts can also be used to meet the requirements in this section.

Each facility may have a different weight threshold for expanded-capacity lifts, but the suggested expanded-capacity threshold is at least 600 lbs. The threshold is determined by the weight capacity of existing standard capacity lifts used in the hospital, which often have a 600-lb. weight limit.

The projected number of expanded-capacity lifts needed is based on the projected weight capacities for patients of size in the population to be served (see Section 1.2-6.4.1.1) and the projected number of spaces required to accommodate these patients (see Section 1.2-6.4.1.2). When determining the number of expanded-capacity lifts per unit, facilities should consider the following data:

- Average number of patients heavier than 600 lbs. (or facility threshold) admitted on a specific patient care unit each week or served in a specific clinical area each week
- Average length of stay on each specific patient care unit for these patients

Develop projections of future facility needs for accommodating individuals of size from facility data and/or data from the Centers for Disease Control and Prevention (CDC).⁴⁷ The CDC provides obesity data based on geographic location, then drills down by age, gender, and ethnicity. This information can be used to assist in projecting weight capacities for the population to be served in a health care facility. Such planning should also include review of applicable codes and local regulations as well as an understanding of the patient population to be served in each location in a facility.

Number of Rooms and Expanded-Capacity Lifts for Individuals of Size

To ensure a health care facility is designed to provide appropriate care for individuals of size, the design team should work with clinical and other facility staff during the planning phase to project the weight capacities of the population to be served. CDC obesity rates can be helpful in doing this, particularly when designing a new facility for which the patient population must be estimated. Also, estimates of the number of rooms and expanded-capacity lifts needed for individuals of size should be based on facility estimates of the population to be served. (In health care, projections commonly extend for 20 or more years.) With this information, requirements for the number of patient care locations for individuals of size and the number of expanded-capacity overhead lifts can be determined.

Determining the Number of Rooms

In an existing facility with historical data, be sure to consider data on patient weight and trends by patient care area, not facility-wide, and include at least one to two years of data. Identify the average number of patients heavier than 300 lbs. admitted each week on a specific unit and the average length of stay on the unit for these patients, and review the CDC obesity rates for the geographic area.

To project the number of patient rooms required for new construction with no historical data available, use CDC obesity data for the geographic location where the hospital or outpatient facility will be built. For example, if CDC data show 30 percent of the population in the geographic area weigh more than 300 lbs. or have a BMI greater than 30, and it is a 200-bed hospital, then a minimum of 60 patient rooms (or 200 beds times 30 percent) should be designed for individuals of size.

Determining the Number of Expanded-Capacity Lifts

When calculating how many of the 60 patient rooms in the previous example would need expanded-capacity lifts, use the same method of data collection but apply a higher weight capacity.

A health care organization should use the weight capacity of its existing or planned overhead lifts to make an estimate. For example, if the weight capacity of the standard facility lift is 550 lbs. and it is estimated that 5 percent of the individuals of size population will weigh more than 550 lbs., then 5 percent (three) of the 60 rooms will need expanded-capacity lifts. The weight capacities of the standard or proposed lifts should be used for calculation purposes.

1.2-6.4.2 Design Response for Accommodations for Patients of Size

A1.2-6.4.2 Design response for accommodations for care of patients of size

a. Accommodations for patients of size and the equipment needed to care for them require more operational space and more storage space than a traditional patient care environment. The need for increased square footage will be determined by the space needed for caregiver assistance and equipment to accommodate patients of size, both portable (e.g., beds, wheelchairs, furniture, patient lifts) and fixed (e.g., large bore MRI/CT equipment, larger surgical tables and exam tables).

Another primary space driver is the staffing-per-patient ratio and associated maneuverability needed in environments where patients of size are served. In all instances, additional caregivers are recommended for patient handling.

One example of poor accommodation of individuals of size in a hospital is an expanded-capacity bed that is too large to pass through the door of a patient room. When doorways are too narrow, the bed must be disassembled and then reassembled in the patient room. However, this procedure essentially means the patient is trapped in the room if an emergency occurs. Stories abound about not being able to move an individual of size from a patient room for a procedure or an x-ray.

To avoid limiting the health care available to individuals of size, design must make doorways (including elevator doors) wide enough to allow entry/exit of expanded-capacity beds. Appendix O: Equipment Safety Checklist for Accommodating Individuals of Size provides a checklist that health care organizations can use to track the size and weight capacity of facility equipment. This checklist will facilitate provision of a safe environment of care for individuals of size.

b. Other design issues to consider when planning to accommodate patients of size include ingress/egress to primary treatment and service areas. The rooms and/or destinations at the ends of these traverses also need special consideration to accommodate the patients of size:

—Surgical suites. The design needs to address issues that relate to patient transfer, lifting and holding for an extended period, proper and comfortable positioning, and the most efficient positioning for the implementation of surgical processes.

—Imaging suites. Many of the same issues found in a surgical environment, especially patient transfer and positioning, are also present in the imaging environment. It should be noted that much of the equipment associated with imaging is not designed for patients of size. Careful evaluation to ensure selection of appropriate imaging equipment needs to be exercised.

- Exam rooms. Exam rooms should be programmed and sized to accommodate the patient of size and the associated care team.*
- Intensive care units. ICUs should be programmed and sized to accommodate the patient of size and the associated care team.*
- Waiting rooms or areas. Appropriately sized elements with capacity adequate for patients of size should be interspersed with more traditional furnishings to avoid confining patients of size to specific areas of the waiting environment.*
- Additional staff/patient interaction areas. These areas include cashier/registration, patient assessment, food service, physical rehabilitation, and family interaction areas.*

1.2-6.4.2.1 *The projected maximum weight of patients of size who will require accommodations shall determine the design requirements for sinks, toilets, grab bars, casework, and lifts in areas where patients of size will receive care.*

1.2-6.4.2.2 *Those areas of the facility designated for accommodations for patients of size, and the associated path of egress to reach these areas, shall be designed with appropriate support and clearances.*

Design to accommodate individuals of size in hospitals and outpatient facilities. This material is from Section 2.1-2.3 (Accommodations for Care of Patients of Size) in Chapter 2.1, Common Elements for Hospitals, in the 2018 *Hospital Guidelines*. In the 2018 *Outpatient Guidelines*, the material (except that regarding patient rooms) appears in Section 2.1-2 (Accommodations for Care of Patients of Size) in Chapter 2.1, Common Elements for Outpatient Facilities.

2.1-2.3 Accommodations for Care of Patients of Size

2.1-2.3.1 General

During hospital project planning, health care organizations shall determine their need to provide spaces designed to enable safe care of patients of size as required in Section 1.2-6.4.1 (Projected Need for Accommodations for Care of Patients of Size).

2.1-2.3.1.1 Application

- (1) *All patient care areas designated for care of patients of size shall meet the requirements in this section.*
- (2) *A patient handling and movement assessment (Section 1.2-4.3) shall determine the need for expanded-capacity lifts and architectural details that support movement of patients of size in spaces where these patients may be seen. See sections 1.2-6.4.1.3 (Projected number of expanded-capacity lifts required) and 1.2-6.4.2 (Design Response for Accommodations for Patients of Size).*

2.1-2.3.1.2 Location. *Spaces designated for care of or use by patients of size shall be provided where they are needed to accommodate the population expected to be served by the facility.*

***2.1-2.3.1.3 Patient lift system**

- (1) *Accommodations for patient handling, movement, and mobilization shall be provided by either an overhead lift system or a floor-based full-body sling lift and standing-assist lifts.*
- (2) *Lifts chosen shall be capable of accommodating the threshold weight capacity of patients of size identified in the planning phase. See sections 1.2-4.3 (Patient Handling and Movement Assessment) and 1.2-6.4.1.1 (Projected weight capacities for patients of size in population to be served).*

A2.1-2.3.1.3 Patient lift system. *Overhead lift systems have some advantages over floor-based lifts. In addition to needing smaller room dimensions than floor-based lifts, overhead systems biomechanically impact the musculoskeletal*

system of health care providers less than floor-based models. As well, staff prefer and are more compliant in using overhead lifts, reducing the risk of musculoskeletal injury to staff and improving the quality of patient care.

2.1-2.3.2 Patient Room

The following shall apply to patient rooms designated for patients of size.

2.1-2.3.2.1 General

- (1) Capacity. All rooms designated for patients of size shall be single-patient rooms.*
- *(2) Patient lift system. All patient rooms designated for care of patients who weigh 600 lbs. (272.16 kg) or more shall be provided with a lift system (e.g., a ceiling- or wall-mounted system) that can be used to transfer the patient from bed to toilet and is rated to accommodate the maximum patient weight defined in the planning phase.*

***A2.1-2.3.2.1 (2) Patient lifts.** See Section 1.2-4.3 (Patient Handling and Movement Assessment) for information on the lifts appropriate for a project. If, in a renovation project, structural and building material constraints impede the installation of ceiling- and wall-mounted lifts, mobile lifts may be an option. Note that more floor space is needed for use of these floor-based lifts. As well, floor-based lifts are not as stable and result in increased risk of injury for both staff and patients.*

2.1-2.3.2.2 Space requirements

- (1) Area. See Section 2.1-2.2.2.1 (Area) for information on minor encroachments.*

***A2.1-2.3.2.2 (1) Furniture and equipment size.** Furnishings and equipment (e.g., beds, chairs, gurneys) impact clearance requirements. As furnishings and equipment vary based on clinical needs, patient size, manufacturer, and model, it is*

important that furnishings and equipment be selected for planning purposes by the operator of the facility.

(2) *Clearances. The following clearances shall be provided by the room dimensions and arrangements:*

(a) *At the foot of the patient bed: 5 feet (1.52 meters)*

(b) *On the non-transfer side of the bed: 5 feet 6 inches (1.68 meters) from the edge of the expanded-capacity patient bed*

(c) *On the transfer side of the bed: A rectangular clear floor area parallel to the bed shall have these dimensions:*

**(i) In rooms with ceiling- or wall-mounted lifts:*

- *10 feet 6 inches (3.20 meters) long, measured beginning 2 feet (60.96 centimeters) from the headwall*
- *5 feet 6 inches (1.68 meters) wide, measured from the edge of the expanded-capacity patient bed*

A2.1-2.3.2.2 (2)(c)(i) Rectangular clear floor area.

This clear floor area is needed to provide space for the use of an overhead lift and an expanded-capacity wheelchair as well as space for staff to help a patient of size transfer from bed to wheelchair or gurney.

**(ii) In rooms without ceiling- or wall-mounted lifts where mobile lifts will be used:*

- *10 feet 6 inches (3.20 meters) long, measured beginning 2 feet (60.96 centimeters) from the headwall*
- *7 feet (2.13 meters), measured from the edge of the expanded-capacity patient bed*

A2.1-2.3.2.2 (2)(c)(ii) Floor space for mobile lifts.

Mobile lifts require more floor space than overhead lifts to accommodate the lift footprint and the staff needed to help a patient of size transfer from bed to wheelchair or gurney.

When high-risk patient handling tasks are performed in spaces that are too small, the risk of injury for both staff and patient is great. Staff who confront such conditions while caring for individuals of size face a substantially increased risk of injury. To address these risks, during the 2018 *Guidelines* revision cycle an FGI topic group worked to develop minimum size and clearance standards for the use of patient lifts.

The group collaborated with Hillrom to conduct simulations of patient handling tasks using a ceiling lift, floor-based full-body sling lift, sit-to-stand lift, and gurney. The patient handling tasks simulated using this equipment were transportation of a patient to and from a patient room and tasks such as transferring a patient from gurney to bed, from bed to wheelchair, and lifting/transferring a patient from the bed into the bathroom. The results of these simulations are discussed in Appendix D: Clearances for Safe Use of Patient Handling and Mobility Equipment.

2.1–2.3.3 Airborne Infection Isolation (AII) Room

2.1–2.3.3.1 At least one airborne infection isolation (AII) room that meets the requirements in Section 2.1–2.3 (Accommodations for Care of Patients of Size) and the requirements in Section 2.1–2.4.2 (Airborne Infection Isolation Room) shall be provided in the facility.

2.1–2.3.3.2 The number of additional AII rooms for patients of size shall be determined on the basis of an infection control risk assessment (ICRA).

2.1–2.3.4 Hand-Washing Station(s)

Hand-washing stations in toilet rooms designated for use by patients of size shall meet the requirements in Section 2.1–2.8.7 (Hand-Washing Station) as amended in this section.

2.1–2.3.4.1 The downward static force required for hand-washing stations designated for patients of size shall be identified during the planning phase and shall accommodate the maximum patient weight of the patient population.

2.1–2.3.5 Patient Toilet Room

Toilet rooms designated for use by patients of size shall meet the requirements in Section 2.1–2.2.6 (Patient Toilet Room) as amended in this section.

2.1–2.3.5.1 *Where an expanded-capacity toilet is used, it shall be mounted a minimum of 36 inches (91.44 centimeters) from the finished wall to the centerline of the toilet on both sides.*

2.1–2.3.5.2 *Where a regular toilet is used, the toilet shall be mounted a minimum of 44 inches (111.76 centimeters) from the finished wall to the centerline of the toilet on both sides to allow for positioning of an expanded-capacity commode over the toilet when the weight capacity of the existing toilet will not accommodate the patient weight.*

When care for individuals of size will be provided, the weight capacities of toilets, chairs, handrails, sinks, grab bars, and other mounted objects in patient rooms, toilet rooms, hallways, shower rooms, waiting rooms, and elsewhere must be taken into consideration to avoid serious injuries. Providing space to fit an expanded-capacity commode over a toilet in a patient bathroom that does not have an expanded-capacity toilet provides privacy for the patient, which is incredibly important for the dignity of an individual of size in a hospital setting.

2.1–2.3.5.3 *A 46-inch-wide (1.17-meter wide) clear floor area shall extend 72 inches (1.83 meters) from the front of the toilet.*

2.1–2.3.5.4 Grab bars. *See Section 2.1–7.2.2.9 (Grab bars) for requirements.*

2.1–2.3.6 Patient Bathing Facilities

Where bathing facilities are designated for use by patients of size, they shall meet the following requirements:

2.1–2.3.6.1 Shower stalls shall be a minimum of 4 feet by 6 feet (1.22 meters by 1.83 meters).

2.1–2.3.6.2 Showers shall be equipped with grab bars that are capable of supporting 800 lbs. (362.88 kilograms).

2.1–2.3.6.3 Showers shall be provided with handheld spray nozzles mounted on a side wall.

2.1–2.3.7 Single-Patient Examination or Treatment Room

2.1–2.3.7.1 A single-patient examination or treatment room designated for care of patients of size shall meet the requirements in Section 2.1–3.2 (Examination Room or Emergency Department Treatment Room) as amended in this section.

2.1–2.3.7.2 Space requirements

(1) Clearances. Rooms shall be sized to permit the clearances in this section.

(a) At the foot of the expanded-capacity exam table: 5 feet (1.52 meters)

(b) On the non-transfer side of the expanded-capacity exam table: 5 feet (1.52 meters)

In the 2018 *Outpatient Guidelines*, the clearance on the non-transfer side of the exam table is 3 feet (91.44 centimeters) rather than 5 feet because patients seen in an exam room in an outpatient facility are ambulatory and generally healthier than patients seen in an exam room in a hospital.

**(c) On the transfer side of the expanded-capacity exam table:*

A2.1–2.3.7.1 (1)(c) Floor space for using patient lifts. The transfer side clearance in an exam/treatment room with a ceiling- or wall-mounted lift is smaller than that in a patient

room because the patient is anticipated to be upright for transfer. In rooms where mobile lifts will be used, more floor space is required to accommodate the lift footprint and the staff needed to help a patient of size transfer from a wheelchair to an exam table.

(i) Where a ceiling- or wall-mounted lift is provided: 5 feet (1.52 meters) from the edge of the expanded-capacity table

(ii) In rooms without a ceiling- or wall-mounted lift: 7 feet (2.13 meters) from the edge of the expanded-capacity table

(2) When not in use for a patient of size, this examination or treatment room shall be permitted to be subdivided with cubicle curtains or movable partitions to accommodate two patients if each resulting bay or cubicle:

(a) Meets the clearance requirements for patient care stations in Section 2.1-3.2.3 (Multiple-Patient Examination Room).

(b) Has direct access to a hand-washing station.

(c) Meets all electrical and medical gas requirements.

***2.1-2.3.8 Equipment and Supply Storage**

When sizing equipment storage for areas where care will be provided for patients of size, space shall be provided to accommodate the size of the expanded-capacity equipment (e.g., floor-based lifts, lift slings and accessories, etc.) and supplies that will be used.

A2.1-2.3.8 Expanded-capacity floor-based lifts, slings, and accessories for patients of size are larger than standard equipment and require greater unit and in-room storage spaces than may be required in other patient care areas.

2.1-2.3.9 Waiting Areas

2.1-2.3.9.1 Waiting areas shall be sized to accommodate the expanded-capacity furniture required for patients and visitors of size.

2.1-2.3.9.2 A minimum of 5 percent of the seating shall be able to accommodate a person who weighs 600 pounds (272.16 kilograms).

2.1-2.3.10 Special Design Elements for Spaces for Care of Patients of Size

**2.1-2.3.10.1 All plumbing fixtures, handrails, grab bars, patient lift equipment, built-in furniture, and other furnishings and equipment shall be designed to accommodate the maximum patient weight established in the planning phase.*

A2.1-2.3.10.1 Maneuvering of patients of size is an issue designers must consider. If a patient is able to walk, he or she likely will need to use a handrail for support or balance. Such handrails should be designed to support at least 800 lbs.

2.1-2.3.10.2 Door openings. *Door openings shall be provided in accordance with Section 2.1-7.2.2.3 (2) (Door openings) as amended in this section.*

**(1) All door openings used for the path of travel to public areas and areas where care will be provided for patients of size shall have a minimum clear width of 45.5 inches (115.6 centimeters) to provide access for expanded-capacity wheelchairs. Access for expanded-capacity gurneys or beds will require additional clear width.*

A2.1-2.3.10.2 (1) Larger door openings may be required to allow for movement of expanded-capacity beds and equipment. When calculating clearances for expanded-capacity beds, an allowance should be made for two inches on each side of the bed for staff to maneuver through the door openings. For additional information, see appendix section A2.1-2.2.2 (Space considerations for patient mobility).

(2) Door openings to patient rooms for patients of size shall have a minimum clear width of 57 inches (144.8 centimeters).

(3) Door openings to toilet rooms designated for patients of size shall have a minimum clear width of 45.5 inches (115.6 centimeters).

Accommodating Individuals of Size in Residential Health, Care, and Support Facilities

When considering ergonomic issues, the focus should be on a resident's weight, height, and distribution of weight rather than body mass index (BMI). The terms "bariatric" and "body mass index" (BMI) are clinical terms. For ergonomic, or safe patient/resident handling and mobility purposes, 300 lbs. or greater is used as the threshold for identifying individuals of size in the 2018 Hospital and Outpatient *Guidelines*. However, if BMI is used when identifying ergonomic thresholds, the BMI threshold is 30 as opposed to 40, which is used in clinical practice.

Planning for individuals of size in long-term care settings.

The following material is from two chapters, as cited, in the 2018 Residential *Guidelines*.

Chapter 1.2 Planning/Design Process

...

1.2-5.6 Planning Considerations for Persons of Size

1.2-5.6.1 If it has been indicated in the functional program that a facility will accommodate persons of size, the following shall be identified and evaluated:

1.2-5.6.1.1 Areas of the facility designated for accommodations for care of persons of size, including those undergoing bariatric treatment

1.2-5.6.1.2 Paths of egress to reach areas supporting the needs of persons of size

1.2-5.6.2 The areas identified in Section 1.2-5.6.1 shall be programmed and planned with appropriate weight support and clearances.

1.2-5.6.3 See Section 2.2-3 (Design Criteria for Accommodations for Persons of Size) for other requirements.

Chapter 1.4 Design, Construction, and Commissioning Considerations and Requirements

...

***1.4-2.3 Design Considerations for Accommodation of Persons of Size**

Where residents who are persons of size are part of the care population, the facility shall be designed with support and clearances appropriate for these individuals. Other requirements for accommodating persons of size are contained in the facility chapters of this document. See Section 2.2-3 (Design Criteria for Accommodations for Care of Persons of Size) for additional information.

A1.4-2.3 Design considerations for accommodations for care of persons of size. “Person of size” is a term intended to describe a person whose height, weight, body width, weight distribution, and/or size requires increased space for care and use of expanded-capacity devices, equipment, furniture, technology, and supplies. The term is often interchangeable with obese, morbidly obese, and bariatric.

a. The need to accommodate residents who are extremely obese or tall is increasing in the United States. In addition to requiring facilities with more space and resident handling equipment and furnishings with greater weight capacities (e.g., grab bars, chairs, toilets), these residents have a variety of special health care needs from climate control requirements to specialty bathing fixtures. Visiting family members of residents also may be persons of size.

b. Creating residential health, care, and support environments that can accommodate persons of size requires attention to issues that significantly affect design. To determine the number of beds per unit, dwelling units per project, or needs required in a non-residential setting that should be able to accommodate a population of persons of size, the design team should consider design issues along with an analysis of factors such as

resident volume, expected length of stay, the nature of the care population, current codes, and local regulation requirements.

Another primary space driver is the staffing-per-resident (or participant or outpatient) ratio and associated space needed for maneuverability in environments accommodating persons of size. In some instances, additional caregivers are recommended for resident, participant, or outpatient transfers. Many users may also need enlarged facilities to accommodate resident-operated mobility devices, transfer and toileting assistance, and bathing assistance.

Any environment sized to accommodate residents, participants, and outpatients who are persons of size will likely be the largest resident care environment in a facility. If so, all other resident types will be subsets of design parameters established for this environment.

For specific details for accommodating residents, participants, and outpatients who are persons of size, see Section 2.2–3 (Design Criteria for Accommodations for Care of Persons of Size).

In project planning, projections of future facility needs for individuals of size are based on data from the care organization and/or CDC data.⁴⁸ The CDC provides obesity data based on geographic location, with details by age, gender, and ethnicity. This information can be used to project weight capacities for the population expected to be served in a long-term care setting. Planning for accommodations for individuals of size should also include review of current codes and local regulations as well as an understanding of the facility's resident population.

For further information, see the sidebar “Number of Rooms and Expanded-Capacity Lifts for Individuals of Size.”

c. Worker's compensation costs for nurses and nursing assistants amount to nearly \$1 billion per year (Bureau of Labor

*Statistics). Caring for obese residents presents challenges to resident positioning, mobility tasks, and overall resident and staff safety. The Bureau of Labor Statistics has reported that nursing employees suffer more than 200,000 work-related injuries and illnesses a year, including sprains/strains; lower back pain; and wrist, knee, and shoulder injuries, especially when manually moving or lifting residents who are overweight or obese (S. D. Choi and K. Briggs, “Work-related musculoskeletal risks associated with nurses and nursing assistants handling overweight and obese residents: A literature review,” *Work* vol. 53, no. 2, pp. 439–448, 2016). Restricted space increases exposure to high-risk events known to cause injury (G.T. Holman, T. Blackburn, and S. Maghsoodloo, “The Effects of Restricting Space: A Study Involving a Patient-Handling Task,” *Journal of the American Society of Safety Engineers* July 2010:38–46). Clear floor space for correct positioning may reduce injuries during resident handling activities.*

Design to accommodate individuals of size in long-term care settings. The following material is from chapters 2.2, Design Criteria; 2.3, Design Elements; and 2.4, Design and Construction Requirements, in the 2018 Residential *Guidelines*.

Chapter 2.2 Design Criteria

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****2.2-3 Design Criteria for Accommodations for Care of Persons of Size***

Where it has been determined that a facility will need to accommodate residents who are persons of size, areas of the facility designated to accommodate these residents and the associated path of egress to arrive at these areas shall be designed to address weight support and clearances identified during the planning phase.

A2.2-3 Design considerations for accommodations for care of persons of size

a. Accommodations for persons of size and the equipment needed to care for them require more operational space and more storage than a traditional resident health, care, or support environment. Therefore, additional square footage may be required to accommodate these needs.

Size increases will be determined by the space needs of expanded-capacity portable equipment (e.g., beds, wheelchairs, lifts) and fixed equipment (e.g., exam tables) designed for persons of size. Equipment used for persons of size is considerably larger than standard equipment. For example, a bed with a 1,000-pound capacity is 44 inches (101.6 centimeters) to 57 inches (144.78 centimeters) wide by 96 inches (243.84 centimeters) to 102 inches (259.08 centimeters) long.

Resident rooms and exam rooms for persons of size should have a minimum clear floor area of 200 square feet (18.58 square meters); a minimum clear dimension of 17 feet (5.18 meters); and a minimum clearance of 7 feet (2.13 meters) on one side and 5 feet (1.52 meters) on the other side and at the foot of the treatment table or bed. Where a portable lift is used, a minimum of 35 square feet (3.25 square meters) of storage space should be provided.

When a residential health, care, or support facility is constructed without planning to accommodate individuals of size, this oversight can limit these residents' access to care and services. For instance, if a doorway is too narrow to accommodate the full width of an expanded-capacity bed, the bed must be disassembled and reassembled in the resident room. In this situation, the resident is basically trapped in the room if an emergency occurs. Appendix O: Equipment Safety Checklist for Accommodating Individuals of Size provides a safety checklist to help organizations track the size and

weight capacity of facility equipment. This checklist will facilitate provision of a safe environment of care for individuals of size.

Toilet fixtures should be floor-mounted and designed to sustain a minimum concentrated load of 800 pounds (362.88 kilograms)—or as indicated for the care population being served—and mounted a minimum of 24 inches (60.96 centimeters) on center from the finished wall. A clear floor space of 5 feet (1.52 meters) should be provided on one side of the toilet for access and assistance.

Sinks also need to be floor mounted, as people lean on a sink and its surrounds while using the bathroom. A clear floor area of 5 feet (1.52 meters) should be provided on either side of the sink and toilet to accommodate a caregiver who is assisting the resident. It is also good practice to provide a handrail designed to sustain a minimum concentrated load of 800 pounds (362.88 kilograms), or as indicated for the care population being served, adjacent to the sink to give the resident a means of support other than the sink and its surrounds.

If a resident is able to walk, he or she will likely need to use a handrail for support or balance. Such handrails should be designed to support and sustain a minimum concentrated load of 800 pounds (362.88 kilograms).

When accommodations for individuals (and visitors) of size are provided or anticipated, the weight capacities of toilets, chairs, handrails, sinks, grab bars, and other mounted objects in resident rooms, toilet rooms, hallways, shower rooms, resident common areas, public bathrooms, and elsewhere must be taken into consideration to avoid serious injuries. Providing space to place an expanded-capacity commode over a toilet in a resident bathroom that does not have an expanded-capacity toilet provides privacy, which is important to the dignity of an individual of size in a long-term care setting.

b. Other design issues to consider for accommodating persons of size include ingress/egress to primary treatment and service areas. The rooms and/or destinations at the ends of these traverses also need special consideration to accommodate persons of size, whether resident, participant, or outpatient:

- Exam rooms. Exam rooms should be programmed and sized to accommodate the user and the associated care team.*
- Waiting rooms. Furnishings with capacity adequate for persons of size should be interspersed with more traditional furnishings to avoid confining persons of size to specific areas of the waiting environment.*
- Community spaces. Living rooms, dining rooms, activity rooms, and similar interior spaces as well as exterior gardens and similar outdoor spaces should be sized to accommodate the number of persons of size—residents or participants—expected as identified during the planning phase.*
- Additional staff/resident or participant interaction areas. These areas include resident assessment spaces, food service, physical rehabilitation areas, and family interaction areas.*

Chapter 2.3 Design Elements

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2.3-3.2.2 Examination and Treatment Room Space Requirements

2.3-3.2.2.1 Area

- (1) Each examination or treatment room shall have a minimum clear floor area of 120 square feet (11.15 square meters).*
- (2) Where an examination or treatment room is used for a population that includes persons of size, a minimum clear floor area of 210 square feet (19.51 square meters) shall be provided.*

2.3-3.2.2.2 Clearances. *Clearances shall be determined based on the*

type of examination table, recliner, or chair chosen for use. For further requirements based on an evaluation of patient or resident cognitive ability, see Section 2.3–3.2.1.2 (Examination, Observation, and/or Treatment Rooms—General).

- (1) Room arrangement shall permit a minimum clearance of 3 feet (91.44 centimeters) at each side and at the foot of the examination table, recliner, or chair.*
- (2) Where an examination or treatment room is used for a population that includes persons of size, clearances shall be evaluated based on the size of the equipment and furniture to be used, including (but not limited to) bariatric wheelchairs, examination table or bed, and resident seating.*

Chapter 2.4 Design and Construction Requirements

2.4-2.2.9 Grab Bars

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2.4-2.2.9.3 Alternative grab bar configurations

- *(1) Where residents can undertake independent transfers, alternative grab bar configurations shall be permitted.*

A2.4-2.2.9.3 (1) Alternative grab bar configurations

...

e. Where design for persons of size is required, the length of rear wall grab bars should be 44 inches (112 centimeters) and mounted per the ADA Standards for Accessible Design.

...

2.4-2.2.9.5 Concentrated load requirements

- (1) Grab bars, including those that are part of fixtures such as soap dishes and toilet paper holders, shall be anchored to sustain a minimum concentrated load of 250 pounds (113.4 kilograms).*

- (2) *Grab bars installed in areas intended for use by persons of size shall be anchored to sustain a minimum concentrated load of 800 pounds (362.88 kilograms).*

Design for individuals of size in nursing homes. The material below is from Chapter 3.1, Specific Requirements for Nursing Homes, in the 2018 Residential *Guidelines*.

***3.1-2.2 Resident Unit**

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***3.1-2.2.2.2 Space requirements**

A3.1-2.2.2.2 Determining space needs. Resident rooms should be sized, arranged, and furnished to maximize safe resident mobility, mobilization, weight-bearing exercise, and ambulation potential while minimizing risk to caregivers. This should apply to all populations being cared for and served.

Clearances should be provided and maintained to accommodate safe resident mobility and mobilization of residents. Designated clearances should not be obstructed by any object that does not qualify as movable according to Section 1.5-4.2 (Movable and Portable Equipment).

a. To facilitate planning for minimum clearances around beds, bed type and size should be established as part of the functional program. As acceptable to AHJs, bed placement should be chosen by individual residents and their families to satisfy the needs and desires of the resident.

b. Provision of bed clearances to support resident safety should include the following:

...

—Resident rooms for persons of size with an overhead lift:

- 72 inches (182.88 centimeters) from the bed by 120 inches long (304.8 centimeters) on the transfer side
- 36 inches (91.44 centimeters) on the non-transfer side of the bed
- 66 inches (167.64 centimeters) at the foot of the bed

—Resident rooms for persons of size without an overhead lift to accommodate use of a mobile lift:

- 84 inches (213.36 centimeters) from the bed by 120 inches long (304.8 centimeters) on the transfer side
- 36 inches (91.44 centimeters) on the non-transfer side of the bed
- 66 inches (167.64 centimeters) at the foot of the bed

Where lifts are used, additional clearance is needed to accommodate use of the lift and an expanded-capacity wheelchair as well as space for staff to help a person of size transfer from bed to wheelchair or gurney. Mobile lifts require more floor space than overhead lifts to accommodate the lift footprint.

- (1) *Space shall be provided to accommodate resident care and for maneuverability when resident-operated mobility devices are used.*
- (2) *Resident rooms shall be sized, arranged, and furnished to maximize safe resident mobility, mobilization, weight-bearing activity, and ambulation potential and to minimize risks to caregivers. This requirement shall apply to all resident rooms, regardless of resident weight or condition.*

...

3.1-6.9 Elevator Systems

...

3.1–6.9.2 Dimensions and Clearances

Elevator car doors shall have a clear opening of no less than 3 feet 8 inches (1.12 meters).

Design for individuals of size in hospice facilities. The material below is from Chapter 3.2, Specific Requirements for Hospice Facilities, in the 2018 Residential *Guidelines*.

3.2–2.2.2 Resident Room

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***3.2–2.2.2.2 Space requirements**

A3.2–2.2.2.2 Space requirements

...

b. Provision of bed clearances to support resident safety should include the following:

—Resident rooms for persons of size with a ceiling lift:

- *72 inches (182.88 centimeters) from the bed by 120 inches long (304.8 centimeters) on the transfer side*
- *36 inches (91.44 centimeters) on the non-transfer side of the bed*
- *66 inches (167.64 centimeters) at the foot of the bed*

—Resident rooms for persons of size without a ceiling lift to accommodate use of a mobile lift:

- *84 inches (213.36 centimeters) from the bed by 120 inches long (304.8 centimeters) on the transfer side*
- *36 inches (91.44 centimeters) on the non-transfer side of the bed*

- 66 inches (167.64 centimeters) at the foot of the bed

...

A3.2-2.2.2.2 (3)(i) Seating accommodations should be provided for persons of size and their families, who are typically of larger size.

...

3.2-5.2.2.10 Handrails

(1) See Section 2.4-2.2.10 (Handrails and Lean Rails) for requirements in addition to that in this section.

**(2) Handrails capable of supporting 250 pounds (113.50 kilograms) shall be provided in all corridors.*

A3.2-5.2.2.10 (2) Where persons of size are accommodated, supporting weight should be evaluated based on the needs of the care population.

Design for individuals of size in assisted living facilities. The material below is from Chapter 4.1, Specific Requirements for Assisted Living Facilities, in the 2018 Residential *Guidelines*.

4.1-6.9 Elevator Systems

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***4.1-6.9.2 Dimensions and Clearances**

A4.1-6.9.2 Elevator dimensions and clearances

a. Handrail projections of up to 3.5 inches (8.89 centimeters) should not be construed as diminishing the clear inside dimensions.

b. If required to serve the care population and indicated by a mobility transfer assessment, at least one facility elevator should

accommodate attending staff and an ambulance gurney 7 feet 6 inches (2.29 meters) in length and/or an expanded capacity width of 4 feet (1.22 meters) for persons of size.

Design for individuals of size in long-term residential substance abuse treatment facilities. The material below is from Chapter 4.3, which presents specific requirements for this facility type in the 2018 Residential *Guidelines*.

4.3-6.9 Elevator Systems

...

****4.3-6.9.2 Dimensions and Clearances***

Elevator car doors shall have a clear opening of no less than 3 feet 8 inches (1.12 meters).

A4.3-6.9.2 Elevator dimensions and clearances

...

b. If required to serve the care population and indicated by a mobility transfer assessment, at least one facility elevator should accommodate attending staff and an ambulance gurney 7 feet 6 inches (2.29 meters) in length and/or an expanded capacity width of 4 feet (1.22 meters) for persons of size.

Design for individuals of size in settings for individuals with intellectual and/or developmental disabilities. The material below is from Chapter 4.4, which presents specific requirements for this facility type in the 2018 Residential *Guidelines*.

4.4-6.9 Elevator Systems

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***4.4-6.9.2 Dimensions and Clearances**

Elevator car doors shall have a clear opening of no less than 3 feet 8 inches (1.12 meters).

A4.4-6.9.2 Elevator dimensions and clearances

...

b. If required to serve the care population and indicated by a mobility transfer assessment, at least one facility elevator should accommodate attending staff and an ambulance gurney 7 feet 6 inches (2.29 meters) in length and/or an expanded capacity width of 4 feet (1.22 meters) for persons of size.

Design for individuals of size in wellness centers. The material below is from Chapter 5.2, Specific Requirements for Wellness Centers, in the 2018 Residential *Guidelines*.

5.2-6.9 Elevator Systems

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5.2-6.9.2 Dimensions and Clearances

Elevator car doors shall have a clear opening of no less than 3 feet 8 inches (1.12 meters).

Design for individuals of size in outpatient rehabilitation therapy facilities. The material below is from Chapter 5.3, which presents specific requirements for this facility type in the 2018 Residential *Guidelines*.

5.3-2.3.3 Outpatient Waiting Areas

5.3-2.3.3.1 Size. *The waiting room capacity needed for each therapy provided shall be based on the care population being served.*

...

5.3-6.9 Elevator Systems

...

***5.3-6.9.2 Dimensions and Clearances**

Elevator car doors shall have a clear opening of no less than 3 feet 8 inches (1.12 meters).

Facilitation of Patient Mobility and Related Space Requirements

Early mobilization is currently a key focus of hospital care. Research has found that mobilization in general, but particularly early mobilization, has a significant effect on the quality and speed of a patient's recovery as well as a patient's ability to preserve current levels of physical capability. As well, insufficient movement and mobilization put patients at high risk of immobility-related adverse events.⁴⁹ Mobility loss is associated with more days on a ventilator, longer hospital stays, and negative outcomes such as falls and nursing home placement.^{50 51} Mobility loss leads to patient/resident dependency⁵² and affects caregiver health,⁵³ increasing acute and post-acute care costs.^{54 55}

When manual patient handling is the primary or only method of caring for patients, patient mobilization efforts are negatively affected. Conversely, SPHM technology facilitates mobilization, both of dependent patients in bed and of rehabilitating patients who are ambulating. Limited space negatively impacts movement and mobilization for both patients/residents and caregivers, while

provision of sufficient space will facilitate mobilization and its positive health benefits.

Planning to Support Patient Mobility in Hospitals

The shaded text in italics that follows is taken from the 2018 edition of the FGI *Guidelines for Design and Construction of Hospitals*. It is the patient immobility assessment portion of the safety risk assessment requirements, found in Section 1.2-4 (Safety Risk Assessment), with its related appendices. The remaining text in this section discusses and expands on the patient immobility assessment concepts.

****1.2-4.7 Patient Immobility Assessment***

Patient immobility risk in patient care areas shall be assessed to identify design factors that discourage patient mobility and determine how to mitigate their contribution to sedentary patient treatment and behavior.

A1.2-4.7 Patient immobility risk assessment. *The purpose of assessing risk for patient immobility is to decrease the risk of hospital-acquired disabilities caused by lack of mobility.*

a. Patient immobility (a decrease in the time a patient spends out of bed and moving) causes loss of muscle strength and harmful changes in the heart and blood vessels as well as increasing chances of delirium, pressure ulcers, venous thromboembolism, falls, and functional decline. Functional decline (the loss of ability to perform activities that ensure independence, such as getting to the toilet) leads to increased lengths of hospitalization and readmission.

b. Design of the hospital physical environment can influence whether a person remains inappropriately immobile and can be used to encourage and enable patients to remain active. It can also support caregiver efforts to keep patients mobile and support rehabilitation efforts. Design considerations for prevention of immobility include the following:

- Identification of patient care areas in the scope of the project that serve inpatient populations at risk for immobility*
- Identification of conditions that foster immobility or work together to keep patients in bed*
- Identification of furniture and equipment that supports weight-bearing patient mobility and assessment of the space needed for its use and storage*
- Specification of project environmental design features that facilitate patient mobility*

Use of SPHM equipment facilitates early mobilization of patients⁵⁶,⁵⁷ by making the task easier for staff and more secure for patients. Ambulation slings provide a safety net for those rehabilitating and learning to walk again, fostering early and more effective ambulation. The ability to use turning and repositioning slings also helps staff move bed-ridden patients, reducing their risks of acquiring hospital-acquired pneumonia and urinary tract infections and decreasing their length of stay in the hospital. For additional information, see Appendix C: Lift System Components/Sling Selection, Use, and Care.

Design to Support Patient Mobility in Hospitals

The shaded text below is from the 2018 FGI Hospital Guidelines and discusses supporting patient mobility in patient care areas in a hospital, including patient rooms; it is largely appendix material, which is advisory rather meant to be enforced as code.

2.1-2 Patient Care Units and Other Patient Care Areas

2.1-2.1 General

***2.1-2.1.1 Application**

The patient care unit and other patient care area requirements included in this section are common to most hospitals. For requirements specific to a hospital type, see the applicable hospital facility chapter.

A2.1-2.1.1 Accommodations to encourage patient mobility.

Patient care units should be designed to enhance opportunities for patient ambulation, including provision of ceiling track systems that support a harnessed patient walking with assistance (e.g., in patient unit corridors, a physical therapy clinic, and other patient rehabilitation service locations). See Section 1.2-4.7 (Patient Immobility Assessment) for more information about patient immobility prevention as a component of the safety risk assessment.

...

****2.1-2.2 Patient Room***

A2.1-2.2 Equipment and architectural details for the patient room

a. Standing assists. Aids to help patients stand from seated positions (e.g., bedrails, grab bars, and extended chair armrests) should be available.

...

****2.1-2.2.2 Space Requirements***

A2.1-2.2.2 Space considerations for patient mobility. *Patient rooms should be sized, arranged, and furnished to maximize safe patient mobility, mobilization, weight-bearing exercise, and ambulation potential while minimizing risk to caregivers. This should apply for patients of all sizes and conditions described in the functional program.*

Clearances should be provided and maintained to accommodate safe patient mobility and mobilization of patients. Designated clearances should not be obstructed by any object that does not qualify

as movable according to appendix section A1.4-2 (Equipment Classification). Particular attention should be given to the following:

a. Provision of bed clearances to support patient safety

—Medical/surgical patient rooms: 36 inches on far side, 48 inches on transfer side, 36 inches at foot of bed

—Critical care patient rooms: 54 inches on far side, 66 inches on transfer side, 60 inches at foot of bed, 18 inches at head of bed

—Rooms for patients of size: 60 inches on far side, 72 inches on transfer side, 60 inches at foot of bed

b. Furniture and equipment size. Furnishings and equipment (e.g., beds, exam tables, exam chairs, gurneys) impact clearance requirements. As furnishings and equipment vary based on clinical needs, patient size, manufacturer, and model, it is important that furnishings and equipment be selected for planning purposes by the operator of the facility.

c. Sizing of patient rooms to accommodate clearances for patient chairs, etc. The size of patient rooms should allow unimpeded clearance on at least one side and at the front of any patient chair, recliner, wheelchair, or other such device. The clearances should equal, at minimum, those recommended just above for the far side and foot of the bed and may share bed clearance space.

When high-risk patient handling tasks are performed in spaces that are too small, the risk of injury for both staff and patients rises substantially. The clearances shown in this appendix section are based on the FGI topic group's work with Hillrom during the 2018 revision cycle. More information can be found in Appendix D: Clearances for Safe Use of Patient Handling and Mobility Equipment.

Design to Support Patient Mobility in Long-Term Care Settings

The shaded text in italics that follows is from Chapter 3.1, Specific Requirements for Nursing Homes, in the 2018 edition of the FGI *Guidelines for Design and Construction of Residential Health, Care, and Support Facilities*. Some requirements for design of a resident room are provided, but much more of the text is advisory material intended to help designers and providers determine the space needed to support safe patient mobility in resident rooms in nursing homes.

3.1-2.2 Resident Unit

...

3.1-2.2.2 Resident Room

...

****3.1-2.2.2.2 Space requirements***

A3.1-2.2.2.2 Determining space needs. Resident rooms should be sized, arranged, and furnished to maximize safe patient mobility, mobilization, weight-bearing exercise, and ambulation potential while minimizing risk to caregivers. This should apply to all populations being cared for and served.

Clearances should be provided and maintained to accommodate safe resident mobility and mobilization of residents. Designated clearances should not be obstructed by any object that does not qualify as movable according to Section 1.5-4.2 (Movable and Portable Equipment).

a. To facilitate planning for minimum clearances around beds, bed type and size should be established as part of the functional program. As acceptable to AHJs, bed placement should be chosen by individual residents and their families to satisfy the needs and desires of the resident.

b. Provision of bed clearances to support resident safety should include the following:

—Standard resident room:

- *48 inches (121.92 centimeters) on the transfer side*
- *36 inches (91.44 centimeters) on the non-transfer side of the bed*
- *36 inches (91.44 centimeters) at the foot of the bed*

—Resident rooms for persons of size with an overhead lift:

- *72 inches (182.88 centimeters) from the bed by 120 inches long (304.8 centimeters) on the transfer side*
- *36 inches (91.44 centimeters) on the non-transfer side of the bed*
- *66 inches (167.64 centimeters) at the foot of the bed*

—Resident rooms for persons of size without an overhead lift to accommodate use of a mobile lift:

- *84 inches (213.36 centimeters) from the bed by 120 inches long (304.8 centimeters) on the transfer side*
- *36 inches (91.44 centimeters) on the non-transfer side of the bed*
- *66 inches (167.64 centimeters) at the foot of the bed*

Where lifts are used, additional clearance is needed to accommodate use of the lift and an expanded-capacity wheelchair as well as space for staff to help a person of size transfer from bed to wheelchair or gurney. Mobile lifts require more floor space than overhead lifts to accommodate the lift footprint.

c. Sizing of resident rooms should accommodate clearances for resident chairs, recliners, wheelchairs, or other devices; these clearances may overlap with the bed clearances. The size of each

room should allow unimpeded clearance on at least one side and at the front of any resident chair, etc., as follows:

—48 inches (121.92 centimeters) on the transfer side of the chair, etc. for both standard and person of size room types

—36 inches (91.44 centimeters) for the approach to the chair for a standard room

—66 inches (167.64 centimeters) for the approach to the chair for a room accommodating a person of size

- (1) Space shall be provided to accommodate resident care and for maneuverability when resident-operated mobility devices are used.*
- (2) Resident rooms shall be sized, arranged, and furnished to maximize safe resident mobility, mobilization, weight-bearing activity, and ambulation potential and to minimize risks to caregivers. This requirement shall apply to all resident rooms, regardless of resident weight or condition.*

When high-risk resident handling tasks are performed in spaces that are too small, the risk of injury for both staff and residents rises substantially. For more information, see Appendix D: Clearances for Safe Use of Patient Handling and Mobility Equipment.

...

**(h) Clearance for staff members to use lifting equipment to access the bed, chairs, and toilet. See appendix section A3.1-2.2.2.2-b (Determining space needs) for recommendations.*

***A3.1-2.2.2.2 (3)(h)** Although use of portable lifting equipment requires more clearance for maneuvering than fixed lifting equipment, use of fixed equipment does not eliminate the need for portable equipment. Portable equipment will be required when a resident falls out of range of a fixed lift or requires a sit-to-stand lift.*

Using a portable lift without powered wheels to move a resident laterally requires more exertion by staff than using a fixed lift; in addition, the exertion required is increased where the floor is carpeted. However, carpet types differ in their resistance to wheeled devices, and carpet has significant advantages over hard-surface flooring in noise reduction and residential appearance, both of which are important in creating a comfortable, attractive living environment. See Section 2.4–2.3.2 (Flooring and Wall Bases) for requirements.

Resident rooms and associated toilets may be equipped with a ceiling-mounted track to accommodate ceiling-mounted mobility and lifting devices. The track layout should be designed to aid in maintaining or improving resident mobility and ambulation, independent function, and strength and to help staff members transfer residents to or from bed/chair/toilet/bathing facilities/stretcher or reposition them in a bed or a chair.

One objective in using ceiling systems would be to assist residents who have poor balance or are unable to bear all of their weight to stand and ambulate throughout the room. A second objective would be to maximize resident choice and control of bed location and room arrangement, key factors in creating “home” for the resident.

One way to meet these objectives is to install permanent tracks the full length of two sides of the room with a perpendicular spur that extends into the toilet room over the toilet and into a shower, where provided. With this basic layout, when residents who require mobility or transfer assistance move into a room, a cross track and lift device can be installed for the duration of their stay. This approach would make all areas of the room accessible to the resident using the lifting device, thereby offering the resident a variety of room arrangements and substantially reducing the need for a portable lift.

Endnotes

- 1 U.S. Veterans Health Administration, Center for Engineering and Occupational Safety and Health (CEOSH), *Safe Patient Handling and Mobility Guidebook* (2016). Retrieved 7/15/2019 from <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.
- 2 A. Nelson, unpublished research data from pilot study (James A. Haley VA Medical Center, Tampa, FL, 1996).
- 3 A. L. Nelson and G. Fragala, "Equipment for Safe Patient Handling and Movement," in W. Charney & A. Hudson, eds., *Back Injury Among Healthcare Workers* (Washington, D.C.: Lewis Publishers, 2004), 121–35.
- 4 B. Owen and A. Garg, "Assistive devices for use with patient handling tasks" in B. Das, ed., *Advances in Industrial Ergonomics and Safety* (Philadelphia: Taylor & Francis, 1990).
- 5 M. S. Rice, S. M. Woolley, and T. R. Waters, "Comparison of required operating forces between floor-based and overhead-mounted patient lifting devices," *Ergonomics* 52, no. 1 (2009): 112–20.
- 6 W. S. Marras, G. G. Knapik, and S. Ferguson, "Lumbar spine forces during manoeuvring of ceiling-based and floor-based patient transfer devices," *Ergonomics* 52, no. 3 (2009): 384–97.
- 7 Occupational Health and Safety Agency for Healthcare (OHSAH) in British Columbia, "Ceiling lifts as an intervention to reduce the risk of patient handling injuries: A literature review" (Vancouver, BC: OHSAH, 2006).
- 8 E. Carlson, B. Herman, and P. Brown, "Effectiveness of a Ceiling Mounted Patient Lift System," *AOHP Journal* 25, no. 3 (2005): 24–26.
- 9 P. L. Santaguida, M. Pierrynowski, C. Goldsmith, and G. Fernie, "Comparison of cumulative low back loads of caregivers when transferring patients using overhead and floor mechanical lifting devices," *Clinical Biomechanics* 20 (2005): 906–16.
- 10 A. L. Nelson, M. Matz, F. Chen, K. Siddharthan, J. Lloyd, and G. Fragala, "Development and Evaluation of a Multifaceted Ergonomics Program to Prevent Injuries Associated with Patient Handling Tasks," *Journal of International Nursing Studies* 43 (2006): 717–33.
- 11 C. Engst, R. Chhokar, A. Miller, R. B. Tate, and A. Yassi, "Effectiveness of overhead lifting devices in reducing the risk of injury to care staff in extended care facilities," *Ergonomics* 48, no. 2 (2005): 187–99.
- 12 H. M. Tiesman, A. L. Nelson, W. Charney, K. Siddharthan, and G. Fragala, "Effectiveness of a ceiling-mounted patient lift system in reducing occupational injuries in long term care," *Journal of Healthcare Safety* 1, no. 1 (2003): 34–40.

- 13 C. Engst, R. Chhokar, A. Miller, and A. Yassi, "Preventing back injuries to healthcare workers in British Columbia, Canada and the ceiling lift experience" in *Back Injury among Healthcare Workers: Causes, Solutions, and Impacts*, edited by W. Charney and A. Hudson (Boca Raton, FL: Lewis Publishers, 2004), 253–63.
- 14 S. Hignett and J. Arch, "Ensuring bed space is right first time," *Health Estate Journal* (Feb. 2008): 29–31.
- 15 U.S. Veterans Health Administration. *Safe Patient Handling and Mobility Guidebook*.
- 16 M. Muir and S. Gerlach, "Reducing the risks in bariatric patient handling," *Canadian Nurse* 99, no. 8 (2003): 29–33.
- 17 Marras et al., "Lumbar spine forces."
- 18 AORN Workplace Safety Taskforce, *Safe Patient Handling and Movement in the Perioperative Setting* (Denver, CO: Association of periOperative Registered Nurses [AORN], 2007).
- 19 Marras et al., "Lumbar spine forces."
- 20 Rice et al., "Comparison of required operating forces."
- 21 Ibid.
- 22 Ibid.
- 23 Ibid.
- 24 U.S. Veterans Health Administration, *Safe Patient Handling and Mobility Guidebook*.
- 25 Nelson, unpublished research data.
- 26 Nelson and Fragala, "Equipment for Safe Patient Handling and Movement."
- 27 Owen and Garg, "Assistive devices for use with patient handling tasks."
- 28 Rice et al., "Comparison of required operating forces."
- 29 Marras et al., "Lumbar spine forces."
- 30 OHSAH in British Columbia, "Ceiling lifts as an intervention...literature review."
- 31 Carlson et al., "Effectiveness of a Ceiling Mounted Patient Lift System."
- 32 Santaguida et al., "Comparison of cumulative low back loads."
- 33 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 34 Engst et al., "Effectiveness of overhead lifting devices in reducing the risk of injury."
- 35 Tiesman et al., "Effectiveness of a ceiling-mounted patient lift system."

- 36 Engst et al., "Preventing back injuries to healthcare workers."
- 37 Hignett and Arch, "Ensuring bed space is right first time."
- 38 U.S. Veterans Health Administration, *Safe Patient Handling and Mobility Guidebook*.
- 39 Marras et al., "Lumbar spine forces."
- 40 AORN Workplace Safety Taskforce, *Safe Patient Handling and Movement in the Perioperative Setting*.
- 41 Marras et al., "Lumbar spine forces."
- 42 Rice et al., "Comparison of required operating forces."
- 43 Ibid.
- 44 Ibid.
- 45 Ibid.
- 46 A. J. Weiss and A. Elixhauser, "Obesity-Related Hospitalizations, 2004 versus 2009," Statistical Brief #137 (Healthcare Cost and Utilization Project, July 2012).
- 47 Information on trends in obesity can be found on the Centers for Disease Control and Prevention website on the "Data & Statistics" page under "Overweight & Obesity" section at <https://www.cdc.gov/obesity/data/index.html>. Retrieved on July 15, 2019. See the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition, Physical Activity and Obesity, Atlanta, GA, 2015. Available at <https://www.cdc.gov/obesity/index.html>.
- 48 Ibid.
- 49 R. L. Kane, J. G. Ouslander, and I. B. Abrass, *Essentials of Clinical Geriatrics*, 5th ed. (New York: McGraw-Hill, 2004), 245–48; and Rosemary A. Timmerman, "A mobility protocol for critically ill adults," *Dimensions of Critical Care Nursing* 26, no. 5 (Sept.-Oct. 2007):175–79.
- 50 C. J. Brown, R. J. Friedkin, and S. K. Inouye, "Prevalence and outcomes of low mobility in hospitalized older patients," *Journal of the American Geriatric Society* 52 (2004):1263–70.
- 51 R. K. Lord et al., "ICU early physical rehabilitation programs: Financial modeling of cost savings," *Critical Care Medicine* 41 (2013):717–24.
- 52 C. Graf, "Functional decline in hospitalized older adults," *The American Journal of Nursing* 106 (2006):58–67 (quiz 67–68).
- 53 H. Li et al., "Creating avenues for relative empowerment (CARE): A pilot test of an intervention to improve outcomes of hospitalized elders and family caregivers," *Research in Nursing and Health* 26 (2003):284–99.

- 54 R. H. Fortinsky et al., "Effects of functional status changes before and during hospitalization on nursing home admission of older adults," *The Journals of Gerontology Series A Biological Sciences and Medical Sciences* 54A (1999):M521–M526.
- 55 D. B. Reuben et al., "The effect of self-reported and performance-based functional impairment on future hospital costs of community-dwelling older persons," *Gerontologist* 44 (2004):401–07.
- 56 Association of Safe Patient Handling Professionals and American Nurses Association, "Advancing the Science and Technology of Progressive Mobility," (2013). Retrieved 7/15/19 from http://www.asphp.org/wp-content/uploads/2011/05/1400387-ASPHP_ANA_Whitepaper-HR.pdf.
- 57 National Public Radio, "People With Brain Injuries Heal Faster If They Get Up And Get Moving" on 'Your Health', Gretchen Cuda Kroen, July 6, 2015. Retrieved 7/15/19 from http://www.npr.org/sections/health-shots/2015/07/06/419519145/people-with-brain-injuries-heal-faster-if-they-get-up-and-get-moving?utm_campaign=storyshare&utm_source=twitter.com&utm_medium=social.

Making the Business Case for a Safe Patient Handling and Mobility Program

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In an increasingly cost-constrained health care environment, it is important to show that investment in safe patient handling and mobility (SPHM) equipment and training for new or existing facilities is cost-effective and a good use of scarce capital. The case must be made that among the many competing priorities for funds to improve patient care an SPHM program merits funding. This chapter will present a methodology for making an investment-grade evaluation of the total costs and benefits of such a program.

Financial Benefits of an SPHM Program

The recommendations of a patient handling and mobility assessment (PHAMA) can provide the foundation for new care plans that include SPHM equipment. These plans minimize immobility-related and other adverse patient outcomes that result in costs for the health or residential care organization and improve staff satisfaction and retention.

Savings from Improved Patient Health and Quality of Life

Although studies of patient outcome measures related to safe patient handling and mobility are few, indications are that positive relationships exist between the implementation of an SPHM program and improvements in the overall quality of patient care as well as in specific outcome measures such as reduced skin tears, fewer falls, and more frequent mobilization. For example, when mobilization is limited, prolonged bed stays may result in diminished health status and functioning of patients¹ (see the sidebar “Some Complications of Patient Immobility” in Chapter 1 for details), leading to extended and/or repeated stays in health care facilities with their associated costs. Another example is critical care unit (CCU) stays during which patients are not mobilized; this situation can have devastating long-term physical and emotional effects that last well beyond the illness that initiated hospitalization.²

The implementation of an SPHM program, coupled with proper equipment and adequate staff training and support, can mitigate adverse patient conditions resulting in real cost savings to a health care organization. Moreover, safe patient handling and mobility can support patient quality of life with more positive outcomes than are possible in its absence.

Savings from Increased Staff Retention

Many researchers who have undertaken trials of multifaceted safe patient handling programs with use of SPHM equipment as the key risk reduction element have achieved great success in decreasing staff injuries and lost work and modified duty days.^{3, 4} When data on job satisfaction were captured, results showed increases in feelings of professional status and decreases in task requirements, which resulted in improved job satisfaction. Such positive outcomes were thought to increase nursing retention and have a positive effect on nursing recruitment,⁵ thus positively affecting the quality of patient care and an organization’s bottom line.

Implementation of an SPHM program has been shown to improve caregiver efficiency,⁶ substantially decrease workers' compensation costs, and produce a return on investment⁷ ranging from two to four years.⁸ Reductions in indirect costs caused by increased staff morale, decreased need for retraining and overtime pay, and improvements in the quality of care have been estimated as high as five times the direct costs, but more commonly are around two times as high.⁹

Methods for Financing an SPHM Program

Common approaches to financing SPHM programs are grants, loss prevention loans, and capital investments.

Grants and Similar Funding Sources

Private and government (local, state, and federal) grants, endowments, or private donations may be available to fund the acquisition of SPHM equipment especially in localities that have adopted "safe lifting" legislation. This source of funds would be the ideal solution for a health care organization with financial challenges. Each organization should research what funding assistance might be available locally.

Accrued Savings Based on the Use of SPHM Equipment

Hospitals and nursing facilities have promoted SPHM programs and equipment to management, owners, and others who make fiscal decisions by outlining the cost savings associated with workers' compensation insurance, including reductions in claims, claim payouts, and premiums. Some specialized companies that sell SPHM equipment will guarantee a specified cost savings based on their analyses and formulas.

An SPHM program can reduce the risk of injury to employees and patients through training and use of appropriate equipment, which should result in successful loss containment. Based on the resulting savings, the loss prevention option is often the most practical—and thus the most frequently employed—financial solution to funding an SPHM program. Estimates of potential savings form the basis for development of a program budget. The savings should offset the cost of purchasing the equipment and implementing the program. With this option, the equipment cost can be financed and repaid using savings realized from insurance and incident reduction. This cost payback will take place over a few years, and reductions in claims and settlement costs will generate a perpetual savings to the organization.

Research shows that reducing employee patient handling injuries produces a minimum of 30 to 40 percent savings of direct costs in workers' compensation claims and associated payments.¹⁰ Indirect costs will be reduced from two to four times the cost savings from workers' compensation claim settlement payments. Indirect costs include items such as employee replacement, incident investigation time, supervisor time, staff training and morale, social cost of pain and suffering, possible patient or resident injury, breakup of work teams, administrative time, and paid overtime. The combination of decreases in direct and indirect costs is expected to generate significant savings.

Direct financial outlays required to implement an SPHM program will include the cost of purchasing equipment necessary to reduce the risk of injury. When construction activities are planned, the 2018 FGI *Guidelines for Design and Construction* requires that each health care organization conduct a PHAMA to determine the need for and type of equipment best suited for its patients and the building infrastructure. After suitable types of SPHM equipment have been identified, they can be priced by selected equipment companies. This will give the organization actual cost estimates to run the projected savings scenarios for presentation to leadership. The cost scenarios and guarantees to the organization are typically provided by the equipment company or an independent consultant specializing in conducting patient care ergonomic evaluations and SPHM program implementation.

Capital Investment

A straightforward capital expenditure by the health care organization is another way to pay for SPHM equipment and training as part of the cost of doing business. The equipment might be funded through an internal appropriation, an equipment loan, and/or as part of a construction loan. The workers' compensation solution described above may serve as a justification for choosing this approach because the cost can be offset by the insurance claims' savings.

Methods of Making a Business Case

Making the business case for a safe patient handling and mobility (SPHM) program should answer a number of key questions.

- What is the best program for your institution?
- What are the key sources of benefits and costs?
- Which metrics should you track to validate program value?
- What level of funding will be needed?
- Is leadership committed to implementing and supporting the program?
- Will the funding be approved?
- How do you increase the value of the SPHM program?

Four alternative methods of building a business case by answering these questions are presented here, in order from the simplest to the most sophisticated approach. Examples from actual business cases for Stanford Health Care, the Veterans Health Administration (VHA), and Ascension Health are used as illustrations of each.

Cite an Existing Study

The simplest method of making a business case is to cite an existing study.¹¹ The theory is that some version of an SPHM program that worked for someone else would likely work for your institution. The studies cited will show other organizations' answers for the

key questions. However, the answers to these questions vary for different institutions, and this method doesn't provide guidance as to whether the answers in referenced studies would be valid for your organization.

Fill Out a Funding Template


The second method of addressing the key questions, in particular the required level of funding, is to fill out the funding template for your institution. Many organizations require a completed template as part of the funding and approval process. For example, Figure 3-1 (Sample Funding Template from Stanford University Medical Center) shows a completed funding template for an SPHM equipment purchase at Stanford University Medical Center.

Completing this template required estimating revenues (if any) and costs, including capital costs, over a five-year period. Additionally, this Microsoft Excel template included a formula that calculated the internal rate of return on the proposed investment.

As is evident, this template is not specific to an SPHM program, so more detail is needed to understand the assumptions underlying it. Where did the labor savings come from? What is the source of the reduction in the operating expenses noted? What equipment is included in the capital cost?

In this Stanford example, the purchases consisted of a number of portable lift equipment and air-powered lateral transfer systems. The labor savings resulted from reduced lost or light-duty workdays for staff. The other savings were from reduced workers' compensation costs from staff injuries caused by moving, handling, and mobilizing patients. These categories are a typical start for estimating the costs and benefits of an SPHM program.

Figure 3-1: Sample Funding Template from Stanford University Medical Center

		Project Title Safe Patient Handling	TOTAL \$ 825,675			
		Preparer's name Forte, Joan				
		Cost Center 03002 - Clinical Equipment				
CATEGORY (Required) Necessary	CLASSIFICATION (Required) Hospital	JUSTIFICATION (Required) New Service	SHC 100% \$ 825,675 LPCH \$ - SSOM \$ - OTHER \$ - IRR = 27%			
Market Analysis / Competitor Extensive evaluation was done of the two main vendors. Equipment fairs and RFPs were done. The vendor demonstrated the best value and price.		Conflict of Interest (Required. See Instructions) None				
Detailed Description of the Project This is the equipment for the Safe Patient Handling Initiative, previously presented. The program involves new equipment and extensive education with a resulting significant drop in worker injury. Most organizations see at least a 80% return in year 1.						
(SAVINGS)/COST ESTIMATES						
	FY 2009	FY 2010	FY2011	FY2012	FY2013	TOTAL
REVENUES(\$) (Incremental)						
Projected Volume Increases						
Projected Charge						
Projected Gross Revenues	-	-	-	-	-	
Collection Rate Assumption						
Projected Net Revenues:	-	-	-	-	-	
OPERATING EXPENSE(\$) (positive)						
Salaries	(63,247)	(126,494)	(126,494)	(126,494)	(126,494)	(569,223)
Benefits (34% of Salaries)	(21,504)	(43,008)	(43,008)	(43,008)	(43,008)	(193,536)
Supplies						
Maintenance						
Other	512,850	(436,801)	(499,301)	(499,301)	(499,301)	(1,421,854)
Total Operating Cost/(Savings)	<u>428,099</u>	<u>(606,303)</u>	<u>(668,803)</u>	<u>(668,803)</u>	<u>(668,803)</u>	<u>(2,184,613)</u>
Total Capital Cost (positive)	825,675	-	-	-	-	825,675
Net Savings (Cost)	<u>(1,253,774)</u>	<u>606,303</u>	<u>668,803</u>	<u>668,803</u>	<u>668,803</u>	<u>1,358,938</u>
FTE (Reductions) Additions						
Note: Additional operating expenses must be approved through the operating budget process.						
Signatures to be obtained by Capital Assets Department						
Authorization						
CEO/COO	Date	VP or Department Chair	Date	Chair Finance Committee	Date	

Create a Cost/Benefit Projection

The next most detailed method is to create a cost/benefit projection for the SPHM program. Typically calculated using a template created in Excel, this projection estimates the year-by-year costs and benefits for the program. Equipment purchase and installation are included in the year(s) they occur, as are operational costs and benefits.

The first step is to estimate the training costs to launch the SPHM program. See Figure 3-2 (Estimated SPHM Training Costs from Stanford University Medical Center) for that organization's estimated training costs.

Figure 3-2: Estimated SPHM Training Costs from Stanford University Medical Center

Safe Patient Handling Program					
Labor Training Costs					
Employee		Training	Superusers**	Extended Program	Basic Program
				Total Costs	Total Costs
RN Staff*	1680		145		
Extended	4 hr	544320	95700	\$640,020.00	\$367,860.00
Basic	2 hr	272160			
NA Staff*	156		6		
Extended	4hr	18720	1440	\$20,160.00	\$10,800.00
Basic	2hr	9360			
Transport Staff	25		6		
Extended	4hr	2700	1296	\$3,996.00	\$2,646.00
Basic	2hr	1350			
OT/PT Staff*	62		6		
Extended	4hr	14880	2880	\$17,760.00	\$10,320.00
Basic	2hr	7440			
Rehab Aides*	5				
Extended	4hr	600		\$600.00	\$900.00
Basic	2hr	300			
Diagnostic Staff	75		6		
Basic	2hr	9450	3024	\$12,474.00	\$12,474.00
RT Staff	64		6		
Basic	2hr	7680	2880	\$10,560.00	\$10,560.00
Initial Training Costs				\$705,570.00	\$415,560.00

* Includes inpatient areas, ED, OR at 5 per area. Does not include Clinics

** Assumes coverage 24/7

Next, savings from implementing the SPHM program are estimated. Stanford determined their total workers' compensation costs for patient mobilization injuries, then projected a savings of 30 percent of the costs in the first year of the program and 60 percent thereafter. They projected the same percentage reduction in replacement staff costs for injured caregivers. See these figures inserted into Stanford's cost/benefit projection in Figure 3-3 (Cost/Benefit Projection for an SPHM Program at Stanford University Medical Center).

Figure 3-3: Cost/Benefit Projection for an SPHM Program at Stanford University Medical Center

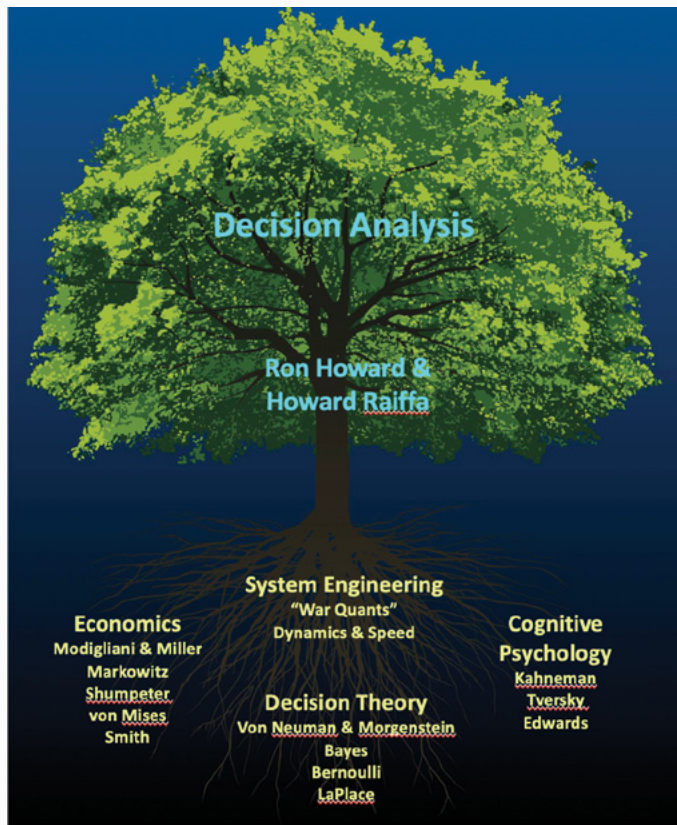
Safe Patient Handling Direct Cost Savings for Worker's Compensation and Replacement Staff Only						
	Year 1	Year 2	Year 3	Year 4	Year 5	Total 5 Year
Average Worker's Comp Expense	\$ 832,168	\$ 832,168	\$ 832,168	\$ 832,168	\$ 832,168	\$ 4,160,840
Staff Replacement Cost						
Salary	\$ 210,824	\$ 210,824	\$ 210,824	\$ 210,824	\$ 210,824	\$ 1,054,120
Benefits	\$ 71,680	\$ 71,680	\$ 71,680	\$ 71,680	\$ 71,680	\$ 358,401
Savings						
WC Expense Reduction 30%	\$ (249,650)					\$ (249,650)
WC Expense Reduction 60%		\$ (499,301)	\$ (499,301)	\$ (499,301)	\$ (499,301)	\$ (1,997,203)
Replacement Cost Reduction 30%	\$ (84,751)					\$ (84,751)
Replacement Cost Reduction 60%		\$ (169,502)	\$ (169,502)	\$ (169,502)	\$ (169,502)	\$ (678,010)
Total Savings	\$ (334,402)	\$ (668,803)	\$ (668,803)	\$ (668,803)	\$ (668,803)	\$ (3,009,615)
Operating Costs						
Staff Training	\$ 700,000					\$ 700,000
Education Consultants	\$ 62,500	\$ 62,500				\$ 125,000
Total Costs	\$ 762,500	\$ 62,500				\$ 825,000
Net Savings	\$ 428,098	\$ (606,303)	\$ (668,803)	\$ (668,803)	\$ (668,803)	\$ (2,184,615)

The cost/benefit projection provides more details than appear in the funding template and other guidance for answering a few of the key questions. For instance, the key benefits are the ones included in the projection, and presumably they are also the ones to track. The cost/benefit projection also furnishes totals needed for the funding template.

This method, however, does not provide guidance for alternative programs because typically information for only one approach is projected. Nor does it indicate whether any of the other potential benefits of an SPHM program would be important enough to be tracked. It also doesn't identify how to increase the value of an SPHM program.

To answer the full set of useful questions regarding an SPHM program at your institution and to ensure funding and leadership support, a more sophisticated means of making the business case may be required.

Figure 3-4: The Roots of Decision Analysis



Employ Decision Analysis

Decision analysis was developed to make high-quality decisions in the face of uncertainty. As illustrated in Figure 3-4 (The Roots of Decision Analysis), founders Ronald Howard at Stanford and Howard Raiffa at Harvard drew from a number of disciplines in creating the philosophy, theory, practice, tools, and methodology of decision analysis.¹²

Decision analysis works by building the basis of a good decision in pieces. As illustrated in Figure 3-5 (The Basis of a Good Decision), alternatives are options for achieving your goal. Information and beliefs are the available historical data and careful estimates of the probabilities of relevant uncertainties. Preferences are the time value of money and attitude toward risk. These pieces are used to

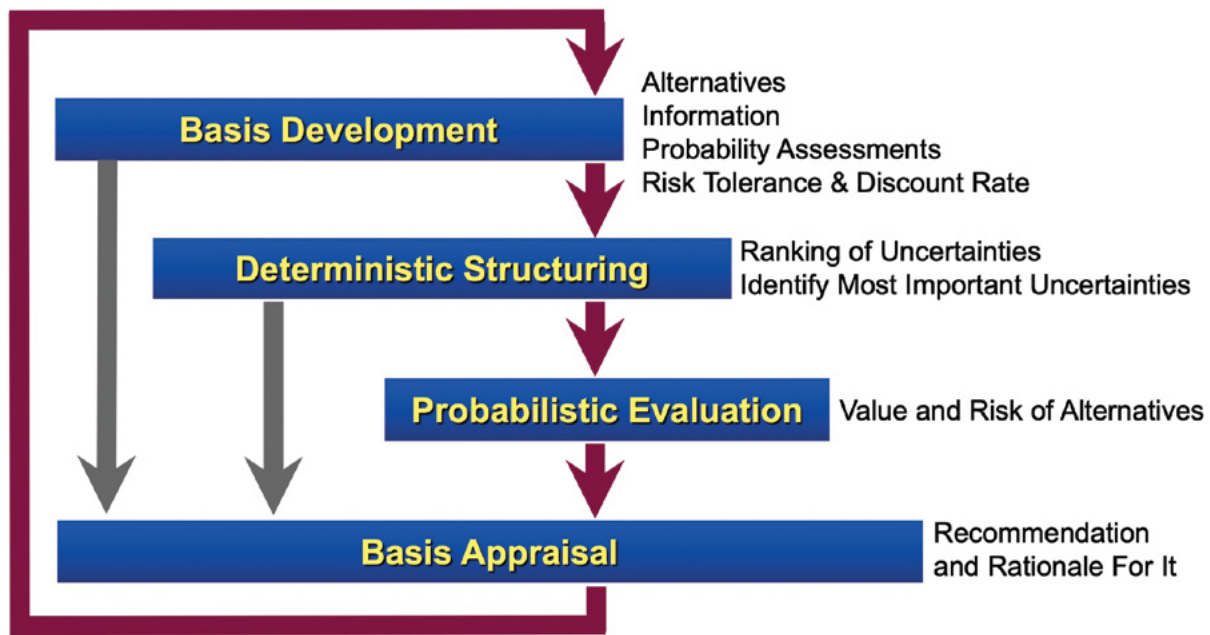
create a quantitative model that provides insight into which alternative is best and why. After consideration of this model, a decision is made. The resulting outcome is uncertain until it actually happens.

Figure 3-5: The Basis of a Good Decision



With the foundation offered by decision analysis, a good decision is defined as one logically consistent with what is known at the time the decision is made. A good outcome is what you hope will happen. This approach is fundamentally different from how most people evaluate a decision. Typically, a decision is considered good if it has a fortunate outcome and bad if it does not. However, this hindsight approach rewards luck rather than good decisions. In contrast, decision analysis builds understanding of which alternative is best and why in stages, as illustrated in Figure 3-6 (Decision Analysis Builds Insight in Stages).

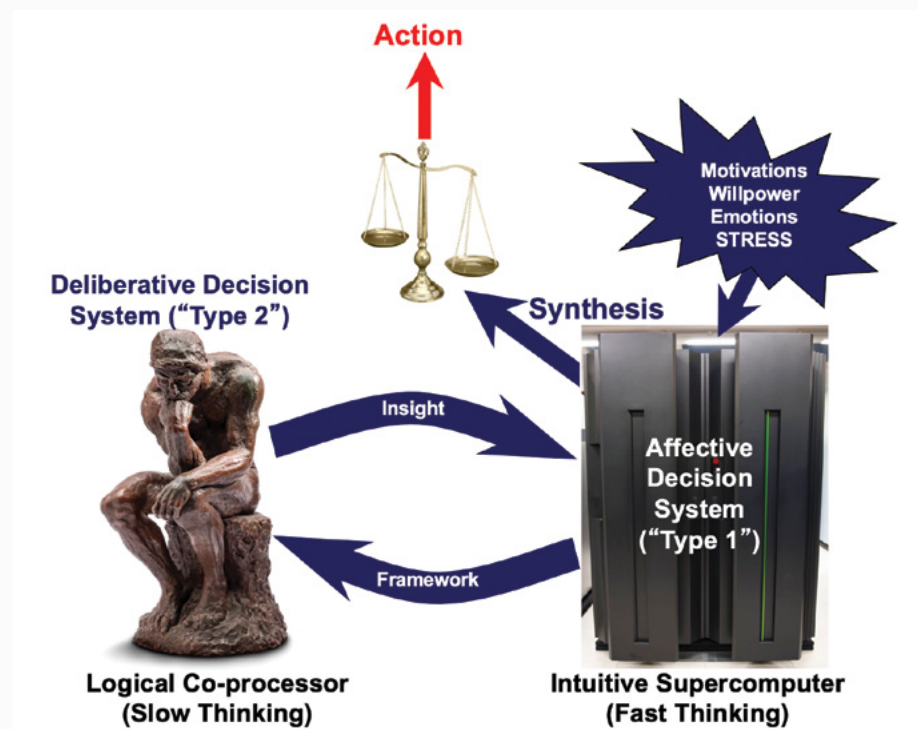
Figure 3-6: Decision Analysis Builds Insight in Stages



In basis development, the alternatives, data, probability assessments, risk tolerance, and discount rate are pulled together. In deterministic structuring and evaluation, we identify which uncertainties are most important and rank them. In probabilistic evaluation, the value and risk of each alternative is calculated. Finally, in basis appraisal, the best course of action and the rationale for it are determined. The process is iterative: at each stage, we examine whether we have the best possible information and ways of analyzing it to reveal the best decision.

Decision analysis is a methodology for making better use of the two built-in thinking modes available to most people—an intuitive supercomputer (fast thinking) and a logical co-processor (slow thinking).¹³ See Figure 3-7 (Two Thinking Modes to Achieve Better Decisions).

Figure 3-7: Two Thinking Modes to Achieve Better Decisions



Fast thinking (or intuition) is quick and easy and works well most of the time. It employs subtle, complex reasoning processes that are difficult to trace. It governs emotions, trust, empathy, and action. It is highly developed for understanding other people and their intentions. Unfortunately, intuition very predictably and repeatedly goes astray when dealing with uncertain or complex situations.

Thankfully, nature has also equipped us with slow thinking, our logical co-processor. It is a slower process and takes more effort to invoke, but is less prone to error. It uses transparent, logical reasoning. It requires concentration and focus—at the risk of solving the wrong problem. Most importantly, logical arguments do not lead to action unless they are trusted and persuasive.

People naturally make decisions with some combination of intuition and further reflection (slow thinking). Decision analysis furnishes a structured way of applying both approaches to decision-making and answering tough questions. Intuition furnishes the decision basis. Logic evaluates that in a quantitative model. The results drive insight as to which alternative (in this case, which SPHM program) is best for your institution and why. That insight can be communicated to decision makers in a one-sentence summary backed up by detail about the decision basis and the analysis.

Decide Which Method to Use

Which method should you use to make the business case for an SPHM program at your institution? Our suggestion is to start with the simplest possible method that addresses the challenges your SPHM program faces, then get fancier as you need to. For example, for a single or small institution, referencing an existing study may be sufficient to justify purchasing equipment and training staff how to use it.

At Stanford, the SPHM program was approved on the basis of the funding template and the cost/benefit analysis. When the organization ran into challenges acquiring funding to sustain the program and figuring out how to increase the program value, additional work was needed. At that point, they went to a decision analysis.

In contrast, the Veterans Health Administration (VHA) and Ascension Health went directly to a decision analysis. At the VHA, headquarters funding for an initial program had ended and implementation at VA medical centers was faltering; to respond, they needed a strong case for what additional program (if any) should be undertaken and to justify funding. Ascension Health was trying to launch the program in a highly cost-constrained environment in the face of very strong pushback on purchasing any but the most minimal equipment.

In the next sections, we'll illustrate how, for these three institutions, decision analysis furnished persuasive answers to the tough questions

posed about a prospective SPHM program. Whenever it is difficult to answer these questions, a decision analysis is the best means of tackling them and creating consensus for successful implementation.

Answering Key Questions About the Business Case

Making the business case for an SPHM program is a process of understanding, quantifying, measuring, and finding ways to increase the program's value. This process enables you to answer the key questions about your program and ensure it is successfully implemented. Each of these questions is discussed in some detail in this section.

What is the best program for your institution?

The core modality of an SPHM program is well established: implement patient-mobilization equipment and methods to increase patient dignity, reduce patient harm, and reduce injuries to caregivers.¹⁴ However, there is no one-size-fits-all prescription for the best program at your institution. To determine that program, many questions need to be addressed:

- **Scope of program:** Should you focus on the critical care unit, include all acute care, or expand to include outpatient and long-term care facilities? Or, should you take a flexible approach based on patient mobility by care area?
- **Equipment strategy:** Should you go “low-tech” with slide sheets, slide boards, and limb lifters; include portable mobilization equipment; add overhead track fixed equipment?
- **Communication:** What communications will be needed to alert and educate staff? Patients and family?
- **Education and training:** How much training will be needed and for whom? How many people will you need with various levels of expertise?
- **Feedback and leadership support:** What regular reporting on

program progress and results will be needed? What roles do nursing and executive leadership need to play?

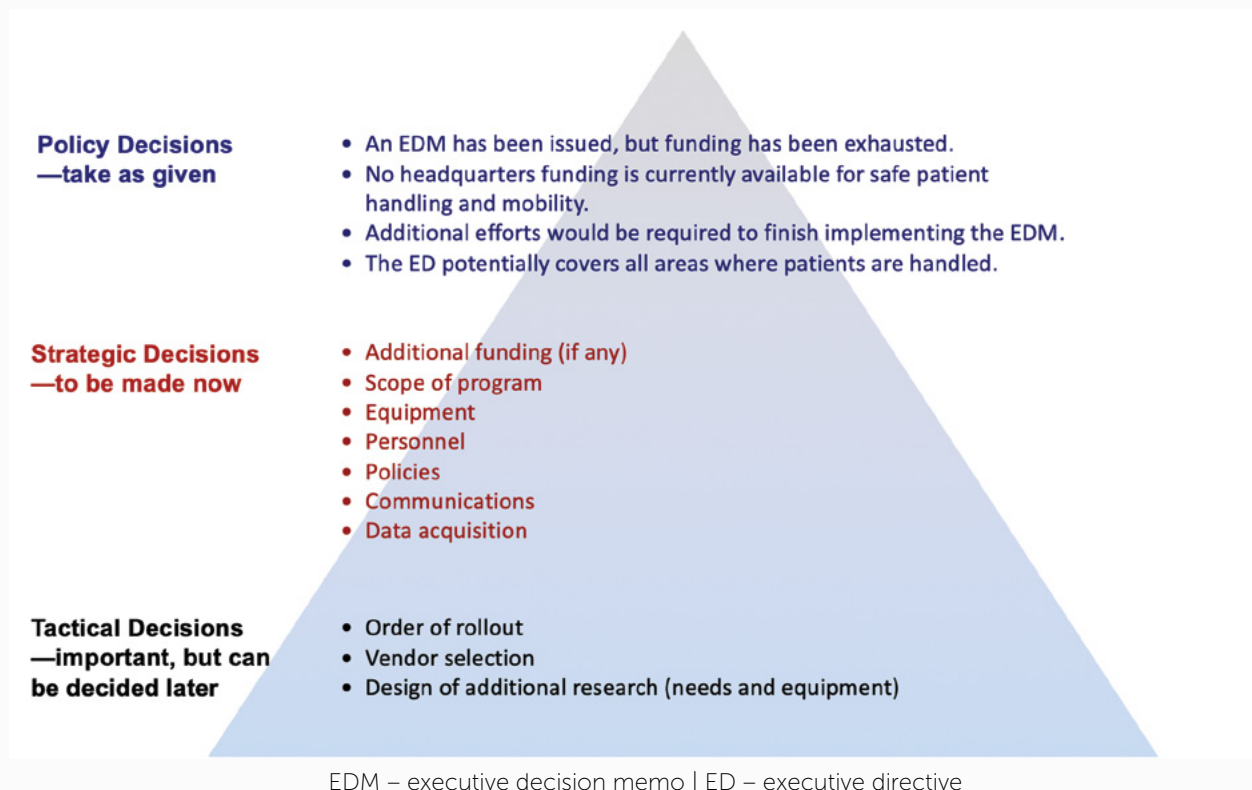
- **Compliance:** Will you need to monitor behavior and compliance? Should personnel regularly certify their competence to apply SPHM equipment and methods?

The best program for your institution is the one that, from among all these possible choices, creates the most value. We define value simply as benefits minus costs. Hence, identifying and quantifying the key sources of benefits and costs is critical.

A look at other business cases will reveal what other institutions have done but will likely shed little light on whether some variation would be better for you. Doing a cost/benefit analysis will shed some light, but only if you create cost/benefit analyses for multiple alternatives.

In contrast to these approaches, a key part of a decision analysis is creating and analyzing multiple alternatives, including a “do nothing”

Figure 3-8: Decision Hierarchy for the VHA



or “status quo” alternative. It answers the question of what is the value or cost of doing nothing. Understanding the value of doing nothing is usually critical to creating consensus and understanding for doing something.

For the VHA, understanding the value of the status quo (no new program) was critical to creating impetus for a new program. The first step toward decision analysis taken by the VHA was to structure the program alternatives. They began by creating a decision hierarchy to identify and separate the policy decisions (taken as given) from the strategic ones (important and to be made now) or the tactical decisions (still important, but they can be made later). Figure 3-8 (Decision Hierarchy for the VHA) shows points the VHA considered for each type of decision. Table 3-1 (VHA Strategic

Table 3-1: VHA Strategic Decision Factors

Strategic Decision	Factors Affecting the Decision
Scope of program	Facilities
	Special needs populations
Equipment	Additional equipment
	Supply chain
	Engineering/facility management
Personnel	FTE staff
	Training
	Leadership support
Policies	Compliance
	SPHM performance and measures
	Training materials
Communications	Communications out
	Patient involvement
	Web-based communications
	Communications in
Data acquisition	Surveys

Decision Factors) breaks down each type of strategic decision into factors that influence it.

To help direct the strategic decision-making, the VHA created a strategy table with each decision heading a column and alternatives listed underneath. The first column shows the possible alternative strategies, including the status quo (no new program). A complete strategy could then be identified by making one or more selections from each column. See Table 3-2 (Excerpt from VHA Strategy Table) for a sample from the VHA's completed strategy table.

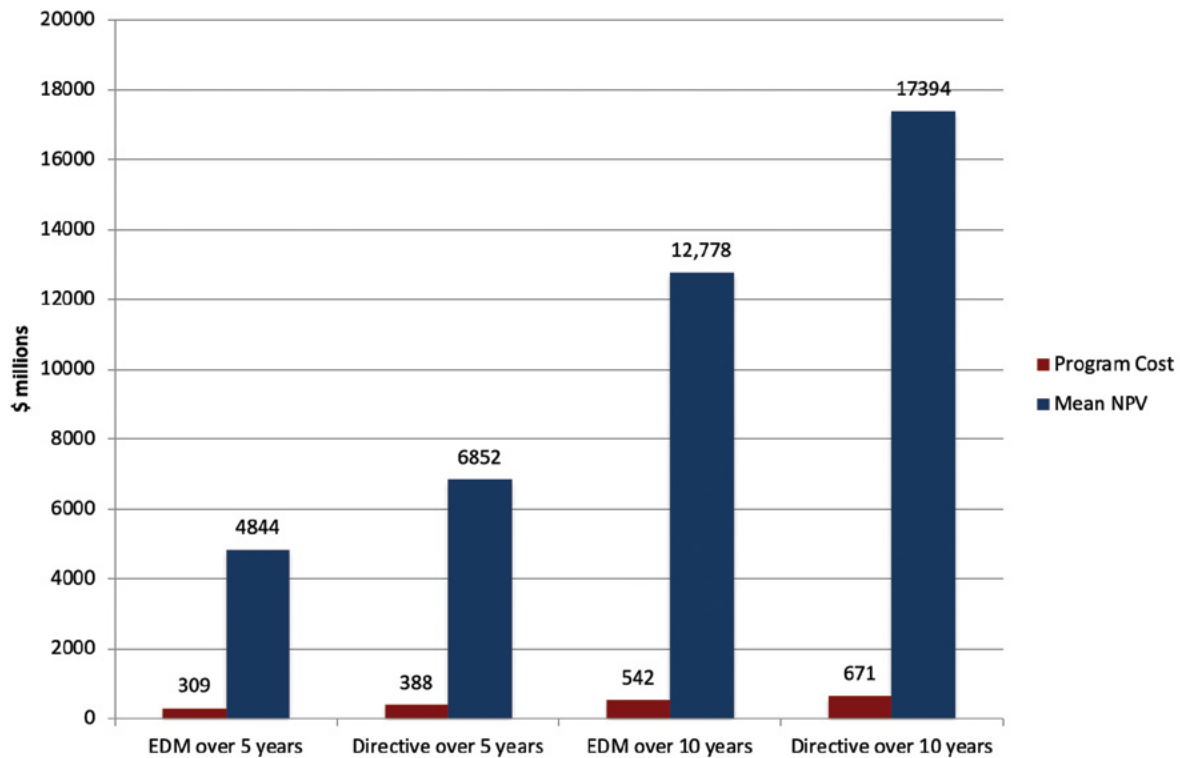
Table 3-2: Excerpt from VHA Strategy Table

Candidate Strategies	Scope of Program		Equipment		
	Facilities	Special Needs Populations	Additional Equipment	Supply Chain	Engineering/ Facilities Management
Status Quo-	Status Quo: focus on VA Medical Centers	SQ: no specialized Programs; research on SCI patient handling needs	SQ: no HQ funding	SQ: local staff assist FCs	SQ: local staff assist FCs; Natl Eng office assists natl prog mgr & FCs
Finish Implementing EDM, expand program to cover other areas within facility not originally included and include bariatrics	Add bariatrics and areas not included in EDM to go facility-wide 2 3	Add Bariatric Program 5	Add funding to finish VAMC areas in EDM 6	Develop standardized SOWs for SPH sole sources	Multidisciplinary team to put together purchase package. FC inclusion in Design Developmt from beginning. Bring Fac Mgmt along when conducting walk-through with vendors.
Fully Implement Directive 1	Fully Implement Directive 4 - Add Rehab Facilities, Primary Care Centers, CBOC's, Home based Health, Assisted Living Facilities, Domiciliaries Ensure sustainability of PL Program Funding for Future Growth	Add Falls Prevention Program Add Wound Care Program Add Research to further define patient population needs and impact on quality of Patient Care	Add funding for slings and other lift accessories Add Bariatric equipment 7 Add funding to bring VAMC in full compliance with Directive 8 Add facility funding for replenishable/ disposable supplies and equipment 9 Add funding for all areas in 'Facilities' column Add Simulator lab equipment	Identify SPH liaison from Supply & Equip Commodities Team Add COTR training for FCs Expand role of VISN SPH POC to advocate for SPH contracting National acquisition Equip Committee - [Equip Life cycle mgmt] Classification of equip supply type - clinical vs non-clinical	Add development of national commissioning, routine inspection, and maintenance standards Add bariatric rooms/suites 10 Add revision to VA Master Specifications to ensure facility staff select ceiling lift systems, not contractors -OR Facility provides equipment rather than contractor Define minimum storage and space requirements

Note: The complete strategy table included two additional pages and footnotes.

Quantifying the status quo was critical because it was the basis against which incremental costs and benefits for the two other alternatives were measured. The first alternative was to fully implement the program started previously (described in an executive decision memo or EDM), while the second was to fully implement an executive directive (ED) for safe patient mobilization. Both alternatives were evaluated over five- and 10-year time horizons. The five-year horizon was intended to show program value with just a few years of benefits after implementation, while the 10-year horizon

Figure 3-9: Mean Values for Program Alternatives at the VHA



EDM – executive decision memo | Directive – executive directive

captured a more complete picture of program benefits. The mean program results are shown in Figure 3-9 (Mean Values for Program Alternatives at the VHA).

The results clearly showed that a new program had compelling value over no new program and that the more expansive program (the ED) created the greatest value of all. Further, even the more expansive program promised a mean value of \$17.4 billion in benefits after subtracting the \$671 million in mean incremental program costs.

What are the key sources of benefits and costs?

At a broad level, benefits can be sorted into patient benefits and caregiver benefits. Patient benefits from safer, earlier, and more effective mobilization may include:

- Reduced falls
- Reduced pressure ulcer incidence and severity
- Reduced need for catheterization and catheter harm
- Reduced length of stay
- Reduced hospital-acquired complications

For each of these benefits, it's helpful to consider both reduction in the cost of care and reduced costs from claims or suits.

Some of these benefits accrue as an effect of benefits to caregivers. For example, the physical demands of the job are often described as a key reason for nurses changing jobs. If nurses stay in their jobs longer because an SPHM program reduces physical demands, that increased tenure is associated with a reduction in hospital-acquired complications.

Caregiver benefits may include:

- Reduced musculoskeletal stress and strain injuries, resulting in workers' compensation costs
- Reduced caregiver health care costs (Some of the costs of those stress and strain injuries fall under employee benefits rather than workers' compensation.)
- Reduced caregiver turnover
- Time savings when mobilizing patients (It is often faster and requires fewer people to mobilize a patient using SPHM equipment and methods.)

Program costs can be roughly sorted into equipment and labor. Some examples of equipment costs are:

- Initial equipment purchases and installation
- Ongoing equipment maintenance and operations costs (e.g., maintenance contracts, sling laundering, replacement of items)

Labor costs include:

- Initial training and education

- Ongoing certification and training
- Program management, including creation of training materials

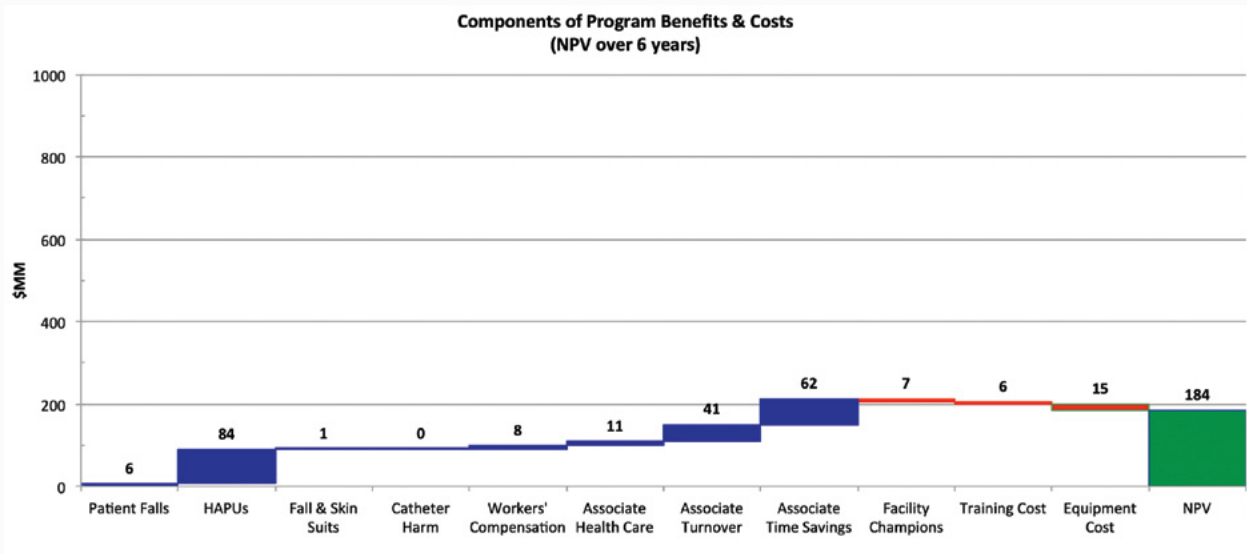
Program value, then, is determined by adding up all the benefits and subtracting all the costs. Thus, calculating the program value requires quantifying each benefit and cost.

A cost/benefit analysis gives you a start to identifying the key benefits and costs by quantifying each category. Decision analysis adds further rigor with a deterministic evaluation stage, in which sensitivity analysis tests the assumptions going into each category. Once sensitivity analysis has given a thorough road test to the assumptions, it is useful to summarize the benefits, costs, and total program value for each alternative in a waterfall chart. This type of chart illustrates how benefits add up and costs subtract to reveal total program value.

For Ascension Health, efforts began with identifying and quantifying the status quo or “no new program” alternative. Against this, the value of a low-tech strategy (training plus slide sheets, slide boards, and limb lifters) and a strategy that added portable lifts and ceiling lifts in low-mobility areas (like the CCU) were measured. A waterfall chart for the low-tech strategy at Ascension is shown in Figure 3-10 (Value Assessment of Low-Tech Strategy at Ascension Health). Figure 3-11 (Value Assessment of Low-Tech + Lifts Strategy at Ascension Health) shows a waterfall chart for the low-tech plus lifts strategy at Ascension.

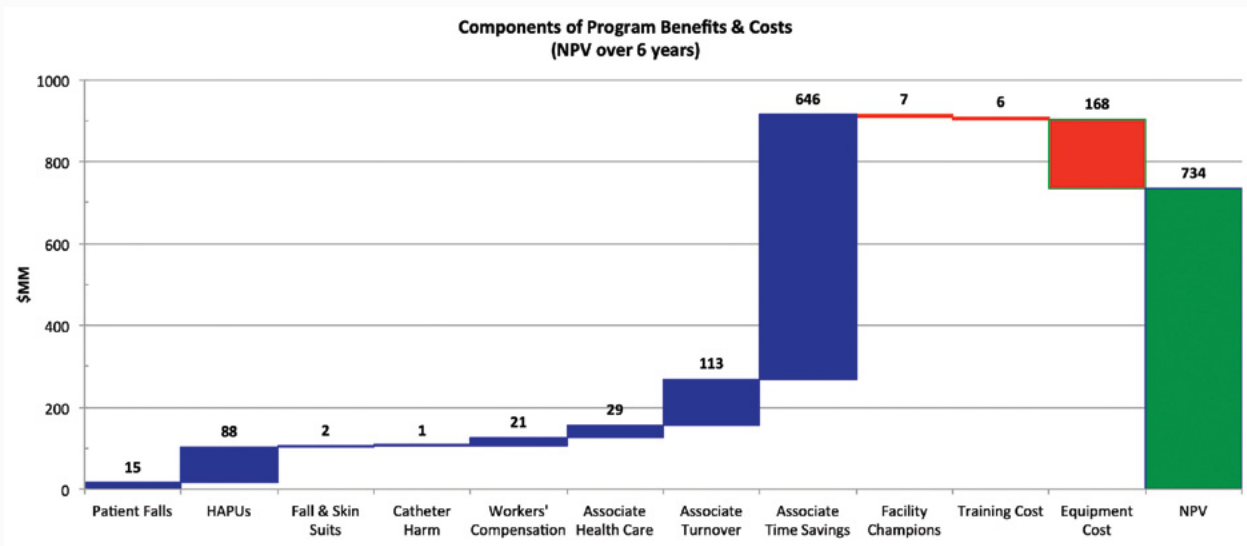
A comparison of these two charts was revealing. The low-tech strategy was indeed highly worthwhile. The greatest value came from reducing hospital-acquired pressure ulcers (HAPUs), which was quite surprising because Ascension Health already had a very successful HAPU prevention program. Careful examination of the assumptions showed that a program wouldn't reduce the rate of HAPUs (which was already very low), but would catch most of the HAPUs that later progress to Stage 3 or Stage 4 and keep them at a Stage 1 or 2. The costs of treating a Stage 3 or 4 HAPU are much greater.

Figure 3-10: Value Assessment of Low-Tech Strategy at Ascension Health



This waterfall chart demonstrates the value of implementing a low-tech SPHM program (training plus slide sheets, slide boards, and limb lifters). Red indicates costs, blue indicates benefits, and green is the difference—the net present value.

Figure 3-11: Value Assessment of Low-Tech + Lifts Strategy at Ascension Health



This waterfall chart demonstrates the value of implementing a low-tech plus lifts SPHM program. Red indicates costs, blue indicates benefits, and green is the difference—the net present value (associate - nurse).

Adding lifts did not add much value in HAPU reduction but yielded far greater benefits in reducing caregiver turnover and in saving time during tasks. Studies have shown that using SPHM methods requires

fewer nurses and is faster than manual methods of patient handling. In the case of Ascension Health, including lifts was better than the low-tech approach alone.

Careful analysis such as this can reveal where the key benefits and costs lie for an SPHM program.

Which metrics should you track to validate program value?

Two factors can determine which metrics should be tracked to validate program value:

- Where will the program create value?
- Where can the impact of the program be tracked?

To identify where a program creates value, start by looking at areas that show the biggest benefit numbers in a cost/benefit analysis. What you're really interested in is the total value by benefit category over the program life, which is nearly impossible to intuit from a stream of annual numbers. Net present values over program life, as displayed in a waterfall chart, are perfect for making this determination. For example, the waterfall chart in Figure 3-11 (Value Assessment of Low-Tech + Lifts Strategy at Ascension Health) shows the biggest benefits in caregiver time savings, reduction in turnover, and reduction in HAPUs. Thus, these areas would be initial candidates for tracking metrics.

Here's where the second question comes in. Where can the impact of the SPHM program be tracked separately from all the many other factors that could influence the tracking results? In the case of caregiver time savings, for example, many factors drive the caregiver hours at a facility aside from time spent caring for patients, including patient load and acuity. If more patients are admitted than planned or the patients are more acute and require more care, those factors could easily swamp any time efficiencies gained from an SPHM program.

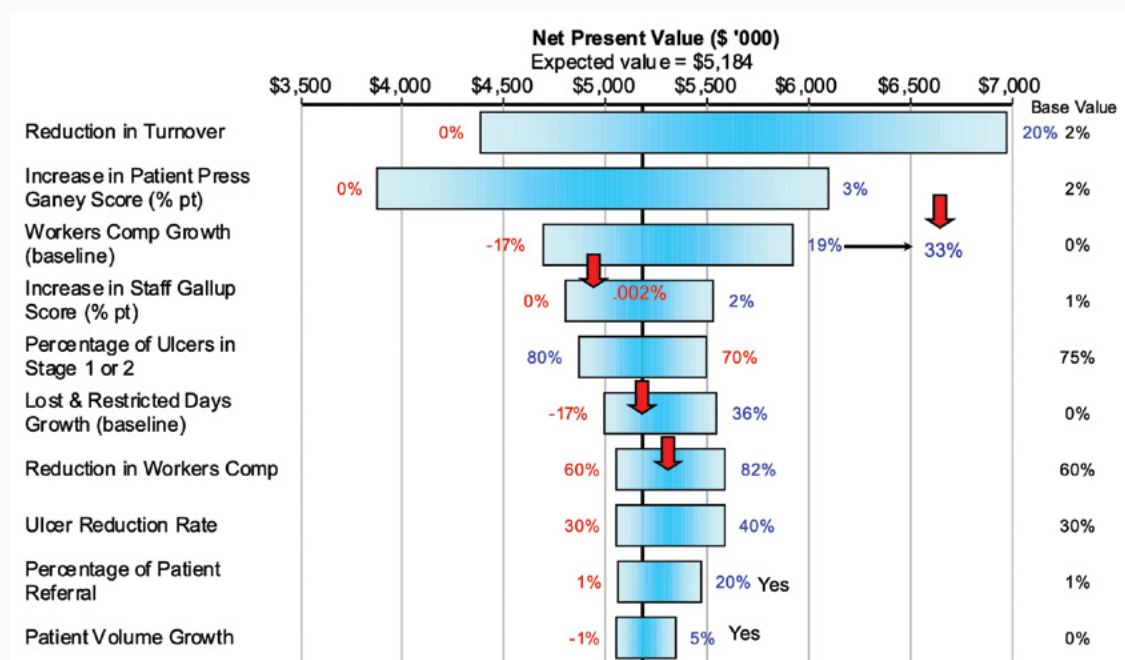
Thus, the typical metric to track is the very direct measure of caregiver sprain and strain injuries from patient handling, as Stanford

did. Relying only on this information, however, will miss where most of the potential program value lies, as many organizations have found, including Ascension Health.

For Ascension, the other metrics important to track would be the nurse turnover rate and the rate of stage 3 or 4 pressure ulcers (recalling that, at Ascension, the HAPU value came not from dropping the overall HAPU rate but from reducing stage 3 or 4 HAPUs to stage 1 or 2). The stage 3 or 4 HAPU rate was an especially good metric for Ascension to track because they already had a very low overall HAPU from a prior successful program.

A decision analysis tool useful in finding metrics that most clearly show the effects of implementing an SPHM program is the deterministic sensitivity analysis. This analysis shows which inputs, varied over the range of possibilities, have the greatest impact on program value. When these impacts are plotted on a bar graph from largest impact to smallest, it produces the characteristic shape prompting the moniker tornado chart. The tornado chart for Stanford shown in Figure 3-12 (Metric Tracking from SPHM Program at

Figure 3-12: Metric Tracking from SPHM Program at Stanford



This tornado chart shows the metrics Stanford tracked to find which measures provided the best value information. (associate – nurse | NPV – net present value)

Stanford), along with actual costs from program implementation (the red arrows).

Even though reduction in turnover had the biggest potential impact and Stanford, in fact, achieved a reduction in turnover, they declined to assign credit to the SPHM program because a local labor market recession likely also reduced turnover.

At the same time, though, Stanford noted that the baseline growth in workers' compensation costs was increasing (at 33 percent), much more than the range of -17 to +19 percent that had been estimated. A closer look revealed that a return-to-work program had been discontinued, which led to the much faster than projected increase in costs. Stanford reinstated the program.

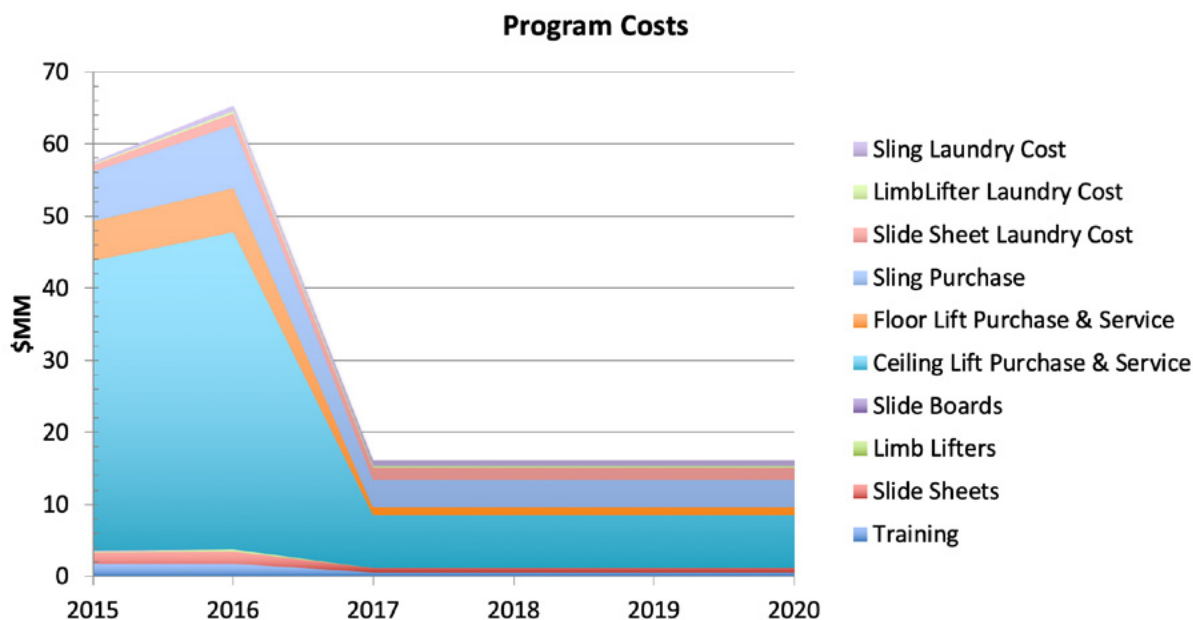
In summary, establishing program metrics to validate program value is a critical and necessary job, but requires careful thinking about where and how a program works and where it can be tracked to gain the most useful information. Use of a cost/benefit analysis, waterfall charts, and tornado charts can help immensely in figuring this out.

What level of funding will be needed?

If the work to fill out a funding template has been completed or a cost/benefit analysis created, you will have a good understanding of the funding required to implement an SPHM program. If you've done the further work of evaluating alternative programs, you also know the level of funding needed for these alternatives.

For example, the waterfall chart in Figure 3-11 (Value Assessment of Low-Tech + Lifts Strategy at Ascension Health) shows the program will require (in NPV over six years) \$7 million for training facility champions, \$6 million for other training costs, and \$168 million in equipment purchase and maintenance costs. These costs usually need to be shown in further detail, which the cost/benefit analysis provides. Figure 3-13 (Annual Costs for Low Tech + Lifts SPHM Program at Ascension) shows the annual costs at Ascension Health for this SPHM program.

Figure 3-13: Annual Costs for Low-Tech + Lifts SPHM Program at Ascension



Of course, determining the required funding level is usually much easier than getting it approved. Before addressing that question, we face the important prerequisite for approval: Is leadership committed to implementing and supporting the program?

Is leadership committed to implementing and supporting the program?

Getting organizational leadership commitment to implement an SPHM program usually requires tackling three big questions:

- Do you understand the total SPHM program value, the sources of that value, and how the program can realize its potential value?
- Do you understand the uncertainty in the SPHM program value and what is driving that uncertainty and why?
- How does the SPHM program fit with the organization's other strategic priorities?

We'll take each in turn.

Citing a previous study gives insight into the value other institutions have found in an SPHM program, but not into the value your organization might see. For the latter, at least a cost/benefit analysis and possibly a decision analysis will be needed. If you have done those, you should have identified most potential costs and benefits. The program value is benefits minus costs.

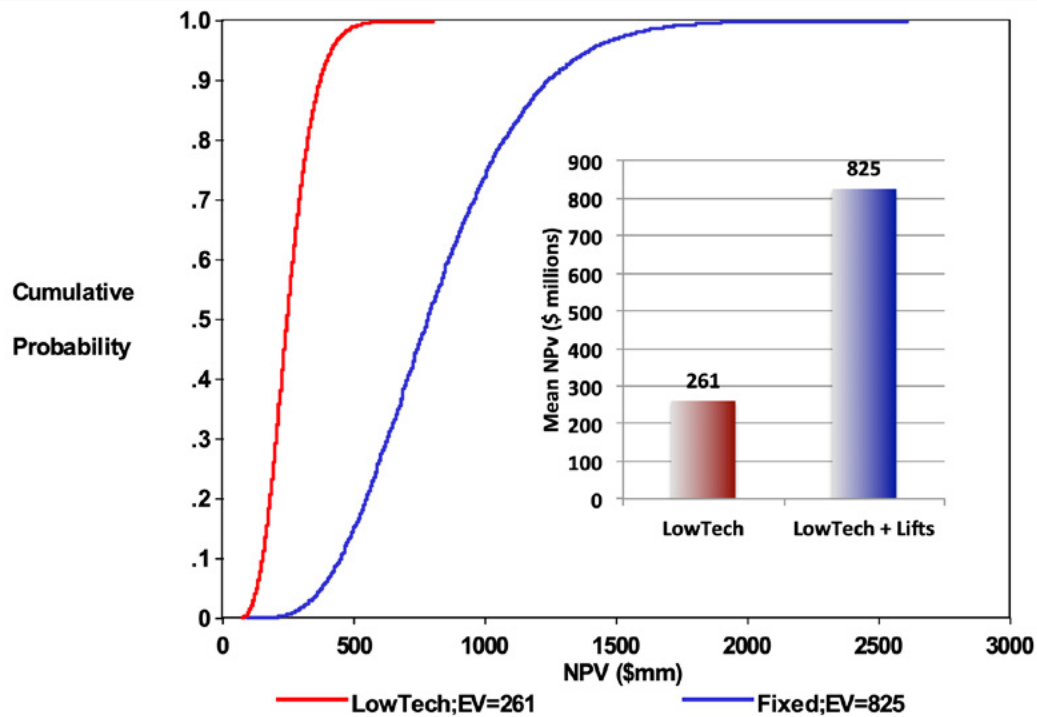
However, really understanding the program and its uncertainty is another matter. Citing an existing study won't shed light on whether your institution has the same value potential and uncertainty because these vary by institution. Filling out a template or creating a cost/benefit analysis doesn't address uncertainty either. It is in reaching an understanding of program uncertainty that decision analysis adds unique insight.¹⁵

In decision analysis, we not only look at multiple alternatives, we also look at different scenarios depending on how the uncertain factors turn out (like what the actual reduction in staff injuries turns out to be). Varying the factors to be analyzed one at a time produces a tornado chart. Varying them all at the same time typically results in thousands of scenarios, which are best shown as a probability distribution. Figure 3-14 (Probability Distributions for Alternative SPHM Programs at Ascension) shows the probability distributions for program alternatives at Ascension Health, with the mean values of the distribution for each factor plotted on a simple bar graph.

The lower left of each distribution shows the worst-case scenario, while the right end shows the best case. The spread of the distribution is the uncertainty in program value. When someone asks about risk, they usually mean, could you get an unfortunate outcome and do you understand the chances of that happening and the ways it could happen?

At Ascension Health, there was no risk of the program losing money. The worst-case scenario for the low-tech strategy created about \$100 million in value and the best case around \$750 million. For the low-tech + lifts program ("fixed" in Figure 3-14), the worst-case scenario

Figure 3-14: Probability Distributions for Alternative SPHM Programs at Ascension



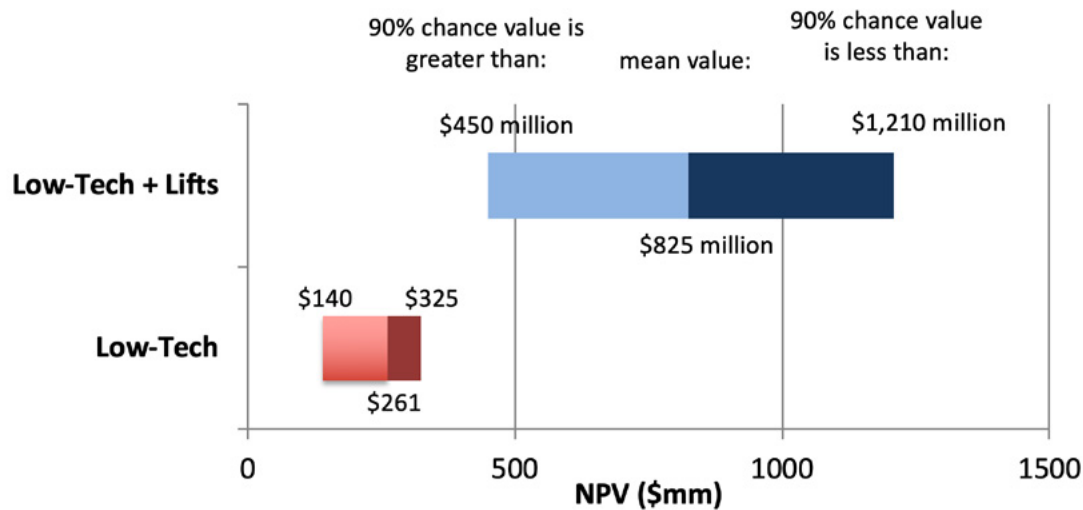
is about \$250 million in value and the best about \$2.5 billion. Note that the mean values for each alternative are significantly higher than for the single scenario (with all uncertainties set to a base case number, i.e., midpoint at 50/50 value) shown in the waterfall chart in Figure 3-11 (Value Assessment of Low-Tech + Lifts Strategy at Ascension Health). The effect of uncertainty often has asymmetric upside or downside potential.

With this understanding of the uncertainty in program value, a compelling case can be made for both the anticipated program value and the uncertainty in that value. What’s the worst-case scenario? What’s the best case? What’s a mean value for planning purposes?

A simpler way than probability distributions to show the uncertainty is with a bar graph, as shown in Figure 3-15 (Possible Costs for SPHM Program Alternatives at Ascension).

The left end of each bar shows the 10 percent low scenario; there is a 90 percent chance value will be greater than this. The right end shows

Figure 3-15: Possible Costs for SPHM Program Alternatives at Ascension



the 10 percent high scenario; there is a 90 percent chance the value will be less than this. The middle of each bar is the mean value.

This graph makes the point very clearly—why would you ever choose the low-tech strategy when you could do low-tech + lifts?

The answer requires understanding how an SPHM program fits with other strategic priorities at your institution. Maybe the organization is capital constrained or in cost-cutting mode after failing to hit planning targets. Whatever those other strategic priorities are, if you have a well-understood and compelling case on the value and risk of an SPHM program, you are in the best possible position to get leadership on board and committed to implementation.

For Ascension Health, a consensus to go with the low-tech SPHM program had already been reached before a decision analysis was undertaken. That analysis developed a new alternative (low-tech + lifts) and created an understanding of the value and risk of each strategy. In the end, approval was gained to begin purchasing lifting equipment and installing lifts in high-acuity areas. As tracking metrics began to validate program value, additional approval was given to roll out the program system-wide.

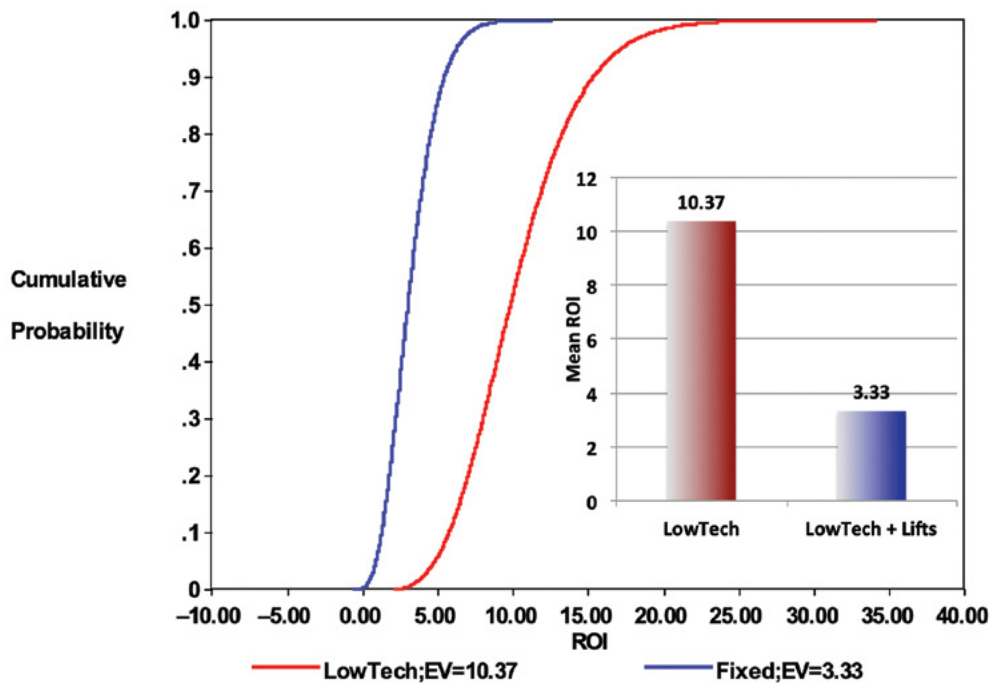
Will the funding be approved?

Whether funding will be approved is often the first question people pose when considering an SPHM program, but we have put it toward the end of the list purposely. If you have addressed the preceding questions, you have likely addressed the major potential barriers to funding. You should be able to get funding approved unless other organizational issues are blocking it, as is sometimes the case. By doing a good job of developing a business case to answer these key questions, you have the best possible prospects to get your program approved.

One additional question is often posed for approval—what is the program's expected return on investment (ROI)?

We can easily calculate the program ROI, including the uncertainty in ROI, as shown in Figure 3-16 (Mean ROI and Uncertainty in ROI for Ascension).

Figure 3-16: Mean ROI and Uncertainty in ROI for Ascension



Low-Tech: Expected value = 10.37

Fixed: Expected value = 3.33

However, we recommend using NPV for decision-making rather than ROI for two reasons. First, ROI does not reveal which program creates the most value (including the greatest cost savings). For Ascension Health, one has no idea from looking at the ROI where the greatest value lies.

Second, a decision to go for the highest ROI alternative often creates far smaller total value, as was the case for Ascension. The low-tech strategy created far less value but has a much higher ROI. This result makes complete sense: one often starts with the most problematic areas (such as mobilizing patients in the CCU) where the payback would be highest. But only putting lifts in the CCU in the largest hospital would save far less money than a broader program and likely make very little difference in overall costs.

For these reasons, we show the ROI where requested, but recommend against basing decisions on it.

How do you increase the value of the SPHM program?

Once you have some level of executive and organizational commitment to funding and supporting an SPHM program, the question is often asked, how can you get more value out of the program? The simpler methods of making a business case offer little guidance on this question. Decision analysis, however, can tackle this question head-on.

The first approach is to develop multiple alternatives. As illustrated earlier in this chapter for both the VHA and Ascension Health, the decision analysis developed other program alternatives that were shown to offer more value. For the VHA, the status quo strategy was to stick with the SPHM program that had already been implemented. As shown in Figure 3-9 (Mean Values for Program Alternatives at the VHA), a new program could create far more value and a broader program scope (i.e., implementing the program in all patient care areas) could create the most value. In the case of Ascension, adding portable lifts and ceiling lifts in low-mobility

areas created far more value, as shown in figures 3-14 (Probability Distributions for Alternative SPHM Programs at Ascension) and 3-15 (Possible Costs for SPHM Program Alternatives at Ascension). Developing new, higher value alternatives is one of the most powerful ways a decision analysis can increase program value.

The second way a decision analysis can add value is through use of a tornado chart, as shown in Figure 3-12 (Metric Tracking from SPHM Program at Stanford). Note that even though nurse turnover was already low at 2.4 percent annually and reduction in turnover wasn't included in the cost/benefit analysis, being able to reduce turnover had the biggest potential to increase program value. Driving turnover reduction from a base estimate of 2 percent to a 20 percent reduction could drive program value from \$5 million to \$7 million—a 40 percent increase.

Accordingly, Stanford modified its program to include a communication and education campaign to let nursing staff know a key goal of the SPHM program was giving caregivers tools they needed to safely mobilize patients, avoid injury, and keep working. The physical demands on nurses are revealed by surveys as a key reason for leaving the profession. By adding this dimension to its program, Stanford hoped to boost the value of the program even further.

In this manner, means and methods of creating new program alternatives identified in a tornado chart are powerful ways a decision analysis can increase SPHM program value.

Making the Case Simply

Making the business case for an SPHM program is not about assembling a set of numbers for its own sake. Rather, it is about developing numbers as a tool for addressing serious questions about a possible SPHM program to ensure it can be implemented successfully. Failing to address these questions may prevent your program from being started or from achieving its full potential.

To make your business case, start simple and only get as sophisticated as necessary to address the questions. Of the methods, decision analysis offers unique potential for creating the greatest understanding of and compelling answers to each question.

Resources

- Celona, J. N. "Elements of a Successful Safe Patient Handling and Mobility Program." *American Nurse Today* 9, no. 9 (September 2014).
- Celona, J. N. "Making the Business Case for a Safe Patient Handling and Mobility Program." *American Nurse Today* 9, no. 9 (September 2014).
- Celona, J. N., J. Driver, and E. Hall. "Value-Driven ERM: Making ERM an Engine for Simultaneous Value Creation and Value Protection." *The Journal of Healthcare Risk Management* 30, no. 4 (2011).
- Evanoff, B., et al. "Reduction in injury rates in nursing personnel through introduction of mechanical lifts in the workplace." *American Journal of Industrial Medicine* 44 (2003):451–57.
- Garg, A., and J. M. Kapellusch. "Long-term efficacy of an ergonomics program that includes patient-handling devices on reducing musculoskeletal injuries to nursing personnel." *Human Factors* 54 (2012):608–25.
- Hodgson, M., M. Matz, and A. Nelson. "Patient handling in the Veterans Health Administration: facilitating change in the health care industry." *Journal of Occupational and Environmental Medicine* 55, no. 10 (2013):1230–37.
- Howard, R. A., and A. E. Abbas. *Foundations of Decision Analysis* (London: Pearson, 2016).
- Marras, W. S., G. G. Knapik, and S. Ferguson. "Lumbar spine forces during manoeuvring of ceiling-based and floor-based patient transfer devices." *Ergonomics* 52, no. 3 (2009):384–97.
- Matz, M. "Analysis of VA Patient Handling and Movement Injuries and Preventive Programs." Internal VHA report to Director, VHA, Occupational Health Program (2008).
- Nelson, A., and A.S. Baptiste. "Evidence-Based Practices for Safe Patient Handling and Movement." *Online Journal of Issues in Nursing* 9, no. 3 (September 30, 2004):4.
- Nelson, A., et al. "Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks." *International Journal of Nursing Studies* 43, no. 6 (August 2006):717–33.
- Nelson, A., et al. "Link between safe patient handling and patient outcomes in long-term care." *Rehabilitation Nursing* 33 (2008):33-43.

Nelson, A., et al. "Myths and facts about safe patient handling in rehabilitation." *Rehabilitation Nursing* 33 (2008):10–17.

Restrepo, T. E., et al. "Safe lifting programs at long-term care facilities and their impact on workers' compensation costs." *Journal of Occupational and Environmental Medicine* 55 (2013):27–35.

Endnotes

- 1 C. Allen, P. Glasziou, and C. Del Mar, "Bed rest: A potentially harmful treatment needing more careful evaluation," *The Lancet* 354 (October 9, 1999): 1229–33.
- 2 G. Kolata, "A Tactic to Cut I.C.U. Trauma: Get Patients Up," *New York Times*, January 11, 2009.
- 3 M. Hodgson, M., Matz, M., and A. Nelson, . . ., "Patient handling in the Veterans Health Administration: Facilitating change in the health care industry," *Journal of Occupational and Environmental Medicine*, 55 no. 10 (2013):1230-7.
- 4 A. L. Nelson et al., "Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks," *Journal of International Nursing Studies* 43 (2006): 717–33; J. W. Collins et al., "An evaluation of a 'best practices' musculoskeletal injury prevention program in nursing homes," *Injury Prevention* 10 (2004): 206–11; B. Evanoff et al., "Reduction in injury rates in nursing personnel through introduction of mechanical lifts in the workplace," *American Journal of Industrial Medicine* 44 (2003): 451–57; A. Nelson and A. Baptiste, "Evidence-based practices for safe patient handling and movement," *Nursing World/Online Journal of Issues in Nursing* 9, no. 3 (2004): 4.
- 5 A. L. Nelson et al., "Development and evaluation of a multifaceted ergonomics program."
- 6 H. Alamgir et al., "Evaluation of ceiling lifts: Transfer time, patient comfort and staff perceptions," *Injury*. 40 no. 9 (2009):987-92.
- 7 K. Siddharthan et al., "Cost effectiveness of a multi-faceted program for safe patient handling," *Advances in Patient Safety* 3 (2005): 347–58; and A. B. de Castro, "Handle with care: The American Nurses Association's campaign to address work-related musculoskeletal disorders," *Online Journal of Issues in Nursing* 9, no. 3 (2004).
- 8 K. Siddharthan et al., "Cost effectiveness of a multi-faceted program for safe patient handling."
- 9 Ibid.
- 10 Arjo USA, Injury Prevention Program Data.
- 11 J. N. Celona, "Applying Decision Analysis to Program Management and Leadership Issues at the U.S. Veterans Health Administration" in J. I. Kantola et

al. (eds.), *Advances in Human Factors, Business Management and Leadership, Advances in Intelligent Systems and Computing* 594 (Switzerland: Springer International Publishing, 2017), pp. 362-73.

- 12 J. N. Celona, *Winning at Litigation through Decision Analysis* (New York: Springer, 2016); P. C. McNamee and J. N. Celona, *Decision Analysis for the Professional*, 4th ed. (Menlo Park: SmartOrg, Inc., 2007).
- 13 D. Kahneman, *Thinking, Fast and Slow* (New York: Farrar, Straus and Giroux, 2011).
- 14 J. W. Collins et al., "An evaluation of a 'best practices' musculoskeletal injury prevention program in nursing homes, *Injury Prevention* 10 (2004):206-11.
- 15 Some readers may object that a risk analysis could also be done with a Monte-Carlo simulation. Indeed, there are many software packages to do just this. Formally, a Monte Carlo simulation is just a calculation method that can, conceptually, accomplish the same results a simple decision tree. In practice, it fails for two reasons. First, the software prompts (and most users avail themselves of) faulty choices of probability distribution for inputs that lead to unrealistic results. Second, Monte Carlo simulations are incapable of handling the complex conditional distributions or dependencies on decisions usually found in real-world problems. For these reasons, we recommend decision trees over Monte Carlo distributions.

Facilitating Safe Patient Handling and Mobility Program and Technology Acceptance

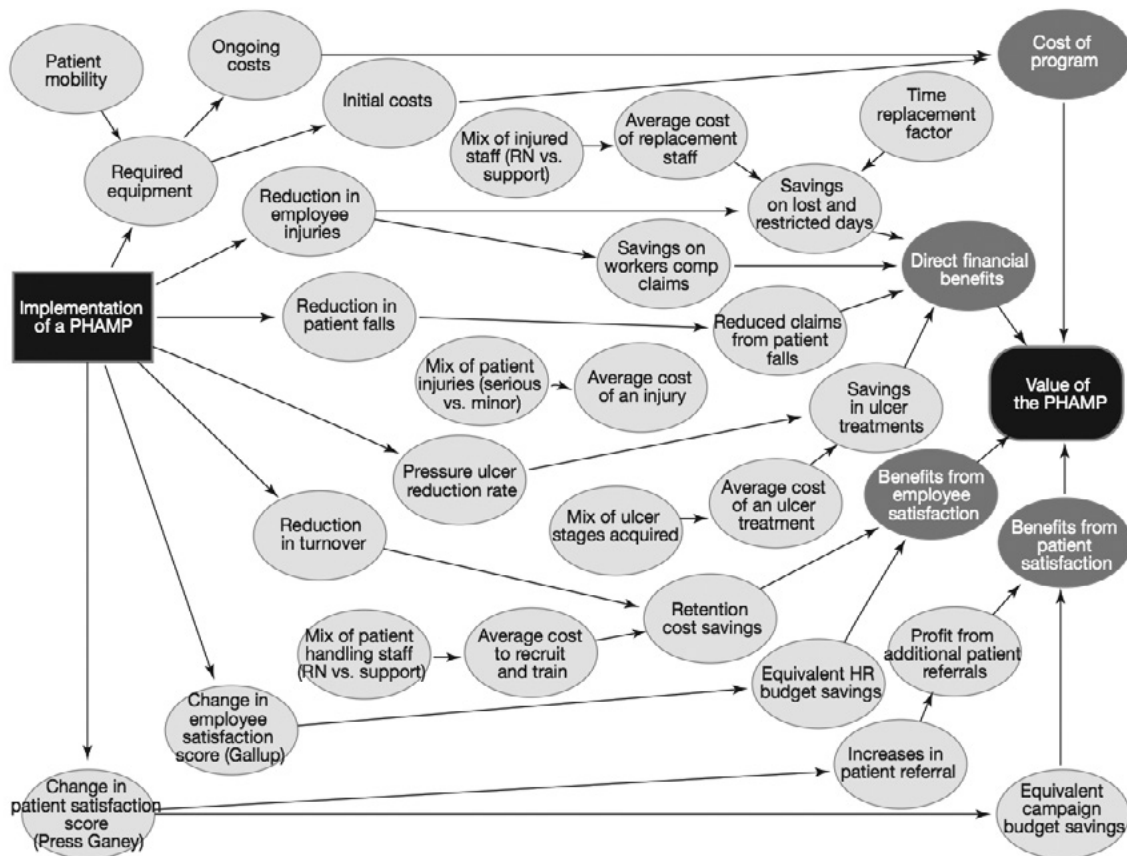
Principal author: Mary W. Matz, MSPH, CPE, CSPHP

At one time, many health care leaders thought that simply introducing patient handling and mobility (SPHM) equipment was sufficient to change the way caregivers perform their work. Over and over, though, organizations have found this is not true.

Recognizable leadership support, program support structures, and the cooperation of a variety of organizational entities are required to change entrenched ways of performing tasks. These organizational entities are many and crucial to a successful program. As you can see in Figure 4-1, an SPHM program is a multi-faceted, multi-functional program that is both affected by and affects nearly every department in a health care organization.

Because of the SPHM program's connections to so many departments, policies, and procedures in the organization, it is not enough to simply conduct a PHAMA and incorporate its recommendations into the design of a new building or renovation project. Implementation of a full-fledged SPHM program is necessary to ensure that SPHM equipment is actually used and

Figure 4-2: Value of SPHM Program Based on Clinical and Staff Outcomes



John Celona

This influence diagram demonstrates program outcomes that affect the value of the SPHM program.

The American Nurses Association (ANA) used the basic concepts from the VA SPHM program to develop its early “Handle with Care” program⁶ and also its *Safe Patient Handling and Mobility: Interprofessional National Standards Across the Care Continuum*. Other health care organizations have taken the lessons of the VA and other SPHM programs and run with them, developing their own programs to promote a safe environment of care.

Not all health care organizations have chosen to implement an SPHM program or to make use of SPHM equipment to protect their staff and patients. The decision to implement a program depends on an organization’s basic organizational values and other

factors that define its culture of safety. See Table 4-1 (Factors that Define a Culture of Safety) for details.⁷

Table 4-1: Factors that Define a Culture of Safety

Aspects of a Culture of Safety	Range of Attainment	
	Negative	Positive
	(Traits indicating lack of an effective culture of safety)	(Traits showing an effective culture of safety)
Values	Focus is only on productivity.	Focus is on maintaining a safe patient care environment for staff and patients.
Available technology	The facility/organization has no or little patient handling and mobility (SPHM) equipment.	SPHM technology is state-of-the-art and found throughout the facility and/or there is progress toward that goal.
Procurement of equipment	The purchasing department directs selection and purchase of SPHM equipment.	Frontline workers are actively involved in selecting SPHM equipment.
Social interaction	Management uses a top-down approach.	Employees are empowered and co-workers are guided by a collective belief in the importance of safety, with the shared understanding that every member will uphold the group's safety norms.
Language (Terms/phrases used as descriptors)	The terms "injury" and "accident" are used. Staff members call out for "Big Boy" beds.	The terms "minimizing risk" and "safety" are used. Staff members take into consideration the feelings of individuals of size and use "expanded-capacity" or another sensitive term.
Knowledge transfer (Sharing of knowledge and information learned from doing a job and/or written information)	Staff members only follow procedures and policies.	Staff members are allowed to use their creativity and the knowledge they have gained from doing their work to improve their workplace.

Movement toward creation of an effective culture of safety entails a fundamental change in organizational thinking. Such significant change requires an understanding of all that goes into creating the best possible environment of care, including the physical setting and patient handling and mobility technology.

To be sustainable, adoption of a culture of safety must be built on person-centered values and on a vision of the patient who—after his or her encounter with the health care organization—is as mobile as possible, functions at as high a level as possible, and is as healthy as possible. The patient also should be maximally involved in the care process and as informed and prepared as possible (together with his or her personal supporters) to continue into the next venue of care. Means for achieving this vision include use of patient handling and mobility assistive technology, staff members who are trained to properly use the technology, a building design that supports use of the technology, and an SPHM program set up to support this vision.⁸

As is apparent by now, use of SPHM technology is the overarching program element in an SPHM program, which means much of the implementation process revolves around the period when equipment is introduced. But even though SPHM equipment is essential, program success depends on knowledge transfer support structures and change strategies. For example, the clinical units involved in the VA SPHM program were well set up to provide an effective culture of safety. This was because the elements of the VA program were comprehensive and included not only SPHM equipment and an ergonomic process to determine equipment needs but also appointment and training of SPHM facility coordinators/program managers,⁹ facility SPHM advisory teams,¹⁰ and unit/area SPHM peer leaders.^{11, 12} Extensive training on equipment and program elements was conducted, and other avenues for transferring information were provided.^{13, 14, 15} Written assessments using ergonomic algorithms and guidelines provided an efficient knowledge transfer methodology plus the desired consistency in determining appropriate patient handling techniques and patient equipment needs.^{16, 17, 18, 19, 20} Although the program elements described here are listed sequentially, their implementation often overlaps and may be enacted in a different sequence.

Since the original FGI “Patient Handling and Movement Assessment: A White Paper” was published in 2010, the ANA and many SPHM experts throughout the country have developed SPHM standards to help organizations implement, sustain, and evaluate

their programs. The ANA's *Safe Patient Handling and Mobility: Interprofessional National Standards Across the Care Continuum* are an important resource for developing an SPHM program. The standards generally cannot be achieved all at once, but following the steps in this chapter will assist in their implementation. (Please note that “Standard 3. Incorporating ergonomic design into the environment of care” and “Standard 7. Providing a means to accommodate the injured employee post-injury” are not discussed in this chapter. Chapter 2 provides comprehensive advice on Standard 3. For information on Standard 7 and the other standards, review the ANA's *Implementation Guide to the Safe Patient Handling and Mobility Interprofessional National Standards*.²¹)

This chapter provides guidance for (1) readers who are learning about an SPHM program for the first time, (2) readers whose organization has an existing program and would benefit from a few program implementation or maintenance pointers, and (3) readers who would like to benchmark their program.

Often, one or several persons who have been educated about SPHM concepts or who have seen firsthand the impact of patient handling injuries are the initial drivers behind the decision to implement an SPHM program in an organization. Sometimes these staff members become facility coordinators/champions, but not always. SPHM programs also may be instituted as a result of a PHAMA process. No matter the catalyst for the program, at least one person will head the charge for the long term. The information presented in this chapter is written for those directing an SPHM program.

Getting Started

Steps involved in getting an SPHM program off the ground are these:

- Promote the safe patient handling and mobility concept to leadership.
- Identify an SPHM facility coordinator/program manager.

- Convene a facility SPHM advisory team.
- Promote critical connections.

Promote the SPHM Concept to Leadership

Frequently, the first task of an individual working to initiate a patient handling and mobility program is to garner upper management/leadership support. To do this, an organization's bottom line—financial well-being—must be addressed. The good news is that over the long term, financial benefits are seen when an organization implements an SPHM program, including acquisition of the necessary SPHM equipment.^{22, 23, 24, 25} See Chapter 3 for information about developing a business case for implementation of an SPHM program.

In addition to the financial benefit, education on the rationale for instituting an SPHM program, including the benefits for patients, staff, and the organization, should be communicated to upper management. A quick overview of desired SPHM equipment is also helpful. This educational effort should be ongoing, with leadership continually updated on the status of the SPHM program.

SPHM Program Benefits for Presentation to Leadership

Patient handling and mobility programs have been known to fail from lack of support from organizational leadership and management. This lack of support commonly results from an insufficient understanding of patient care ergonomics, inattention to safe patient handling and mobility issues, lack of incentives, outdated policies, space constraints, and cost concerns. These roadblocks can be addressed by emphasizing the following benefits of instituting an SPHM program:

- Decreased costs related to patient handling injuries^{26 27, 28, 29, 30, 31}
- Solidification of recognition as an “employer of choice”^{32, 33}
- Improved recruitment^{34, 35}
- Increase in staff satisfaction, improved perception of professional status and task requirements^{36, 37}
- Improved staff retention³⁸
- Decreased injuries from patient handling tasks^{39 40, 41, 42, 43, 44}
- Enhanced regulatory compliance⁴⁵
- Improved staff efficiency⁴⁶
- Improved patient safety^{47, 48}
- Facilitation of a culture of safety⁴⁹

Identify an SPHM Facility Coordinator/Program Manager

To implement and maintain an SPHM program, a facility needs a strong and proactive facility coordinator as well as a peer leader program. Facility coordinators can creatively keep peer leaders involved, invested, and cohesive as a unit and are integral to the success of the program.

At least one full-time facility coordinator is essential in large organizations, whether hospitals, nursing homes, or other facility types. For health care organizations with many facilities, it is helpful to have one person oversee all of the facility coordinators. Smaller institutions may be able to implement and maintain their program with a part-time staff member, but more often they need a full-time position.

The person selected as facility coordinator should have a clinical background, preferably in either nursing or therapy, and be accustomed to handling, moving, and mobilizing patients. Some facilities, however, have appointed an individual from the safety staff with ergonomic knowledge. Most often, facility coordinators report to a nursing director.

The facility coordinator's role is to implement the SPHM program throughout the facility and at least includes the following:

- Conducting patient care ergonomic evaluations to develop recommendations for SPHM technology based on the needs of each patient care area
- Facilitating SPHM equipment purchases
- Preparing for and coordinating equipment arrival, introduction, and installation
- Leading and acting as the resource person for patient care area SPHM peer leaders
- Training/educating SPHM peer leaders, staff, management, and administrators

- Leading the facility SPHM team
- Acting as liaison between staff and management/administration
- Acting as liaison with other organizational entities that affect the SPHM program
- Acting as the facility SPHM expert for individuals of size
- Tracking SPHM equipment and slings
- Tracking use and maintenance of SPHM equipment
- Identifying trends in patient handling injuries
- Identifying trends in patient outcomes related to patient handling and mobility activities
- Performing other duties related to the SPHM program

Institute a Facility SPHM Advisory Team

An interdisciplinary team should be appointed to serve as advisers to the SPHM program. The team members should include all of these: SPHM peer leader representative(s); the SPHM facility coordinator; nurse/facility educators; and direct patient care staff representatives (from nursing, physical and occupational therapy, imaging, and other patient care areas). An organization may choose to involve others as well: staff from employee health, safety, union, and contracting/purchasing departments; risk manager; engineers/designers; nursing administrators; and patients or residents. The team may be an informal group or a more formal entity chartered by the facility environment of care committee or facility management. If the team is formed prior to selection of a facility coordinator, the team members also aid in that selection process.

The purpose of the team is to provide support to the facility coordinator by assisting with the following duties:

- Implement the SPHM program.
- Develop policy.
- Develop processes.

- Facilitate program buy-in from other key players.
- Ensure incidents/injuries are investigated.
- Review patient handling and mobility injuries/trends.
- Facilitate equipment purchases (lifts, accessories, slings).
- Develop long-term and short-term strategic plans.
- Drive the program using goals and objectives.

Promote Critical Connections

In health care organizations, a safe patient handling and mobility program is often thought of as a nursing program, but organizations quickly learn that these programs impact a surprising number of departments and people. If these stakeholders are not included from the beginning, they can present significant barriers to moving the program forward.

Institution of an SPHM program requires good working relationships with virtually all facility entities and services. Those with significant influence include, at minimum, the departments and staff listed below. (Various terms are used to denote services; for example, “facility management” is sometimes called “engineering.” The service/entity in your organization should be recognizable on this list even when another term is used.)

- Environment of care/facility safety committee/accident review board
- Safety/occupational health department
- Middle management/frontline supervisors
- Frontline staff
- Education staff (nursing and facility)
- Procurement/contracting staff
- Facility management/engineering/project management staff
- Environmental services staff
- Laundry services

- Supply/processing/distribution staff
- Infection prevention staff
- Union representatives

All these entities can affect how easy or hard it will be to implement an SPHM program in a facility, so the sooner connections are made and the stronger the collaboration that results, the better.

Some individuals who are promoting an SPHM initiative may find forging relationships outside their normal work boundaries uncomfortable. Such individuals should partner with someone accustomed to working across the facility or read a book or attend a class on “asking the right questions,” “communication in business settings,” or something similar. See Appendix P: Making Critical Connections for SPHM Program Success for elaboration on the importance of making vital associations with each entity listed.

Implementing and Maintaining an SPHM Program

Once a facility leader and team are in place and working with various facility services and entities, the real process of program implementation begins. It is indeed a process and takes the time and concerted efforts of many, not just those on the SPHM team. Successful completion of the implementation process, and especially this hands-on phase, requires the support of organizational and middle management and the cooperation of many facility services, as previously noted.

The larger and more complex an organization, the more time and care will be needed to successfully implement an SPHM program. There is no one single “right” way to do it; each program reflects the uniqueness of the organization. Each organization chooses the program, including equipment and roll-out, that are right for it. However, following the steps below will help ensure that no major parts of the program will be missed during planning and execution.

- Develop strategic plans
- Select and implement SPHM program elements
- Develop standard operating procedures
- Facilitate change and program acceptance

Develop Strategic Plans

Developing a strategic plan for the organization as a whole will give direction to an SPHM program and facilitate its success. During this process, decide which SPHM program elements to include in your program. Options are described in the “Select and Implement SPHM Program Elements” section below. Specific organizational cultural differences and the needs of your facility, as well as current SPHM program status, will drive decisions about adding elements to your SPHM strategic plan.

Strategic planning should be structured and include short-term and long-term goals and objectives. Include time limits for various phases, but be sure they are realistic. Consult with others in the organization who might have information that could impact a time frame.

Developing a plan for facility peer leaders as a group is helpful, as is having peer leaders from each patient care area develop a plan unique to their area. Ensure that marketing strategies are planned to foster continued motivation of peer leaders, staff, management, and patients. Include strategies for continued training and succession planning for peer leaders.

Following are a few suggestions for tackling the strategic planning needed to launch an SPHM program:

1. Determine the goals you want to achieve for patients, staff, and the organization or your patient care area.
2. Identify who and which groups to target and why.
3. Prioritize strategies you think will decrease the incidence/severity of nursing work-related injuries at your facility.
4. Prioritize strategies you think will decrease the impact

on patients from unsafe patient handling and inadequate mobilization.

5. Identify what approach will be most convincing to each target group.
6. Identify potential staff-, patient-, and organization-level barriers to implementation as well as strategies to overcome these.
7. Identify staff-, patient-, and organization-level facilitators to lead implementation.
8. Determine the strategies you will use to evaluate the program's success.
9. Identify the strategies you will use to maintain SPHM interventions over time.
10. Identify the first five tasks that must be undertaken once strategic planning is complete.

Identifying Facility/Organizational Goals and Objectives

Goals should be individualized to meet the mission of your organization or patient care area as well as your SPHM program. The following are suggested goals.

- Reduce the incidence of musculoskeletal injuries.
- Reduce the severity of musculoskeletal injuries.
- Reduce costs from these injuries.
- Create a safer environment and improve the quality of life for patients.
- Improve the quality of care for patients.
- Decrease patient adverse events related to manual patient handling.
- Encourage reporting of incidents/injuries.

- Create a culture of safety and empower nurses to create safe working environments.
- Increase the frequency with which caregivers are able to move and mobilize patients.

Use of the SMART goals concept is helpful: Each indicator should be (1) specific, (2) measurable, (3) action-oriented, (4) realistic, and (5) time-defined. The following are possible indicators:

- Reduction in manual transfers by ____% within ____ (time frame, e.g., one year from program implementation)
- Reduction in direct costs by ____% within ____
- Decrease in nursing turnover by ____% within ____
- Decrease in musculoskeletal discomfort in nursing staff by ____% within ____
- Reduction in number of lost workdays due to patient or resident handling tasks by ____% within ____
- Reduction in number of light duty days due to patient or resident handling tasks by ____% within ____
- Improvement in patient outcomes such as decreasing skin tears or falls by ____%
- Decrease in patients' average length of stay by ____% within ____

Source: A. L. Nelson, ed., Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement (Tampa, FL: Veterans Administration Patient Safety Center of Inquiry, 2001).

Key objectives should be individualized to meet organizational or patient care area needs and take into account available information/data to measure outcomes such as effectiveness, acceptance, and support. Establish credible baseline statistics for the objectives of interest before the program starts so the same events can be measured periodically thereafter to gauge results.

Select and Implement SPHM Program Elements

SPHM program elements must function to transfer knowledge and facilitate change for the purpose of ensuring the acceptance of—and thus compliance with—new SPHM technology and protocols that reduce ergonomic risk and provides a safer environment of care for patients and staff.

Multi-factored programs have been found to be the most effective.⁵⁰ Certainly, the key to successful SPHM programs is the inclusion of patient handling and mobility equipment, but programs that include only the equipment component have been disappointingly unsuccessful. Program elements with the strongest level of scientific evidence supporting their use include use of SPHM equipment/devices, patient care ergonomic assessments, and SPHM policies. The use of SPHM peer leaders and clinical tools such as algorithms for safe patient handling are less studied interventions that show great promise.^{51, 52} See the sidebar for a list of factors found to be important to successful program implementation.^{53, 54, 55}

Factors that Affect the Success of SPHM Program Implementation

According to a variety of sources, the following factors are important to success when implementing an SPHM program:

- Redesign of the work environment
- Education/training in the use of SPHM equipment
- SPHM peer leaders in each patient care area
- Ergonomic evaluation/risk assessment of each patient care area to identify optimal equipment and program recommendations
- Patient assessments in each patient care area
- Clearly communicated SPHM policy
- Change in work organization and practice

The VA conducted a research study that initiated what became a highly successful SPHM program in which these program elements were introduced:

- Facility SPHM coordinator/program manager
- Facility SPHM team/committee
- Clinical unit/area SPHM peer leaders
- Safety huddles/after-action reviews
- Patient care ergonomic evaluations
- SPHM equipment
- Staff training
- Patient assessment and algorithms for safe patient handling and mobilization
- SPHM policy

Phasing in the program elements in this order ensured that structures were present to support knowledge transfer and VA staff members were familiar with change strategies. Appointing and training SPHM leaders and instituting safety huddles established a structure for participation in the patient care ergonomic evaluation process, which drove the recommendations and introduction of SPHM equipment.

Since the use of the safe patient handling algorithms and adherence to a policy required the newly introduced equipment to be operational and staff training completed, these program elements were introduced last, after the equipment was in place.⁵⁶ Detailed descriptions of these program elements are found in the book *Safe Patient Handling and Movement: A Guide for Nurses and Other Health Care Providers*⁵⁷ and in the VHA's *SPHM Guidebook*.

For more information related to the last six program elements listed above, refer to Appendix Q: SPHM Program Elements.

Develop Standard Operating Procedures

It is important to develop procedures specific to the types of SPHM equipment to be introduced before staff begin using the equipment. As well as following manufacturers' instructions and recommendations, each facility must develop its own guidelines and standard operating procedures for at least the following:

- Use of each type of SPHM technology in your organization. Each patient care area should have an equipment resource guide containing this information or a document file that can be easily accessed.
- Sling laundering, tracking, storage, distribution, and infection prevention
- Equipment cleaning and infection prevention
- Equipment maintenance and repair. (See Appendix L: Checklists for Installation and Maintenance of Ceiling-Mounted Patient Lifts for a checklist to support corrective and preventive maintenance for ceiling-mounted patient lifts.)
- Equipment storage

Facilitate Change and Program Acceptance

Woodrow Wilson once said, “If you want to make enemies, try to change something.” This is the challenge often faced when initiating something new, and introducing equipment that changes the way caregivers do their work often exemplifies Wilson’s statement. However, it is NOT always the case, and knowledge of SPHM concepts and the rationale for change can translate into power to advance rather than inhibit change.

Already discussed are program elements that facilitate change. For instance, peer leaders act as change agents by promoting safe lifting practices and serving as resources for their co-workers. As SPHM change agents, peer leaders and facility coordinators/program managers assist in implementation of a program that promotes significant changes in thought and behavior. However, to be an effective change agent, a person needs knowledge of:

- Why the program is being implemented (rationale/background)
- What the program includes (program elements)
- What is going to be used to implement the program (program materials/tools)
- How the program will be implemented (action plan)

Other strategies that foster change and knowledge transfer in a systematic way are the use of social marketing, coaching techniques, and others listed below. A few of the strategies will be briefly explained. If you have further interest, many articles and books expand on these topics.

Change strategies include:

- Knowledge transfer mechanisms
- Education and training in SPHM
- Social marketing
- Coaching strategies

- Periodic review of SPHM program elements and status
- Development of strategic plans and action plans
- Leadership from unit/area peer leaders

Knowledge transfer mechanisms. In this context, knowledge transfer is the transfer of common information learned from doing work.⁵⁸ The information may be written in policies or procedures, but most importantly it is what is found in people’s heads—what they have learned from doing the work they do. Safety huddles and peer leaders act as powerful agents of knowledge transfer. They empower staff by tapping into the knowledge they possess and facilitating the exchange of information among the parties.

The ultimate purpose of this knowledge transfer is to foster frontline staff acceptance, and involving staff in program development and any other way possible nearly ensures this will take place. Leaders who recognize that every person they lead has valuable information to share, and who listen to and act on that information, will effect change more easily and on a broader scale.

Education and training in SPHM. Certainly, education and training are forms of knowledge transfer and are critical for any organizational transformation. Staff, peer leaders, management, and leadership must be educated in the risks surrounding manual patient handling as well as in the technology to control those risks. Beyond education on the basics of safe patient handling and mobility, peer leaders and staff must be trained on equipment and SPHM program elements. Peer leaders need additional training on techniques to facilitate staff behavior changes and adoption of the new program.

Plans must be in place to provide new employee and new peer leader SPHM orientation and training. To transition smoothly between peer leaders without a break in leadership, a facility peer leader succession planning strategy should also be implemented to orient and train new peer leaders in a timely fashion. Appendix R: SPHM Training Curricula Suggestions provides ideas for curricula for staff, peer leaders, and facility coordinators.

Although SPHM curricula have been developed for schools of nursing, many of these schools are still teaching outdated and risky manual techniques that have been banned in other countries such as the United Kingdom, Canada, Australia, and the Netherlands, to name a few. Progress is being made in the United States, and much of it is due to the efforts of the VA, ANA, and the National Institute for Occupational Safety and Health (NIOSH). These groups worked together to develop curricula for schools of nursing; a link to the training site is available online at <https://www.cdc.gov/niosh/docs/2009-127/default.html>.

The American Physical Therapy Association (APTA) also provides online educational materials to raise awareness of safety concerns during patient handling and mobility tasks. The materials aim to educate physical therapists (PTs) and physical therapist assistants (PTAs) on how to avoid the risk factors associated with patient handling and mobility especially in relation to rehabilitation. An additional goal is to empower PTs and PTAs to be involved in implementation strategies to improve safety for themselves and their patients. This material is found at <http://www.apta.org/SafePatientHandling/>. Also, the APTA position on SPHM is found in “Physical Therapists and Physical Therapist Assistants in Safe Patient Handling” (https://www.apta.org/uploadedFiles/APTAorg/About_Us/Policies/Practice/SafePatientHandling.pdf).

In addition to facility staff, it is very important that patients and their families be made aware of and educated in SPHM concepts. The best place to start is when a patient is first admitted. Include a brochure in your organization’s admissions packet that summarizes your program, its rationale, and the SPHM equipment used in your facility. A continuous loop video played on patient room televisions is also an effective way of bringing the SPHM concept to patients and their families. The VA included video clips of patients “flying, gliding, and sliding” easily from one place to another, which made for a light-hearted demonstration of the use of SPHM equipment.

SPHM program marketing. The following offers two perspectives for marketing SPHM programs. One provides suggestions for using

social marketing techniques, while the other focuses on a variety of strategies to market the program to staff.

Social marketing. Social marketing offers a structured way to “sell” your idea or program by strategically focusing your marketing effort. For instance, leadership would be very interested in the benefit of cost savings, but perhaps a nurse educator would not. Therefore, when making a presentation to leadership, cost would be a critical element, but it would not be included in a presentation to nurse educators. This structured format enables the development of talking points specific to each target group.

Steps in the social marketing process include:

1. Define your goal(s).
 - What information do you want to transmit?
 - What do you want to change?
 - Why?
2. Identify target groups. What groups (e.g., staff, patients, nurse educators, facility management, others) will be affected by or interested in the goals?
3. Brainstorm to identify benefits of achieving the goals.
4. Match target groups with benefits. Which benefits will motivate each group? Using a grid to match benefits with target groups can be helpful, as shown in Table 4-2 (Social Marketing Grid: Matching Benefits to Target Groups).

SPHM program marketing activities/strategies aimed at staff. You can never go wrong feeding caregivers to get their attention, and use of the traditional pens, mugs, T-shirts, and buttons is also a good approach. Any type of program with recognition awards and rewards—such as a trip to an SPHM conference—certainly helps, but there are other creative ways to market your SPHM program. Refer to Appendix S: SPHM Program Marketing Activities/Strategies Aimed at Staff for some ideas.

Coaching strategies. Numerous books have been written on coaching, and many techniques are available. However, it is actually

Table 4-2: Social Marketing Grid: Matching Benefits to Target Groups

Target Groups	Benefits					
	Cost savings	Decreased injuries	Decreased injury severity	Decreased nursing turnover	Increased patient safety	Become employer of choice
Caregivers						
Nurse managers						
Nurse educators						
Facility managers						
Others						

much easier to learn the technical information related to an SPHM program (i.e., how to use a piece of equipment or how the body is affected by exceeding its biomechanical capabilities) than to promote personal behavioral changes and changes in others' behaviors. Thus, training and practice in coaching techniques is extremely important to helping SPHM change agents be successful.

Table 4-3 (“Worst” Boss vs. “Best” Coach Behaviors) illustrates the marked differences between the way an ineffective boss/supervisor and an effective coach might behave. Negative boss behaviors do not engender staff input or program acceptance, so these behaviors should be avoided.

To understand the importance of coaching, you must understand how coaching effects change. Change occurs on three sequential levels. First, the intellect must take in information/knowledge and learn about the subject and the rationale for the change. Next, there must be an emotional reaction to the information

Table 4-3: “Worst” Boss vs. “Best” Coach Behaviors

Boss	Coach
Talks a lot	Listens a lot
Tells	Asks
Fixes	Prevents
Presumes	Explores
Seeks control	Seeks commitment
Orders	Challenges
Works on	Works with
Puts product first	Puts process first
Wants reasons	Seeks results
Assigns blame	Takes responsibility
Keeps distant	Makes contact

Source: M. Cook, *Effective Coaching* (New York: McGraw-Hill, 1999).

“Feed the Plants . . . Not the Weeds”

According to SPHM program implementation experts Hanneke Knibbe, Nico Knibbe, and Annemarie Klaassen of the Netherlands, a great coaching tip is to “feed the plants, not the weeds.” They say you can spend 80 percent of your time trying to change behavior in the 20 percent of people who are resistant, or you can spend 20 percent of your time fostering good behavior in the 80 percent who support your efforts. Which makes the best use of your time?

Source: M. Matz, L. Haney, H. Knibbe, and A. Klaassen, “Refining peer leader skills,” at the 9th Annual Safe Patient Handling and Movement Conference, Lake Buena Vista, Florida, March 27, 2008.

learned. A person who has been injured during patient care or whose co-worker has had a debilitating injury may easily bond emotionally to the concept of safe patient handling and mobility. Another person may internalize the information regarding the inherent risk in manual patient handling and the potential for serious injury and make behavior changes. Still others may emotionally connect by way of negative organizational consequences for non-compliance.⁵⁹ Feeling good about the work a person is doing can be reward enough for some. The attitude of a supervisor toward an employee may be a reward or punishment, as might be the attitude of a co-worker.⁶⁰ However it is attained, the combination of emotional attachment and knowledge creates the change in behavior, the ultimate goal. It is the job of the coach to provide the knowledge and, when needed, foster the emotional change, thus promoting the behavior change.

Evaluate the SPHM Program

Program evaluation methods are a cornerstone of management oversight and, for programs of the magnitude of an SPHM program, evaluation tools should minimally relay the effectiveness, acceptance, and cost benefit of the instituted program. When assessing the effectiveness of a program, often the first SPHM program outcome measures that come to mind are patient clinical outcomes/adverse events and staff injuries; however, a good understanding of the variables that can affect these measures is critical to understanding them. See the sidebar on using staff and patient injury outcome measures to evaluate program effectiveness for discussion of the effects of such variables.

Using Staff and Patient Injury Outcome Measures to Evaluate Program Effectiveness

Injury indicators of effectiveness must be used carefully. Many variables related to a patient's clinical and physical status may influence the effect of SPHM techniques and equipment on patient outcomes. For instance, if skin integrity is used as an indicator of improved quality of care, note that medical conditions and environmental and other factors play into the probability of skin breakdown and consequential skin tears. Even so, reductions in skin tears are sometimes used as reliable indicators of the usefulness of overhead lifts with repositioning slings and air-assisted lateral transfer devices.

Staff injury data is always tracked as an indicator of effectiveness for SPHM equipment and program interventions. The severity of patient handling injuries should be captured as well. Severity indicators are the total number of lost time days for all injuries, number of lost time injuries, total number of modified duty days for all injuries, and number of modified duty injuries. But a few confounders may make this data less helpful.

First, under-reporting of patient handling injuries is surprisingly common, but when staff have been educated on safe patient handling risks and understand their minor aches and pains may lead to greater injury, injury reporting may increase even when the actual incidence of injuries is decreasing.

Second, patient handling injuries are usually cumulative traumas and, as the name implies, they are the result of the accumulation of micro injuries over time. An injury may have been initiated prior to the introduction of patient handling equipment and an SPHM program but not reported at that point. After the accumulation of more micro injuries and resulting pain, the injury may be reported—but if the reporting occurs after implementation, when injury data is being collected to prove the efficacy of the program, the injury data will not show a true picture of the program's effectiveness. This cumulative characteristic of patient handling injuries also affects reports of lost time and modified duty days.*

Finally, there is no universally accepted denominator for staff injuries, so it is difficult to calculate rates that allow for benchmarking and making comparisons between organizations.

*A. L. Nelson et al. "Development and Evaluation of a Multifaceted Ergonomics Program to Prevent Injuries Associated with Patient Handling Tasks," *Journal of International Nursing Studies* 43 (2006):717–33.

Information about program effectiveness can be determined by staff job satisfaction, patient satisfaction, peer leader activity, staff musculoskeletal discomfort, use of patient handling equipment, perception of risk of patient handling tasks, cost comparisons, and other outcome measures. See appendices H: Patient Care Area Characteristics and Ergonomic Issues Survey, T: SPHM Peer Leader Patient Care Area Activity and Program Status Log, and U: Safe Patient Handling and Mobility Equipment Use Survey for some tools to help gather this information. Further information on designing an SPHM program evaluation and examples of SPHM data collection tools for many of these outcome measures are found in Chapter 11 of the VHA *Safe Patient Handling and Mobility Guidebook*.

Endnotes

- 1 M. Hodgson, M. Matz, and A. Nelson, "Patient handling in the Veterans Health Administration: facilitating change in the health care industry," *Journal of Occupational and Environmental Medicine* 55, no. 10 (2013):1230–37.
- 2 G. Powell-Cope et al., "Effects of a National Safe Patient Handling Program on Nursing Injury Incidence Rates," *Journal of Nursing Administration*, 44, no. 10 (2014):525–34.
- 3 A. L. Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program to Prevent Injuries Associated with Patient Handling Tasks," *Journal of International Nursing Studies* 43 (2006):717–33.
- 4 U.S. Veterans Health Administration (VHA), Center for Engineering and Occupational Safety and Health (CEOSH). *Safe Patient Handling and Mobility Guidebook* (2016).
- 5 U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), *Ergonomic Guidelines for Nursing Homes* (2003).
- 6 A. B. de Castro, "Handle with care: The American Nurses Association's campaign to address work-related musculoskeletal disorders," *Online Journal of Issues in Nursing* 9, no. 3 (2004).
- 7 M. Matz, "Safe patient handling & movement/back injury resource nurse training program" (HealthCare Ergonomics Conference, Portland, Oregon, June 26, 2006).
- 8 Personal communication between David Green and Roger Leib, AIA, ACHA.
- 9 J. J. Knibbe, N. Knibbe, and A. M. Klaassen, "Safe patient handling program in

- critical care using peer leaders: lessons learned in the Netherlands," *Critical Care Nursing Clinics of North America* 19, no. 2 (2007):205–11.
- 10 VHA, *Safe Patient Handling and Mobility Guidebook*.
 - 11 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
 - 12 A. L. Nelson, ed., *Safe Patient Handling and Movement: A Guide for Nurses and Other Health Care Providers* (New York: Springer Publishing Company, 2006).
 - 13 S. Hignett et al., "Evidence-based patient handling: systematic review," *Nursing Standard* 17, no. 33 (2003):33–36.
 - 14 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
 - 15 Nelson, *Safe Patient Handling and Movement*.
 - 16 A. Nelson et al., "Algorithms for safe patient handling and movement," *American Journal of Nursing* 103, no 3 (2003):32–34.
 - 17 Hignett et al., "Evidence-based patient handling."
 - 18 de Castro, "Handle with care."
 - 19 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
 - 20 OSHA, *Ergonomics Guidelines for Nursing Homes*.
 - 21 S. Gallagher, *Implementation Guide to the Safe Patient and Mobility Interprofessional National Standards*. (Silver Spring, Md.: American Nurses Association, 2013).
 - 22 B. Evanoff et al., "Reduction in injury rates in nursing personnel through introduction of mechanical lifts in the workplace," *American Journal of Industrial Medicine* 44 (2003):451–57.
 - 23 J. W. Collins et al., "An evaluation of a 'best practices' musculoskeletal injury prevention program in nursing homes," *Injury Prevention* 10 (2004):206–11.
 - 24 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
 - 25 OSHA, *Ergonomics Guidelines for Nursing Homes*.
 - 26 Hodgson, Matz, and Nelson, "Patient handling in the Veterans Health Administration: facilitating change in the health care industry."
 - 27 K. Siddharthan et al., "Cost effectiveness of a multi-faceted program for safe patient handling," *Advances in Patient Safety* 3 (2005):347–58.

- 28 Evanoff et al., "Reduction in injury rates in nursing personnel."
- 29 Collins et al., "An evaluation of a 'best practices' musculoskeletal injury prevention program in nursing homes."
- 30 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 31 de Castro, "Handle with Care."
- 32 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 33 M. Matz, "Analysis of VA Patient Handling and Movement Injuries and Preventive Programs" (Internal VHA report to Director, VHA, Occupational Health Program, 2007).
- 34 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 35 Matz, "Analysis of VA Patient Handling and Movement Injuries and Preventive Programs."
- 36 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 37 Matz, "Analysis of VA Patient Handling and Movement Injuries and Preventive Programs."
- 38 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 39 Hodgson, Matz, and Nelson, "Patient handling in the Veterans Health Administration: facilitating change in the health care industry."
- 40 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 41 Matz, "Analysis of VA Patient Handling and Movement Injuries and Preventive Programs."
- 42 Evanoff et al., "Reduction in injury rates in nursing personnel."
- 43 Collins et al., "An evaluation of a 'best practices' musculoskeletal injury prevention program in nursing homes."
- 44 OSHA, *Ergonomics Guidelines for Nursing Homes*.
- 45 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 46 H. Alamgir et al., "Evaluation of ceiling lifts: transfer time, patient comfort and staff perceptions," *Injury* 40, no. 9 (Sept. 2009):987-92.
- 47 M. Matz, M. "Analysis of VA Patient Handling and Movement Injuries and Preventive Programs,"

- 48 de Castro, "Handle with Care."
- 49 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 50 Powell-Cope et al., "Effects of a National Safe Patient Handling Program on Nursing Injury Incidence Rates,"
- 51 A. Nelson and A. Baptiste, "Evidence-based practices for safe patient handling and movement," *Nursing World/Online Journal of Issues in Nursing* 9, no. 3 (2004): 4.
- 52 A. L. Nelson et al., "Evidence-based interventions for patient care ergonomics," in P. Carayon, ed., *Handbook of Human Factors and Ergonomics in Health Care and Patient Safety* (Mahwah, N.J.: Lawrence Erlbaum Associates, Publishers, 2007), 323–45.
- 53 Hignett et al., "Evidence-based patient handling."
- 54 OSHA, *Ergonomics Guidelines for Nursing Homes*.
- 55 Nelson et al., "Development and Evaluation of a Multifaceted Ergonomics Program."
- 56 Ibid.
- 57 Nelson, *Safe Patient Handling and Movement: A Guide for Nurses and Other Health Care Providers*.
- 58 N. M. Dixon, *How Companies Thrive By Sharing What They Know* (Cambridge: Harvard Business School Press, 2000).
- 59 M. Matz and L. Haney, "Unit-based Peer Leader Training Program" a presentation at the 8th Annual Safe Patient Handling and Movement Conference, Lake Buena Vista, Florida, April 1, 2009.
- 60 F. Fournies, *Coaching for Improved Work Performance* (New York, NY: McGraw-Hill, 2000).

A Vision of the Future of Safe Patient Handling and Mobility Programs

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In recent years, a rapidly increasing number of studies have demonstrated the importance of mobilizing patients as a means of improving and maintaining their health by keeping them as physically active as possible. This is true even in the highest-acuity settings where early mobilization would have been thought impossible not so long ago, such as having patients up and walking in hospital corridors when on extra-corporeal membrane oxygenation. The use of mobility-enabling safe patient handling and mobility (SPHM) technologies, coupled with updated policies and practices, demonstrably improve the safety of the patient care environment and the effectiveness of patient recovery.

Along with this new understanding of the importance of mobility have come developments in the SPHM technologies available. In 2010, when the first edition of this PHAMA white paper was released, handling, moving, and mobilizing patients had already advanced beyond assistive aids for performing manual transfers (e.g., slides, lifting sheets, and belts) to technology that would essentially take the weight of lifting and transferring patients off caregivers

and place it instead on mechanical devices. Such patient handling and mobility technology takes the form of highly specialized overhead (ceiling- and wall-mounted) lifts and wheeled floor-based lifts, among others described in Appendix B: SPHM Equipment Categories.

Today, a broad array of mechanical and electro-mechanical devices that address a wide variety of patient handling and mobility tasks are employed in diverse settings, frequently with high-acuity applications. In addition, an increasing number of lifting, turning, and lowering features built integrally into beds and chairs help raise, stand, or lower patients to sitting and lying positions.

What will the future bring? This chapter discusses new ways of looking at current mobilization efforts, concerns that could impede progress in adopting SPHM programs across the United States, and technologies in development that could make for a very different future.

Values and Aspirations Driving Advances

Progress toward realizing the vision of an SPHM program in place in every health and residential care facility calls for health and residential care organizations and insurers to keep the following concerns in mind when making decisions related to patient handling, movement, and mobility.

Equipment Availability

SPHM equipment is not widely available because many organizations think it is not affordable, especially for long-term care and home use. The lack of understanding of the positive return on investment (ROI) of employing SPHM technology is a barrier to purchase, and often this technology is not seen as a priority. We would like to see changes in awareness that widen the availability of such equipment for a broader range of patients, residents, and caregivers. As well, encouraging new designs for home-based

equipment, better reimbursement from insurance/Medicare, and legislation prioritizing use of SPHM equipment would facilitate availability.

Patient-Centered Focus

Understanding the patient perspective must be the starting point for designing and deploying SPHM equipment. Patient needs include not only their physical requirements but also their emotional, intellectual, and social needs. Apropos of safe patient handling and mobility, many of these needs are most effectively addressed through active engagement of the patient in use of SPHM equipment. Such activities have the following benefits for patients:

- **Enhanced patient dignity.** This begins with seeing the patient as a whole person, not simply a name, condition, room, or bed number. It also means providing each patient the maximum opportunity for self-determination.
- **Improved mobility.** Use of all possible muscles and weight-bearing activities facilitates improvements in patient health and functioning.
- **Emotional support.** This includes preservation of dignity during delivery of all patient care, including mechanically assisted movement.
- **Increased self-determination.** Intellectual needs include the ability to make as many decisions as possible related to care and assisted movement.
- **Social support.** The ability to maintain the normal sitting and standing positions associated with social interactions helps patients and residents maintain and develop interpersonal relationships.

Staff Focus and Staff Needs

Facilitating the ability of direct caregivers to respond to a patient's range of needs, both physical and mental, is essential for the well-being of patients but also for the safety and health of the staff.

Successful implementation of an SPHM program will enable caregivers to live their values on a daily basis in all patient/staff interactions.

A direct benefit to staff of using SPHM equipment is the opportunity to thrive throughout their professional lives with mind and body intact, free of the injuries commonly associated with patient handling. The following minimal supports must be in place to achieve these benefits:

- The SPHM equipment chosen should be designed for all tasks that involve musculoskeletal stress and located so it is convenient to use.
- Caregivers must be trained in SPHM equipment use but also in the importance of following protocols to protect themselves and their patients.
- Caregivers must also be trained in problem-solving so they are prepared to respond to patient handling and mobility issues they have not previously encountered.
- Even with SPHM equipment in place, adequate staffing levels are needed to support caregivers in taking the time to use it.

Systems Thinking

Many shortcomings of available SPHM solutions arise from failure to consider the health care delivery system as a whole and the interrelationship of all its elements. SPHM issues must be addressed contextually rather than as isolated problems. The best physical environment solutions will consider these factors:

- Ease of use, range, and maneuverability of SPHM equipment
- Adequate space (e.g., rooms, hallways, door widths) for use of the equipment
- Convenient storage for SPHM equipment
- Convenient access to equipment from the point of use
- Aesthetics of equipment installation

- Sufficient space to use and store related equipment and furnishings
- Sufficient structural support for overhead lifts
- Interrelationship of lift tracks and building system infrastructure (e.g., mechanical systems, lighting)
- Accommodation for transfers between vehicles and in-facility transport devices

Access to Care

Access to safe care for people with disabilities should be available in health care environments everywhere, including private nursing homes and outpatient clinics.

Dignified Care Environments

Comfortable and homelike environments that enable people to age in place with freedom, quality of life, and the maximum possible level of mobility should be a goal of residential care facilities such as nursing homes and assisted living facilities. Care organizations should provide SPHM equipment to support the safety and activities of residents to help them age in place comfortably and meaningfully.

Transportation

Access to transportation for people with disabilities is part of supporting patient dignity. Depending on the patient population, SPHM equipment may be needed at entrances to a health or residential care facility.

Recreation

Providing access to community activities, facilities, and recreation areas for people with disabilities and those with balance and strength issues is important in long-term care facilities and in the community at large. Use of equipment that allows residents to travel to and

comfortably sit and stand in social areas is necessary to support the emotional and social needs of residents. SPHM equipment can be part of a solution for achieving this as is being seen in an increasing number of activity centers and gyms for seniors where SPHM equipment is used to support individuals and aid in their balance during exercise, dancing, or participation in other physical activities.

New Perspectives and Future Development in Safe Patient Handling and Mobility

As nursing and trained caregiver shortages increase, so will the need for technology to assume many of the physically difficult and dangerous functions that make entering and staying in these fields less desirable. Continued advancement in the development of new technologies is critical to optimize the use of SPHM equipment, which can help move the current state of the industry forward.

Given the aging of the U.S. population, growing rates of obesity, and their derivative results, which increase the need for and cost of care, we must find ways to address the all-too-common decline in health that results when patients are treated for acute conditions. In other words, we have to fix a system of care in which we pay twice: once to cure the acute condition that brings a patient into the system in the first place, and again to rehabilitate the infirmities that result from the treatment process. The aim of a forward-looking SPHM program—and, we believe, of future mobility technology development—should be ongoing mobilization (movement, weight-bearing activity, and ambulation) of patients throughout the day to the absolute limits of what is deemed medically safe.

To this end, we must ensure that physical and occupational therapists are involved in evaluating SPHM equipment. We advocate a paradigm shift that reenvisions the patient room as a rehabilitation site rather than a place where patients take a passive role in their recovery.

Part of this new paradigm is a move away from bed-based care to care in which patients have access to mobility-supportive furnishings that maximize the time they can be upright or semi-upright. As well, we encourage design of areas beyond the patient room to support such extended ambulation.

Assessing the Efficacy of Current Mobilization Efforts

As more and more organizations move toward a culture of mobility—promoting assessment, maintenance, restoration, and even improvement of a patient’s prior level of mobility as early as possible—changes may be needed in how design responds to use of technology that supports patient mobility. Changes have already been made in patient handling assessments. Now, to assess the impact of mobilization efforts and related technology, mobility assessments are conducted that link patient medical and physical status with SPHM technologies.

Ideas for improving patient handling and mobility technology itself are many. The suggestions outlined here are divided into rethinking basic elements, potential short-term improvements to equipment, and more profound improvements that will take time to achieve.

Rethinking basic care elements. Basic care furnishings and fixtures such as beds, chairs, and toilets are not presently conceived or designed to work together as part of a system of care elements that support mobility. The design of these basic elements must be rethought so in the future they can help facilitate the SPHM approach. To accomplish this, the basic care elements must:

- Be conceived as integrated parts of a *system* of patient movement and patient care rather than as separate functional elements.
- Incorporate patient handling functionality as integral to their design, and thus minimize the need for additional SPHM equipment and unclutter the care environment.

- Be designed with consideration of the impact of using portable diagnostic and treatment equipment at patient-side.
- Be able to maximize the weight-bearing and physical activity level of patients during the recovery process.
- Help eliminate or seriously reduce the risk of pressure sores, cross-infection, falls, and other negative patient outcomes.
- Be able to accommodate or adapt to individuals of size as this sector of the population continues to increase.
- Transition from what is today an essentially materials handling approach to moving and transporting patients to a new, more dignified means of mobilizing patients.
- Enable patients to interact with or even manage the mobilization process in a risk-free manner.

Short-term solutions. Below are suggestions that are currently achievable or technologically “close in” for improving existing and emerging equipment. They include provision of:

- Upright postural support devices (e.g., chairs) that are sufficiently comfortable for extended use in order to rectify current overuse of beds
- Beds and chairs that reduce or eliminate the need for caregivers to lean over the patient (cantilevered care)
- Chairs and beds that allow staff and visitors to sit in a manner that supports a normal conversational relationship with patients in bed
- Beds and chairs that provide arm support for caregivers during long-term care procedures such as spoon-feeding a patient
- Beds that accommodate use of sequential compression devices and bring patients into position with limited caregiver effort
- Beds, chairs, and toilets that incorporate functionality that reduces dependence on specialized equipment
- Overhead track systems throughout a care environment that continuously support a patient in a standing position and bear all or part of a patient’s weight

- Overhead lifts that are compatible with ceiling-mounted equipment and have a pleasing appearance
- Overhead lift vests that permit use of normal clothing during toileting
- Overhead lifts with braking mechanisms that enable caregivers to exert lifting force at varying angles (This angular force can assist a patient rising from a chair, where traditional lifts over the patient's head may not.)
- Floor-based lifts with narrow support platforms that can be used in narrow doorways and spaces and are better scaled for residential use
- Improved design and usability of powered lifts
- Universal slings and lift pieces that reduce the challenges of efficiently storing, finding, and deploying the correct item for a patient
- Support slings that are computer-woven in one piece to fit snugly against the patient when vertically suspended and enable more comfortable weight-bearing and ambulation for longer periods
- Safety, usability, and compatibility of lift hanger bars and slings
- Patient support platforms that provide rocking and continuous motion to minimize skin breakdown and maintain or enhance respiration
- Sterile covers for lifts used in the operating room that allow them to be in the sterile field to assist with limb holding or patient repositioning
- Sterile quick-disconnect/reconnect IV tubing, catheters, etc., that allow a patient to ambulate untethered from lines that otherwise restrain movement
- Greater deployment of washlet bidets to lessen the burden of providing hygiene for toileting patients
- New designs for car extraction devices that insert into the hinge of the car door and use the 12V outlet from the car for power

Longer-term (and more profound) solutions. As seen in so many spheres of life, information technology is having a profound impact on the way we do things, from managing home security to managing warehouses. Information technology continues to develop much faster than either hardware development or its incorporation into hardware, and SPHM “hardware” is no different. So, while many people see a maturing lift equipment industry, the authors see one in its infancy on the brink of a whole new set of possibilities.

New Technologies for the Future

New technologies we see as having the greatest potential impact on safe patient handling and mobility in the future are discussed here:

Artificial intelligence (AI) When the first edition of this white paper was published in 2010, there was little discussion of AI beyond headlines about machines beating chess experts. Since then, the speed, cost, and storage of massive computation has changed significantly. The greater availability and more reasonable cost of AI will potentially change SPHM devices from passive tools to active participants in the care process, simultaneously redefining and advancing the very nature of patient-caregiver interaction.

Situation-responsive robotics. First among Bill Gates’s list of 10 breakthrough technologies is what he calls “robot dexterity.” Using neural-network software, AI-enabled robots can now learn through trial and error and reinforcement learning, allowing them to perform increasingly complex tasks. Although true robotic assistance capable of reacting to the seemingly infinite variables that arise in day-to-day patient handling does not yet exist, the prerequisites for this advance are beginning to be developed.

Activity monitoring. While the original publication of this white paper preceded the first Fitbit by only one year, activity tracking has now moved into the mainstream of wellness consciousness and is even used to record falls and message caregivers. However, these capabilities have yet to influence day-to-day patient care (e.g., monitoring the amount of physical activity a patient performs at critical early periods of recovery).

Non-invasive monitoring of vital signs. Activity monitors are now morphing into all sorts of miniaturized devices that measure everything from heart rate and body temperature to ECG and atrial fibrillation detection. Non-invasive means to measure blood glucose levels are now common. Importantly, these developments can advance the field of safe patient handling and mobility beyond ensuring minimum interventions to providing tools that actively optimize recovery, and—beyond that—actually help maintain health.

Exoskeletal technology. The U.S. military has spent much money and many resources developing means to enhance the physical capabilities of soldiers with wearables “designed to improve strength, endurance, and ergonomics while maintaining user safety and reducing physical injury risk during various load tasks.” Currently, these devices are not designed for patient care, nor for use throughout a health care facility as each device must be fit to a single person. However, research and development is underway with the goal of advancing exoskeletal technology.

Advances in materials science. New integral capabilities in cushioning materials will play a major role in patient care in the near future. As we move beyond simple memory foam to “smart foams” that respond actively to pressure variations, we will see materials that rapidly change size, shape, and state.

The future begins with what we imagine in advance. Here are ideas we would like to see turned into products using evolving technologies:

- Processes and equipment sufficiently safe, easy, and instructive to use that habituate deployment of SPHM equipment and help overcome common barriers to its use. (Such behavior change processes may be wholly separate from the actual equipment itself. We are not there yet, and the need for effective behavior change should receive as much attention as the development of new hardware itself.)
- Support devices that provide equal upright, semi-reclined, and supine comfort—a comfortable bed, patient chair, and lift chair in one

- Exoskeletal devices worn by caregivers that multiply their physical strength as they perform manual lifting and carrying functions and avoid unintended impacts on the body and joints with long-term use. (The task-specific usability and wearability of these devices needs to be broadened as presently only specific tasks can be performed with them and proper fit is necessary, limiting who may wear an individual device.)
- Exoskeletal devices that supplement and enhance a patient's physical capabilities for movement and mobility. Programmable devices would be the next development in this technology.
- Wearables that signal times for mobilization and transfers based on both monitoring of vital signs and care schedules
- Equipment that can learn from past use, yet be patient-specific and self-correct and optimize subsequent use with that patient
- Intuitive controls that give the patient a greater role in directing the use of handling, movement, and mobilization technology
- Smart walker designs that enable fall prevention
- AI-enabled robotic caregivers that respond to the infinite variations needed when lifting, lowering, transferring, and otherwise caring for patients
- Smart support surfaces with inherent material properties that reduce the risk of developing bed sores by responding locally to ameliorate pressure, temperature, and moisture conditions
- Floor surfaces sufficiently rigid to accommodate rolling equipment that can soften on impact to cushion falls and reduce the risk of fractures
- Audiology booths that can accommodate lifting/transferring devices

Our Vision for the Future

Ultimately, our vision is that an environment of care will be provided in which patients maintain or, preferably, increase their physical functioning and weight-bearing capacity during their stay and are able to continue to maintain or improve their physical functioning post-discharge. Further, we would like to ensure that caregivers remain free of work-related injuries throughout their careers.

Adoption of new patient care technology is typically slow, and the adoption of SPHM equipment is no exception. Focusing not only on staff well-being but patient quality of care and safety will make workplace changes more palatable to caregivers whose focus is generally on patient well-being rather than their own and to organizations whose focus is on patient satisfaction scores and the financial bottom line.

Safe Patient Handling and Mobility Resources

Design Guidance

Arjo. "Arjo Guidebook for Architects and Planners," 4th ed. <https://www.arjo.com/en-us/solutions/architects-and-planners/>.

Center for Health Design. "Safety Risk Assessment Toolkit." Accessed August 7, 2019. <https://www.healthdesign.org/sra>.

Facility Guidelines Institute. *Guidelines for Design and Construction of Hospitals, Guidelines for Design and Construction of Outpatient Facilities, and Guidelines for Design and Construction of Residential Health, Care, and Support Facilities*. St. Louis: Facility Guidelines Institute, 2018. <https://www.fgiguideines.org>.

Hignett, S., and J. Lu. "Ensuring bed space is right first time." *Health Estate Journal* (February 2008): 29–31, <https://www.healthestatejournal.com/story/3395/ensuring-bed-space-is-right-first-time>.

Matz, M., K. McCoskey, and M. Martin. "Safe Patient Handling and Mobility (SPHM) Technology Coverage and Space Recommendations." Accessed August 7, 2019. https://www.publichealth.va.gov/docs/employeehealth/Pt_Hdlg_Design_Equip_Coverage_Space_Recs.pdf.

Muir, M., and L. Haney. "Designing space for the bariatric resident." *Nursing Homes/Long Term Care Management* 53, no. 11 (November 2004): 25–28.

Ortiz, V., J. Ottolino, M. Matz, R. Uppot, and B. Winters. "Infrastructure Design: A Critical Element in the Care of the Patient with Obesity." *Journal of Patient Safety* (October 2018). <https://doi.org/10.1097/PTS.0000000000000537>.

U.S. Department of Veterans Affairs, Office of Construction and Facilities Management. "Principles of Safe Patient Handling & Mobility: Criteria for Design and Construction." From draft to be published by the end of 2019 at this address: <https://www.cfm.va.gov/til/criteria.asp>.

Villeneuve, J. "Physical Environment for Provision of Nursing Care: Design for Safe Patient Handling." Chapter 12 in *Safe Patient Handling and Movement: A Practical Guide for Health Care Professionals*, edited by A. Nelson. (New York: Springer Publishing Company, Inc., 2006), 187–208.

WorkSafe Victoria. "A Guide to Designing Workplaces for Safer Handling of People." Accessed August 7, 2019. <https://www.worksafe.vic.gov.au/resources/guide-designing-workplaces-safer-handling-people>.

Patient Handling and Mobility Activities

Hignett, S. "Systematic Review of Patient Handling Activities Starting in Lying, Sitting, and Standing Positions." *Journal of Advanced Nursing* 41, no. 6 (March 2003): 545–52. <https://doi.org/10.1046/j.1365-2648.2003.02566.x>.

Hignett, S., E. Crumpton, S. Ruzsala, P. Alexander, M. Fray, and B. Fletcher. *Evidence-Based Patient Handling: Techniques and Equipment*. New York: Routledge, 2002.

Veterans Health Administration (VHA) Center for Engineering & Occupational Safety and Health (CEOSH). "Bariatric Safe Patient Handling and Mobility Guidebook: A Resource Guide for Care of Persons of Size." Accessed August 7, 2019. <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.

VHA Center for Engineering & Occupational Safety and Health (CEOSH). "Safe Patient Handling and Mobility Guidebook." Accessed August 7, 2019. <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.

Waters, T. R. "When is it Safe to Manually Lift a Patient?" *American Journal of Nursing* 107, no. 8 (2007): 53–58. <https://insights.ovid.com/article/00000446-200708000-00030>.

SPHM Equipment

Alamgir, H., O. Wei Li, E. Gorman, S. Yu, C. Fast, and C. Kidd. "Evaluation of Ceiling Lifts: Transfer Time, Patient Comfort and Staff Perceptions." *Injury* 40, no. 9 (September 2009): 987–92. <https://doi.org/10.1016/j.injury.2008.12.002>.

Baptiste, A., "Safe Client Movement and Handling," Chapter 4 in *Working Safely in Health Care, A Practical Guide*, edited by D. Fell-Carlson. New York: Thomson Delmar Learning, 2008.

Baptiste, A., M. McCleerey, M. Matz, and C. Evitt. "Proper Sling Selection and Application While Using Patient Lifts." *Rehabilitation Nursing* 33, no. 1 (January/February 2008): 22–32. <https://doi.org/10.1002/j.2048-7940.2008.tb00189.x>.

Darragh, A., M. Campo, L. Frost, M. Miller, M. Pentico, and H. Margulis. "Safe-Patient-Handling Equipment in Therapy Practice: Implications for Rehabilitation." *The American Journal of Occupational Therapy* 67, no. 1 (January/February 2013): 45–53. <https://ajot.aota.org/article.aspx?articleid=1851647>.

Hignett S. "Determining the Space Needed to Operate a Mobile and an Overhead Patient Hoist." *Professional Nurse* 20, no. 7 (2005): 40–2. <https://www.nursingtimes.net/archive/determining-the-space-needed-to-operate-a-mobile-and-an-overhead-patient-hoist-01-03-2005/>.

International Organization for Standardization. "ISO 10535:2006 Hoists for the Transfer of Disabled Persons – Requirements and Test Methods." Accessed August 7, 2019. <http://www.iso.org/standard/32155.html>.

Nelson, A., B. Owen, J. Lloyd, G. Fragala, M. Matz, M. Amato, J. Bowers, et al. "Safe Patient Handling and Movement: Preventing Back Injury Among Nurses Requires Careful Selection of the Safest Equipment and Techniques. The Second of Two Articles." *American Journal of Nursing* 103, no 3 (March 2003): 32–43. https://journals.lww.com/ajnonline/Citation/2003/03000/Safe_Patient_Handling_and_Movement_Preventing.16.aspx.

U.S. Department of Veterans Affairs, Office of Construction and Facilities Management. "VHA Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts." Accessed August 7, 2019. <https://www.publichealth.va.gov/docs/employeehealth/PreventiveMaintenance.pdf#..>

U.S. Department of Veterans Affairs, Office of Construction and Facilities Management. "VHA Installation and Relocation Checklist for Ceiling Mounted Patient Lifts." Accessed August 7, 2019. <https://www.publichealth.va.gov/docs/employeehealth/InstallationRelocation.pdf#>.

Yassi, A., J. E. Cooper, R. B. Tate, S. Gerlach, M. Muir, J. Trottier, and K. Massey. "A Randomized Controlled Trial to Prevent Patient Lift and Transfer Injuries of Health Care Workers." *Spine* 26, no. 16 (August 2001): 1739–46. https://journals.lww.com/spinejournal/Abstract/2001/08150/A_Randomized_Controlled_Trial_to_Prevent_Patient.2.aspx.

Individuals of Size

American College of Radiology. "One Size Does Not Fit All: How Can Radiology Departments Improve the Overall Imaging Experience for Patients with

Obesity?" *ACR Bulletin* (March 2019). Accessed August 7, 2019. <https://acrbulletin.org/current-issue/1773-one-size-does-not-fit-all>.

Galinksy, T., L. Deter, E. Krieg, A. Feng, C. Battaglia, K. S. Haddock, T. Hilton, et al. "Including Patient Weights with Other Factors to Evaluate Patient Handling Hazards and Interventions." National Institute for Occupational Safety and Health (NIOSH) [under review for publication in 2019].

Muir, M., and L. Haney. "Ergonomics and the Bariatric Patient." *Director* 12, no. 3 (February 2004): 143–6.

Program Justification

Association of Safe Patient Handling Professionals and American Nurses Association. "Advancing the Science and Technology of Progressive Mobility." Accessed August 7, 2019. https://www.asphp.org/wp-content/uploads/2011/05/1400387-ASPHP_ANA_Whitepaper-HR.pdf.

Campo, M., S. Weiser, K. Koenig, and M. Nordin. "Work-Related Musculoskeletal Disorders in Physical Therapists: A Prospective Cohort Study With 1-Year Follow-up." *Physical Therapy* 88, no. 5 (May 2008): 608–619. <https://doi.org/10.2522/ptj.20070127>.

Hodgson, M., M. Matz, and A. Nelson. "Patient Handling in the Veterans Health Administration: Facilitating Change in the Health Care Industry." *Journal of Occupational and Environmental Medicine* 55, no.10 (October 2013):1230–7. https://www.academia.edu/28226763/Patient_Handling_in_the_Veterans_Health_Administration_Facilitating_Change_in_the_Health_Care_Industry

Kim, H., J. Dropkin, K. Spaeth, F. Smith, and J. Moline. "Patient Handling and Musculoskeletal Disorders Among Hospital Workers: Analysis of 7 Years of Institutional Workers' Compensation Claims Data." *American Journal of Industrial Medicine* 55, no. 8 (August 2012): 683–690. <https://doi.org/10.1002/ajim.22006>.

Nelson, A., M. Matz, F. Chen, K. Siddharthan, J. Lloyd, and G. Fragala. "Development and Evaluation of a Multifaceted Ergonomics Program to Prevent Injuries Associated with Patient Handling Tasks." *Journal of International Nursing Studies* 43, no. 6 (August 2006): 717–33. <https://www.sciencedirect.com/science/article/abs/pii/S0020748905001690?via%3Dihub>.

Nelson, A. L., J. Collins, T. Waters, K. Siddharthan, and M. Matz. "Link Between Safe Patient Handling and Patient Outcomes in Long-term Care." *Rehabilitation Nursing* 33, no. 1 (January/February 2008): 33–43. <https://doi.org/10.1002/j.2048-7940.2008.tb00190.x>.

Powell-Cope, G. "Safe Patient Handling and Mobility Research Findings." Healthcare Ergonomics Conference Presentation, 2014. Accessed August 7, 2019. <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.

Powell-Cope, G., P. Toyinbo, N. Patel, D. Rugs, C. Elnitsky, B. Hahm, B. Sutton, et al. "Effects of a National Safe Patient Handling Program on Nursing Injury Incidence Rates." *Journal of Nursing Administration* 44, no. 10 (October 2014): 525-34. <https://doi.org/10.1097/NNA.0000000000000111>.

Wald, H. L., R. Ramaswamy, M. H. Perskin, L. Roberts, M. Bogaisky, W. Wuen, and A. Mikhailovich. "The Case for Mobility Assessment in Hospitalized Older Adults: American Geriatrics Society White Paper Executive Summary." *Journal of the American Geriatrics Society* 67, no. 1 (January 2019): 11-16. <https://doi.org/10.1111/jgs.15595>.

SPHM Curricula

Waters, T. R., A. Nelson, N. Hughes, and N. Menzel. "Safe Patient Handling Training for Schools of Nursing: Curricular Materials." Curriculum developed in partnership with the National Institute for Occupational Safety and Health (NIOSH), the Veterans Health Administration (VHA), and the American Nurses Association (ANA). Accessed August 8, 2019. <https://www.cdc.gov/niosh/docs/2009-127/default.html>.

SPHM Ergonomic Tools and Guidelines

American Physical Therapy Association. "Physical Therapists and Physical Therapy Assistants in Safe Patient Handling HOD P06-19-24-10 [Initial: HOD P06-12-21-20] [Position]." Accessed September 25, 2019. https://www.apta.org/uploadedFiles/APTAorg/About_Us/Policies/Practice/SafePatientHandling.pdf.

Association of periOperative Registered Nurses. "Guideline for Safe Patient Handling and Movement" in *Guidelines for Perioperative Practice*, 817-868. Denver, CO: AORN, Inc, 2019. <https://www.aorn.org/guidelines/purchase-guidelines>.

Baptiste, A., E. Hernandez, N. Hughes, V. Kelleher, J.D. Lloyd, M. Matz, K. Moser, et al. C. Petersen, ed. "AORN Guidance Statement: Safe Patient Handling and Movement in the Perioperative Setting." *AORN Journal* (January 2007): 11-13. Last modified April 12, 2019. <https://www.cdc.gov/niosh/nioshtic-2/20033114.html>.

Sedlak, C. A., M. O. Doheny, A. Nelson, and T. R. Waters, "Development of the National Association of Orthopaedic Nurses Guidance Statement on Safe Patient Handling and Movement in the Orthopaedic Setting." *Orthopaedic Nursing* 28, no. 25 (March/April 2009): 2-8. https://www.nursingcenter.com/journalarticle?Article_ID=855698&Journal_ID=403341&Issue_ID=855695.

U.S. Department of Labor, Occupational Safety & Health Administration. "Guidelines for Nursing Homes: Ergonomics for the Prevention of Musculoskeletal Disorders." Accessed August 8, 2019. https://www.osha.gov/ergonomics/guidelines/nursinghome/final_nh_guidelines.html.

VHA Center for Engineering & Occupational Safety and Health (CEOSH). "Safe Patient Handling and Mobility Guidebook." Ch. 5. Patient Assessment, Care Planning, and Algorithms for Safe Patient Handling and Mobility. Accessed August 7, 2019. <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.

SPHM Program Implementation

American Nurses Association. *Safe Patient Handling and Mobility: Interprofessional National Standards Across the Care Continuum*. Accessed August 8, 2019. <https://www.nursingworld.org/nurses-books/safe-patient-handling-and-mobility-interprofessional-national-standards-ac/>.

Association of Safe Patient Handling Professionals. "Ergonomics—Manual Handling of People in the Healthcare Sector: An edited summary of ISO Technical Report 12296." Accessed August 7, 2019. <http://www.asphp.org/wp-content/uploads/2011/05/ArjoHuntleigh-Summary-ISO-TR-12296.pdf>.

Collins, J., L. Wolf, J. Bell, and B. Evanoff. "An Evaluation of a 'Best Practices' Musculoskeletal Injury Prevention Program in Nursing Homes." *Injury Prevention* 10, no. 4 (August 2004): 206–11. <https://doi.org/10.1136/ip.2004.005595>.

Evanoff, B.; L. Wolf; E. Aton; J. Canos, and J. Collins. "Reduction in Injury Rates in Nursing Personnel Through Introduction of Mechanical Lifts in the Workplace." *American Journal of Industrial Medicine* 44, no. 5 (October 2003): 451–57. <https://doi.org/10.1002/ajim.10294>.

Hignett, S., E. Crumpton, S. Ruzala, P. Alexander, M. Fray, and B. Fletcher. "Evidence-based Patient Handling: Systematic Review." *Nursing Standard* 17, no. 33 (April 2003): 33–36. <https://doi.org/10.7748/ns2003.04.17.33.33.c3383>.

Hodgson, M., M. Matz, and A. Nelson. "Patient Handling in the Veterans Health Administration: Facilitating Change in the Health Care Industry." *Journal of Occupational and Environmental Medicine* 55, no.10 (October 2013):1230-7. https://www.academia.edu/28226763/Patient_Handling_in_the_Veterans_Health_Administration_Facilitating_Change_in_the_Health_Care_Industry.

International Organization for Standardization. "ISO/TR 12296:2012: Ergonomics -- Manual Handling of People in the Healthcare Sector." Accessed August 7, 2019. http://www.iso.org/iso/catalogue_detail.htm?csnumber=51310.

Knibbe, J., N. Knibbe, and A. M. Klaassen. "Safe Patient Handling Program in Critical Care Using Peer Leaders: Lessons Learned in the Netherlands." *Critical Care Nursing Clinics of North America* 19, no. 2 (June 2007): 205–11. <https://doi.org/10.1016/j.ccell.2007.02.009>.

Matz, M., "Back Injury Prevention in Health Care" in *Handbook of Modern Hospital Safety*, 2nd ed., edited by W. Charney. New York: CRC Press, Taylor & Francis Group, 2010.

- Owen, B. D., K. Keene, and S. Olson. "An Ergonomic Approach to Reducing Back/Shoulder Stress in Hospital Nursing Personnel: A Five-Year Follow Up." *International Journal of Nursing Studies* 39, no. 3 (March 2002): 295–302. [https://doi.org/10.1016/S0020-7489\(01\)00023-2](https://doi.org/10.1016/S0020-7489(01)00023-2).
- Nelson, A., K. Motacki, and N. Nivison Menzel. *The Illustrated Guide to Safe Patient Handling and Movement*. New York: Springer Publishing Company, 2009.
- Nelson, A. *Safe Patient Handling and Movement: A Practical Guide for Health Care Professionals*. New York: Springer Publishing Company, 2006.
- Nelson, A., S. Baptiste, M. Matz, and G. Fragala, "Evidence-based Interventions for Patient Care Ergonomics" in *Handbook of Human Factors and Ergonomics in Health Care and Patient Safety*, edited by P. Carayon, 323–45. Mahwah, NJ: Lawrence Erlbaum Associates, 2007.
- Nelson, A., M. Matz, F. Chen, K. Siddharthan, J. Lloyd, and G. Fragala. "Development and Evaluation of a Multifaceted Ergonomics Program to Prevent Injuries Associated with Patient Handling Tasks." *Journal of International Nursing Studies* 43, no. 6 (August 2006): 717–33. <https://doi.org/10.1016/j.ijnurstu.2005.09.004>.
- Powell-Cope, G., P. Toyinbo, N. Patel, D. Rugs, C. Elnitsky, B. Hahm, B. Sutton, et al. "Effects of a National Safe Patient Handling Program on Nursing Injury Incidence Rates." *Journal of Nursing Administration* 44, no. 10 (October 2014): 525–34. <https://doi.org/10.1097/NNA.0000000000000111>.
- Trinkoff, A. M., B. Brady, and K. Nielsen. "Workplace Prevention and Musculoskeletal Injuries in Nurses." *Journal of Nursing Administration* 33, no. 3 (March 2003):153–58. https://journals.lww.com/jonajournal/Abstract/2003/03000/Workplace_Prevention_and_Musculoskeletal_Injuries.6.aspx.
- VHA Center for Engineering & Occupational Safety and Health (CEOSH). "Safe Patient Handling and Mobility Guidebook." Accessed August 7, 2019. <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.
- Washington State Hospital Association. "Workforce Safety: Establishing Your Safe Patient Handling Program." Accessed September 24, 2019. <https://www.wsha.org/quality-safety/projects/worker-safety/>.

Appendix A

High-Risk Manual Patient Handling Tasks by Patient Care Area

TASK	Nursing Home or Other Long-Term Care Facilities (N)	Critical Care Units (C)	Medical/Surgical Units (M)	Labor/Delivery (L)	Operating Rooms (OR)	Pre/Post-Procedure Patient Care Areas (PO)	Psychiatry (P)	Rehabilitation, Spinal Cord Injury, or Traumatic Brain Injury Units (R)	Rehabilitation and Therapy Facilities (RE)	Trauma/Emergency (T)	Imaging (I)	Orthopedic Units (O)	Home Care (H)	Endoscopy Procedure Rooms (G)
Transferring a patient between toilet and chair	•	•	•	•		•	•	•	•	•		•	•	
Transferring a patient between chair and bed	•	•	•	•		•	•	•		•		•	•	•
Transferring a patient between bathtub and chair	•												•	•
Transferring a patient between bed and stretcher	•	•	•	•	•	•	•	•			•	•	•	
Transferring a patient between stretchers					•	•		•		•	•			•
Weighing a patient	•	•	•	•		•	•	•	•	•	•	•	•	
Repositioning a patient to the head of the bed	•	•	•	•		•	•	•		•		•	•	
Repositioning a patient in bed from side to side	•	•	•	•		•		•		•		•	•	
Repositioning a patient in an OR bed (stretcher)					•									
Repositioning a patient in a chair	•	•	•	•			•	•	•	•	•	•	•	

TASK	Nursing Home or Other Long-Term Care Facilities (N)	Critical Care Units (C)	Medical/Surgical Units (M)	Labor/Delivery (L)	Operating Rooms (OR)	Pre-/Post-Procedure Patient Care Areas (PC)	Psychiatry (P)	Rehabilitation, Spinal Cord Injury, or Traumatic Brain Injury Units (R)	Rehabilitation and Therapy Facilities (RE)	Trauma/Emergency (T)	Imaging (I)	Orthopedic Units (O)	Home Care (H)	Endoscopy Procedure Rooms (G)
Changing an absorbent pad	•	•	•	•			•	•		•		•	•	
Making an occupied bed	•	•	•	•			•	•				•	•	
Dressing or undressing a patient	•	•	•	•	•	•	•	•	•	•	•	•	•	
Applying anti-embolism stockings	•	•	•	•		•		•		•		•	•	
Wound care, including sacral and heel care	•	•	•					•		•		•	•	
Feeding a bedridden patient	•	•	•					•					•	
Bathing a patient in bed	•	•	•	•			•	•				•	•	
Bathing a patient in a shower chair	•		•				•	•				•	•	
Bathing a patient on a shower trolley or stretcher	•		•					•				•		
Restorative care and/or ambulation	•	•	•				•	•	•	•		•	•	
Transporting a patient off unit	•	•	•	•	•	•	•	•	•	•	•	•		
Transferring a patient to/from a vehicle	•	•	•			•		•	•	•			•	
Transferring a patient from an ambulance										•				
Preventing falls	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lifting a patient up from the floor	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Applying and removing slings and/or lateral transfer devices	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Moving heavy equipment and accessing electrical outlets	•	•	•	•	•	•	•	•	•	•	•	•	•	

TASK	Nursing Home or Other Long-Term Care Facilities (N)	Critical Care Units (C)	Medical/Surgical Units (M)	Labor/Delivery (L)	Operating Rooms (OR)	Pre-/Post-Procedure Patient Care Areas (PC)	Psychiatry (P)	Rehabilitation, Spinal Cord Injury, or Traumatic Brain Injury Units (R)	Rehabilitation and Therapy Facilities (RE)	Trauma/Emergency (T)	Imaging (I)	Orthopedic Units (O)	Home Care (H)	Endoscopy Procedure Rooms (G)
Performing cardiopulmonary resuscitation or other procedures when many team members are present and it is impossible to have the bed at the right height for every staff member	•	•	•		•			•		•				
Mobilization and ambulation, with lines and monitors	•	•		•				•				•		
Ambulation or gait training	•	•	•	•			•	•	•	•		•	•	
Mobilization and range of motion	•	•	•					•	•			•	•	
Toileting	•	•	•	•		•	•	•	•	•	•	•	•	•
Moving an occupied bed or stretcher	•	•	•	•	•	•	•	•		•	•	•		
Making extensive dressing changes	•	•	•	•	•			•		•		•	•	
Standing for long periods of time	•	•	•	•	•			•	•	•	•	•		
Adopting unnatural positions in order to work effectively or leaning over a patient for protracted periods	•	•	•	•	•			•	•	•	•	•	•	•
Lifting and holding a patient's extremities	•	•	•	•	•			•	•	•	•	•	•	•
Holding retractors for extended periods of time					•									
Reaching, lifting, and moving equipment	•	•	•	•	•	•	•	•	•	•	•	•	•	
Pushing wheeled equipment	•	•	•	•	•	•	•	•	•	•	•	•	•	
Awkward positions with lead aprons					•						•			
Lifting lead aprons					•						•			
Restraining a patient	•	•	•	•			•	•		•		•	•	

TASK	Nursing Home or Other Long-Term Care Facilities (N)	Critical Care Units (C)	Medical/Surgical Units (M)	Labor/Delivery (L)	Operating Rooms (OR)	Pre-/Post-Procedure Patient Care Areas (PC)	Psychiatry (P)	Rehabilitation, Spinal Cord Injury, or Traumatic Brain Injury Units (R)	Rehabilitation and Therapy Facilities (RE)	Trauma/Emergency (T)	Imaging (I)	Orthopedic Units (O)	Home Care (H)	Endoscopy Procedure Rooms (G)
Escorting a confused or combative patient	•	•	•			•	•	•		•			•	
Toileting a confused or combative patient	•	•	•			•	•	•		•			•	
Dressing a confused or combative patient	•		•			•	•			•			•	
Bathing/showering a confused or combative patient	•	•	•	•			•	•				•	•	
Training patients in self-transfer	•	•	•					•	•			•	•	
Assisted standing, sitting, kneeling, stairs, etc.	•							•	•			•		
Activities of daily living	•	•	•	•			•	•	•			•	•	
Repositioning patients on mats									•					
Lifting head of stretcher	•	•	•	•	•	•		•		•	•			
Transferring patients between tables and stretchers or beds	•	•	•	•	•			•	•	•	•			•
Transferring patients between tables and wheelchairs									•	•	•			•
Stabilizing patients in upright or lateral positions	•	•	•	•	•			•		•	•			•
Repositioning patients to/from a prone position	•	•	•	•	•			•			•			
Reaching during ultrasound	•	•	•					•			•			
Inserting plates under patients	•	•	•					•			•			
Turning an orthopedic patient in bed (side to side)	•	•	•		•	•		•				•		
Vertically transferring a postoperative total hip replacement patient	•	•	•		•	•		•				•		
Vertically transferring a patient with an extremity cast/splint	•	•	•		•	•		•				•		

TASK	Nursing Home or Other Long-Term Care Facilities (N)	Critical Care Units (C)	Medical/Surgical Units (M)	Labor/Delivery (L)	Operating Rooms (OR)	Pre-/Post-Procedure Patient Care Areas (PO)	Psychiatry (P)	Rehabilitation, Spinal Cord Injury, or Traumatic Brain Injury Units (R)	Rehabilitation and Therapy Facilities (RE)	Trauma/Emergency (T)	Imaging (I)	Orthopedic Units (O)	Home Care (H)	Endoscopy Procedure Rooms (G)
Lifting and manipulating limbs (without cast or splint)	•	•	•	•	•			•	•	•	•	•	•	
Lifting or holding a limb with a cast or splint	•	•	•	•	•	•		•	•	•		•	•	
Providing patient care in a bed that is not height-adjustable	•	•	•	•			•	•	•	•		•	•	
Providing care in a crowded area, forcing awkward positions	•	•	•	•	•		•	•	•	•	•	•	•	•
Applying abdominal pressure				•							•			•
Scope manipulation														•

Note: Except for the section on orthopedic units, the information in this appendix has been adapted from A. Nelson, "Variations in high-risk patient handling tasks by practice setting," in A. L. Nelson, ed., *Handle with Care: Safe Patient Handling and Movement* (New York: Springer Publishing Company, 2006). The information for orthopedic units is from National Association of Orthopaedic Nurses, "Safe patient handling in orthopaedic nursing," *Orthopaedic Nursing*, Supplement to 28, no. 2 (2009). Updates have been incorporated from VHA Center for Engineering and Occupational Safety and Health (CEOSH), *Safe Patient Handling and Mobility Guidebook*.

Appendix B

SPHM Equipment Categories

The safe patient handling and mobility (SPHM) equipment categories discussed here are those most commonly used as of this writing. However, not all have marked effects on design decisions.

The SPHM devices that have been identified with an asterisk (*) in this appendix must be stored in accessible, appropriate locations (i.e., those with a sufficient number of electrical receptacles, adequate space, and ease of entry/exit); therefore, thought must be given to specifications for storage space for this equipment. See Appendix M: Storage Requirements for Patient Handling Equipment for further information.

Furthermore, during use, SPHM equipment takes up space in patient, treatment, diagnostic, exam, and/or patient toilet/bath rooms. Thus, in locations where the equipment is used, adequate space must be provided for one or more caregivers, including sufficient turning radius in the toilet room, bathroom, patient room, and hallway. Use of expanded-capacity (thus larger) variations of these equipment

A variety of terms are used to identify much of the SPHM equipment listed in this appendix. The terms used here are common in the United States.

The definitions included may refer to dependency levels based on the physical limitations of patients. Please refer to Table H-1: Physical Dependency Levels of Patient Populations in Appendix H: Patient Care Area Characteristics and Ergonomic Issues Survey for definitions of these patient dependency terms.

types, which require more space, is essential for protecting individuals of size and their caregivers.

Patient Lifts

Patient lifts or hoists are available in both overhead and floor-based designs and include slings to assist in lifting and transferring, mobilizing, and ambulating patients; repositioning patients side to side and up in bed; lifting limbs; and other patient handling tasks. Some lifts can also be used for extracting patients from vehicles.

A rechargeable battery pack powers the operation of powered lifts, which are usually controlled with a hand-held device.

At present, the two major categories of patient lifting equipment are *full-body sling lifts* and *sit-to-stand* (stand assist) *lifts*. A third category, *air-assisted lifting devices*, is commonly used to lift patients from the floor.

Full-body sling lifts are categorized as overhead lifts (including ceiling-mounted, wall-mounted, and freestanding/floor-bearing lifts), gantry lifts, or floor-based lifts. The term “ceiling lift” is often used in place of “overhead lift” to identify those lifts with track systems that are permanently affixed to a ceiling or wall structural component. Sit-to-stand lifts are available as powered (non-ambulatory), powered (with ambulation capabilities), and non-powered.

Table B-1: Patient Lift Categories

Full-body sling lifts	Overhead lifts	Ceiling-mounted lifts
		Wall-mounted lifts
		Freestanding/floor-bearing lifts
	Floor-based lifts	
	Gantry lifts	
Sit-to-stand (standing) lifts	Powered lifts	Non-ambulatory
		Ambulation-capable
	Non-powered stand assist aids	
Air-assisted lifts		

Full-Body Sling Lifts

Full-body sling lifts provide total support and assistance for dependent patients and patients who need extensive assistance as well as partial support for patients with some weight-bearing ability. They are used to facilitate mobilization and ambulation. Weight capacities range from a low of around 400 lbs. to 1,000 lbs. or more for individuals of size.

Although there are three types of full-body sling lifts, the overhead (ceiling- and wall-mounted) and floor-based lifts are by far the most commonly used. However, research points to significant biomechanical advantages from using overhead lifts rather than floor-based lifts.^{1, 2, 3, 4, 5} In addition, the convenience and accessibility of overhead lifts^{6, 7, 8} lead to greater use, increased staff acceptance, and thus staff preference for these lifts.^{9, 10, 11, 12} As well, most clinical areas benefit from overhead lifts due to the variety of usable sling applications.

Both overhead and floor-based lifts may be used for supported ambulation, and some of this work may be done in the hallways of clinical units. Specialized lift options may be used for therapy, including scales, springs, or the ability to fix a lift in position for use in exercises.

In addition to lift equipment, gait training systems may include additional features from simple attachments to an overhead rail to complex biodynamic systems that adjust many times per second based on the position of and forces applied by the patient. The biodynamic systems provide consistent support for patients while they perform actions such as catching a ball, sitting, standing, and getting up and down from the floor.

***Overhead lifts (ceiling-mounted, wall-mounted, or freestanding/floor-bearing).** Overhead lifts, which are attached to fixed track/rail systems, are the lift of choice in both new construction and existing buildings.

Ceiling- or wall-mounted lifts are particularly useful in small rooms as floor space requirements are not an issue with them. The motor/lift system traverses along a track that is attached to the building infrastructure, either the I-beam or concrete floor above or the walls and/or floors.

A traverse (also known as X-Y or H-track) system with two fixed rails and a moving traverse allows extensive coverage for repositioning, ambulation, fall recovery, and flexible equipment placement. Single-rail systems are available, but not preferred because they are limited in functionality and may force staff to push beds and furniture. Single rails may be used to connect overhead lifts in multiple rooms (e.g., patient room into bathroom). Such rooms may be connected via single rails or a single rail gate system, which must be designed for safe and efficient connections.

When ceiling or wall-mounted systems cannot be installed, a freestanding four-post rail system with a floor-bearing lift may be used. With this equipment, however, the posts will reduce available floor space.

Figure B-1: Overhead Lifts



AMICO
Ceiling-mounted lift in a patient room



Arjo
Ceiling-mounted lift in a resident room



Ergolet
Ceiling-mounted lift in an emergency department



Romedic
Ceiling-mounted lift



Hillrom-Liko
Ceiling-mounted lift in a critical care unit



Arjo
Ceiling-mounted lift in a bathing room



Ergolet
Wall-mounted lift in patient room



AMICO
Pendant lift in a critical care unit



Marie Martin (Guldmann)
Freestanding/floor-bearing lift

***Floor-based full-body sling lifts.** These portable/mobile lifts move along the floor surface on wheels attached to an expandable base, which allows the lift to spread around chairs/wheelchairs. Weight capacities range from around 350 lbs. to 1,000 lbs. for individuals of size, which means space requirements vary according to the lift's weight capacity and size.

Obstacles to use of floor-based lifts include accessibility,^{13, 14, 15} time to locate and transport the lift to the patient room, and adequate storage requirements.¹⁶ As well, flooring characteristics such as flooring materials^{17, 18} and thresholds impact the ease of use of this type of rolling equipment. Thresholds need to be flush with the floor surface to facilitate safe movement of rolling equipment. Also to ease movement, non-carpeting flooring materials should be used in patient care settings and hallways where rolling equipment is

Figure B-2: Floor-Based Full-Body Sling Lifts



Arjo

Floor-based full-body sling lift



Romedic

Floor-based full-body sling lift



Arjo

Floor-based full-body sling lift for individual of size



EZ Way, Inc.

Floor-based full-body sling lift for vehicle extractions

used by patients and staff. Carpet is avoided because it increases the force required to use floor-based lifts and other rolling equipment, especially when maneuvering and turning corners.

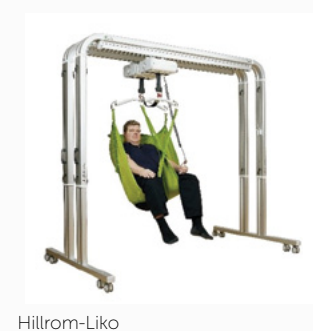
Another important factor in floor-based lift use is door widths. Throughout a facility, all doors through which patients must pass, including standard patient room and bathroom doors, should be able to accommodate the expanded width of portable, floor-based lifts as well as other equipment such as standard and motorized beds/gurneys/stretchers along with one or more accompanying staff members. Doors to expanded-capacity patient rooms and bathrooms for individuals of size must accommodate the width of expanded-capacity floor-based lifts along with at least three staff members. The width of expanded-capacity room doors should be a minimum of 5 feet, and use of a double-door design is recommended. When the population of individuals of size dictates, doors of procedure rooms and other areas must be able to accommodate the width of expanded-capacity beds/stretchers/gurneys.

***Gantry lifts.** Also considered full-body sling lifts, gantry lifts are mobile lifts with two vertical side supports and a support bar that extends horizontally between the two side supports. The lift motor traverses the horizontal bar. The gantry lift is placed over the bed of a patient and functions similarly to a ceiling lift.

As these lifts are mobile, they can be moved from room to room when necessary; however, they are not used to transport a patient from a patient room to another room or location. Organizations often lease these lifts, but sometimes purchase them when sufficient storage is available. They are most often used for individuals of size when there is no overhead lift available to move and lift these patients.

No studies have compared gantry lifts with the other styles of overhead lift, but the need to roll the gantry lift is of ergonomic concern based on the biomechanics of moving rolling equipment.¹⁹ Consequently, the gantry lift is not recommended as a substitute for fixed overhead lifts, although it has advantages over the use of floor-based full-body sling lifts for individuals of size.

Figure B-3: Gantry Lift



Hillrom-Liko

***Lift Slings**

The value of lifts is determined by sling usage and availability. Thus, adequate accessible sling storage is required as these factors will influence staff use of lifting devices.

Full-body sling lifts utilize a variety of sling styles to provide total support and assistance for dependent and extensive assistance patients. They are also used to provide partial support for patients with some weight-bearing ability, in which case the slings are used to facilitate mobilization and ambulation.

Slings come in a variety of types:

- The universal or seated sling, a commonly used sling type, enables lifts to transfer patients from seated position to seated position (e.g., bed to wheelchair, chair, toilet, or commode). It can also be used to lift an individual from the floor and for lateral transfers.
- Repositioning slings assist in moving patients side to side and/or up in bed.
- Turning slings assist caregivers in rolling patients to their side.
- Strap slings, also known as limb support slings, have a variety of helpful functions, including limb support and lateral rotation.
- Ambulation or walking slings provide support for those in the process of rehabilitating who have a goal of increasing mobilization capabilities.
- Supine slings keep patients in a flat position and are used to lift patients from the floor/ground, off a bed so the bed can be made, and for lateral transfers and other tasks.

Figure B-4: Lift Slings



Romedic
Seated/universal sling



Ergolet
Seated/universal sling



Hillrom-Liko
Repositioning sling



Guldmann
Turning sling



Guldmann
Turning sling



Marie Martin (Guldmann)
Strap or limb support sling



Arjo
Ambulation or walking sling



Hillrom-Liko
Supine sling

Sit-to-Stand (Standing Assist) Lifts

***Powered sit-to-stand lifts.** These lifts are mobile and move along the floor surface on wheels attached to an expandable base for spreading around chairs and wheelchairs. They are used for patients

who can provide some assistance in transferring and ambulating (i.e., those with partial weight-bearing capability). To successfully use these lifts, patients must have upper body strength, the ability to grasp with at least one hand, and to the ability to follow simple instructions.

The lifts are used for transfers from seated position to seated position (e.g., bed to wheelchair or commode) and for assistance in dressing, peri-care, toileting, and other activities. Powered sit-to-stand lifts with ambulation capabilities can also be used for assistance in patient mobilization and ambulation therapy.

Weight capacities range from around 350 lbs. to 800 lbs. for individuals of size. Accordingly, space requirements vary with weight capacities and the size of the equipment. Like other floor-based lifts, obstacles to the use of sit-to-stand lifts include accessibility,^{20, 21, 22} time to locate and transport the lift to the patient room, and adequate storage requirements.²³ Flooring characteristics such as flooring materials^{24, 25} and thresholds impact the ease of using this type of rolling equipment.

Figure B-5: Sit-to-Stand Lifts



Hillrom-Liko
Powered sit-to-stand lift



Arjo
Powered sit-to-stand lift,
ambulation capable



Arjo
Non-powered
standing aid

***Non-powered standing aids.** This equipment is useful for patients who are able to help themselves rise from a sitting to a standing position. The standing aid furnishes a secure and steady handle or something similar for patients to grab onto while pulling themselves

up. Some may be used without the assistance of a caregiver, and therefore facilitate independence for the patient. Many styles are available, some freestanding and some attached to beds.

Air-Assisted Lifting Devices

Air-assisted lifting devices are used to raise patients off the floor after a fall.

Figure B-6: Air-Assisted Lifting Devices



HoverTech

Air-assisted lifting device to raise patient to height for lateral transfer onto stretcher/bed (uninflated on left, inflated on right)



Mangar Health

Air-assisted lifting device to raise patient to sitting position

One design is comprised of multiple mattress layers that raise the patient as they are inflated. This type maintains the client in a flat position and can inflate multiple layers, to the height of a stretcher, allowing for a lateral transfer to another flat surface or allowing the patient to sit and stand up as if they were on a bed. Some support a large amount of weight (up to 1,200 lbs.). Another type raises the patient to a raised, seated position, allowing the individual to stand up and transfer to a nearby chair. These can come with or without a back support.

The firm surface of these devices can provide a surface hard enough to perform cardiopulmonary resuscitation (CPR) and to support suspected/spinal injury patients in conjunction with backboard and c-collar. External battery packs allow for the device to be used in areas where electrical access is not available, and rugged bottoms allow for the devices to be used outside and on rough surfaces.

Lateral Transfer/Positioning Devices

Lateral transfer devices are used to move patients horizontally from one flat surface to another (e.g., transfers to/from bed to stretcher to exam or treatment table) and to assist in positioning patients up in bed and laterally side to side. They minimize frictional resistance and thus decrease the pulling force required to move patients. Reducing frictional resistance also benefits patients by reducing shear forces on their skin. Adequate accessible storage is required for these devices.

*Air-Assisted Lateral Transfer and Positioning Devices

These devices float patients on a layer of air from one surface to another and are used not only for lateral transfers but also for repositioning patients side to side and up in bed. They consist of a motorized blower, hose, and mattress with tiny pinholes on the bottom. The blower forces air into the mattress and air escapes through the tiny holes, providing a layer of air for ease in sliding patients as well as decreasing shear forces on the patient's skin. Decreasing shear forces on the skin diminishes the occurrence of skin tears associated with manual patient handling. These devices also provide excellent reduction in forces on the spine of a caregiver. This

Figure B-7: Air-Assisted Lateral Transfer and Positioning Devices



HoverTech

Air-assisted lateral transfer and positioning device



Air Pal

Air-assisted lateral transfer and positioning device for individual of size

style of lateral transfer device was found to be the patient handling device best accepted by staff in a medical ICU setting.^{26, 27}

*Friction-Reducing Devices (FRDs)

FRDs are very low-friction sheets or membranes that readily slide across other materials or each other to decrease frictional resistance when manually sliding a patient.^{28, 29} Depending on the type, some of these devices are used for lateral transfers and for repositioning patients side to side and up in bed. Some are designed to allow movement in only one direction, which reduces the tendency for patient slippage down in the bed and/or in a chair/wheelchair. FRDs are especially helpful when inserting and removing patient lift slings underneath dependent patients.

Figure B-8: Friction-Reducing Devices



Wright Products, Inc.

Friction-reducing device to slide patients in bed with gel inside to facilitate sliding



Arjo

Friction-reducing device with slippery sheets that slide over one another



Marie Martin

Sliding board, often found in surgical suites and emergency departments

*Transfer/ Stretcher Chairs

Transfer/stretcher chairs are used to eliminate the need to perform vertical (seated to seated) transfers. They convert from a chair position, in which they can be used to transport a patient upright from place to place, to a flat (supine) position from which the patient can be laterally transferred to a bed, exam table, stretcher, or other table. Another multi-functional transfer device acts as a stretcher and a chair and also stands the patient to facilitate early mobilization.

Figure B-9: Transfer/Stretcher Chairs



Arjo
Stretcher chair



Arjo
Multi-functional transfer aid that encourages early mobilization, acts as a stretcher, a chair, and a stand-assist aid



Repositioning Aids

Sliding boards or other sliding devices function to bridge the space between, for example, a bed and wheelchair or bedside commode. They are used by more independent patients and afford them a degree of autonomy, since patients can often perform transfers on their own with these devices.

Figure B-10: Repositioning Aids



BeasyTrans
Slide board with disc to facilitate independent transfer



Southwest Medical
Wooden slide board

Patients who are independent with slide boards often lose the ability to self-transfer if a surface (e.g., a toilet seat or exam table) is too high or too low. Other transfer and stand-assist aids facilitate independence for certain patients.

*Specialized Beds/Mattresses

Beds are considered patient handling equipment because of the features and uses they share with other SPHM equipment. Beds raise and lower patients to advantageous work heights and can be made co-planar with other surfaces onto which a patient is to be laterally transferred. In emergencies, when time is of the essence, they are used for patient transport.

Some beds and mattresses have features that ease patient handling tasks such as lateral rotation therapy, percussion, and bringing patients to sitting or standing positions. In addition, motorized patient beds have become more common. However, the dimensions of many of these motorized beds and expanded-capacity beds for individuals of size are greater than those of standard patient beds, and this becomes a problem when elevators and doorways are not large enough to accommodate them.

Following is a list of bed/mattress features that support safe patient handling:

- Motorized drive
- Electric/powered position adjustment
- Retractable footboard
- Percussion/vibration
- Raised knee platform
- Capillary perfusion enhancement
- Built-in scale
- Adjustable height
- CPR function

- Expanded-capacity size
- Lateral rotation therapy
- Adjustable length or width for transport
- Sitting or standing assistance
- Fall prevention features

Figure B-11: Specialized Beds/Mattresses



VitalGo Systems

Specialized bed with sitting/standing assistance



*Stretchers/Gurneys

Stretchers and gurneys with special features can provide assistance for transporting patients, laterally transferring patients, lifting patients from the floor, etc. Motorized stretchers/gurneys are especially helpful in facilities with varying levels of walkways, where caregivers must push equipment up an incline or limit acceleration when pushing it down the incline.

Special elements important to reducing risk from patient handling include a motorization feature or a wheel system that helps move and maneuver non-motorized stretchers. A hydraulic or electric raising and lowering mechanism can decrease the ergonomic risk involved in lifting a gurney from a low position near the ground/floor. Electric patient positioning, which facilitates lifting of the head of a stretcher, also decreases the ergonomic risk of positioning patients.

Figure B-12: Stretchers/Gurneys



Marie Martin (Stryker)
Power drive stretcher



Marie Martin (Stryker)
Power drive stretcher control panel

*Transport Assistive Devices

These devices assist caregivers in pushing heavy rolling objects such as beds, wheelchairs, and heavy equipment.³⁰ They are usually battery-powered and attach to the equipment, such as the head or foot of a bed or the back of a wheelchair. To operate the devices, a caregiver simply steers the device in the right direction.

When used with a patient bed, these devices extend the length of the bed and thus may be of limited use when an elevator is required. An option may be to locate a bed mover on each floor where one may be needed. These devices are especially helpful in facilities with very heavy beds or varying levels of walkways, where caregivers must push equipment up an incline or limit acceleration when pushing it down the incline.

Figure B-13: Transport Assistive Devices



Marie Martin (Staminalift resold by Tollos)
Bed mover



Dane Industries
Wheelchair mover

Assistive Hygiene Equipment

*Ergonomic Shower Chairs

These chairs make it possible for staff to easily access a patient's body areas without squatting and bending excessively. Most are height-adjustable and can tilt the patient into a reclining position.

Figure B-14: Assistive Hygiene Equipment



Arjo
Ergonomic shower chair



Marie Martin (Arjo)
Ergonomic shower trolley



Marie Martin (LiftSeat)
Assistive toilet seat



Pressalit
Adjustable bathroom equipment

*Ergonomic Shower Trolleys

Shower trolleys allow patients to be bathed on a flat surface. Ergonomic designs may include power height adjustment, power tilt adjustment, power head elevation, and/or rail designs that allow staff to work close to the patient.

*Assistive Toilet Seats

A toilet seat with powered standing/lowering features can help a patient transfer on or off a commode or toilet. The raising motion and adjustable armrests can maximize independence and provide greater stability for patients who have difficulty standing from low toilets. The assistive seat can function over a toilet and over a commode at the bedside.

*Adjustable Bathroom Equipment

Flexible bathroom equipment is available to meet the needs of patients with varying body sizes, shapes, heights, and strengths. Height-adjustable sinks, shower chairs, and toilets facilitate safe patient handling as well as patient safety.

Bathroom equipment such as grab bars and sinks that can move along a wall-mounted horizontal rail allow access to patients of various widths as well as caregivers, when required. Some equipment can also assist in raising or lowering patients to accommodate weakness.

In public restrooms in a hospital or elsewhere, height-adjustable changing tables help caregivers and family members by lowering the changing table to the height for seated transfers from a wheelchair onto the table. The table can then be raised to a height that is comfortable for diapering or providing necessary care for children or adults who require assistance.

*Height-Adjustable Exam Tables and Therapy Surfaces/Mats

Height adjustment for exam tables and therapy surfaces are important so that patients can safely transfer to and from the surface and so that staff can work at comfortable heights without awkward positions. If exam tables are not accessible to patients in wheelchairs, they are usually examined in their wheelchairs. In this position, the health care provider may not be able to complete a thorough exam and staff risk injury from working in stooped positions. As well, height-adjustable therapy surfaces/mats provide a low surface for patient transfer and a higher surface for patient treatment.

Figure B-15: Height-Adjustable Equipment



Marie Martin (Midmark)

Height-adjustable exam table



Marie Martin (Hausmann)

Height-adjustable therapy surface/mat

Endnotes

- 1 W. S. Marras, G. G. Knapik, and S. Ferguson, "Lumbar spine forces during manoeuvring of ceiling-based and floor-based patient transfer devices," *Ergonomics* 52, no. 3 (2009): 384–97.
- 2 M. S. Rice, S. M. Woolley, and T. R. Waters, "Comparison of required operating forces between floor-based and overhead-mounted patient lifting devices," *Ergonomics* 52, no. 1 (2009): 112–20.
- 3 P. L. Santaguida et al., "Comparison of cumulative low back loads of caregivers when transferring patients using overhead and floor mechanical lifting devices," *Clinical Biomechanics* 20 (2005): 906–16.

- 4 A. Nelson et al., "Preventing nursing back injuries," *AAOHN Journal* 51, no. 3 (2003): 126–34.
- 5 Santaguida et al., "Comparison of cumulative low back loads of caregivers."
- 6 Occupational Health & Safety Agency for Healthcare (OHSAH) in British Columbia, "Ceiling lifts as an intervention to reduce the risk of patient handling injuries: A literature review" (Vancouver, B.C., 2006). Retrieved 7/17/19 from <http://www.phsa.ca/Documents/Occupational-Health-Safety/ReportCeilingLiftsasanInterventiontoReducetheRisko.PDF>
- 7 A. L. Nelson et al., "Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks," *Journal of International Nursing Studies* 43 (2006): 717–33.
- 8 D. Daynard et al., "Biomechanical analysis of peak and cumulative spinal loads during patient handling activities: A sub-study of a randomized controlled trial to prevent lift and transfer injury health care workers," *Applied Ergonomics* 32 (2001): 199–214.
- 9 Nelson et al. "Development and evaluation of a multifaceted ergonomics program."
- 10 OHSAH, "Ceiling lifts as an intervention to reduce the risk of patient handling injuries."
- 11 Santaguida et al., "Comparison of cumulative low back loads of caregivers."
- 12 Daynard et al., "Biomechanical analysis of peak and cumulative spinal loads."
- 13 Occupational Health & Safety Agency for Healthcare, "Ceiling lifts as an intervention . . . A literature review."
- 14 A. L. Nelson et al., "Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks," *Journal of International Nursing Studies* 43, no. 6 (2006): 717–733.
- 15 D. Daynard et al., "Biomechanical analysis of peak and cumulative spinal loads."
- 16 A. Nelson, G. Fragala, and N. Menzel, "Myths and facts about back injuries in nursing," *The American Journal of Nursing* 103, no. 2 (2003): 32–41.
- 17 Rice et al., "Comparison of required operating forces between floor-based and overhead-mounted patient lifting devices."
- 18 Marras et al., "Lumbar spine forces."
- 19 AORN Workplace Safety Taskforce, *Safe Patient Handling and Movement in the Perioperative Setting* (Denver: Association of periOperative Registered Nurses [AORN], 2007).
- 20 Occupational Health & Safety Agency for Healthcare in British Columbia, "Ceiling lifts as an intervention to reduce the risk of patient handling injuries."

- 21 Nelson et al. "Development and evaluation of a multifaceted ergonomics program."
- 22 D. Daynard et al., "Biomechanical analysis of peak and cumulative spinal loads."
- 23 Nelson et al., "Myths and facts about back injuries in nursing."
- 24 Rice, Woolley, and Waters, T.R., "Comparison of required operating forces between floor-based and overhead-mounted patient lifting devices."
- 25 Marras et al., "Lumbar spine forces during manoeuvring of ceiling-based and floor-based patient transfer devices."
- 26 J. D. Lloyd and A. Baptiste, "Friction-reducing devices for lateral patient transfers: A biomechanical evaluation," *American Association of Occupational Health Nurses* 54, no. 3 (2006): 113-19.
- 27 A. Baptiste et al., "Friction-reducing devices for lateral patient transfers: A clinical evaluation," *American Association of Occupational Health Nurses* 54, no. 4 (2006): 173-80.
- 28 Lloyd and Baptiste, "Friction-reducing devices for lateral patient transfers: A biomechanical evaluation."
- 29 Baptiste et al., "Friction-reducing devices for lateral patient transfers: A clinical evaluation."
- 30 AORN, *Safe Patient Handling and Movement in the Perioperative Setting*.
- 31 Veterans Health Administration, Center for Engineering and Occupational Safety and Health (CEOSH), *Safe Patient Handling and Mobility Guidebook*. Retrieved 7/15/19 from <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.

Appendix C

Lift System Components/Sling Selection, Use, and Care

To provide safe and comfortable patient handling experiences for patients and caregivers using lift equipment, an understanding of the lift system and accompanying slings is a must. Many aspects of sling use are not typically considered in making safe patient handling and mobility (SPHM) equipment choices, and often those considering purchase are unaware of the variety and uses of the different sling types. This appendix is intended to provide information on the components of a lift system, factors to consider for emergency situations, and descriptions of a variety of slings, including how to select the most appropriate for a patient handling task and ensure their safe use and proper care.

Lift System Components

A lift system is comprised of a few essential parts: the motor, strap, hanger bar, hand controller, indicator lights, emergency stop/lower cord, and sling.

Each lift motor, strap, hanger bar, and sling must have adequate capacity to support the weight of the patient. The motor is the workhorse that supplies the force to lift. The strap is connected to both the motor and the hanger bar. Slings are attached to the hanger bar, most commonly by either a loop or clip design. The hanger bar, with attached sling, is moved up or down when the motor pulls up or releases the strap.

A sling is the essential element designed to reduce risk for each specific patient handling task. Often, slings are made in specialty fabrics, such as mesh, wicking, seamless, pressure-reducing, padded, low-friction, wipeable, disposable, or high-temperature options.

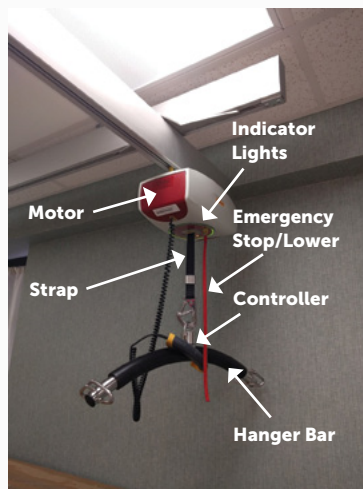
Hanger bars have different designs for different purposes. Some have two attachment points, some four, six, and even eight or more for use with a supine sling that maintains a patient in a position as stable as possible.

Hanger bar attachment points come in two main types: one style uses a loop design to attach the sling to the hanger bar; the other uses a clip design. Many **loop-based slings** have multiple lengths of attachments on a single sling, which may be adjusted to change the patient's position or the fit of the sling.

Figure C-1: Lift Sling Components



Guldmann
Lift sling



Marie Martin (Guldmann)
Lift sling system

Importantly, each sling must **only** be used with a compatible lift and hanger bar. **Never use loop-based slings on clip-based hanger bars. Never use clip-based slings on loop-based hanger bars.**

Figure C-2: Hanger Bars and Attachments



Marie Martin (top: Arjo; bottom: Guldmann)

Example of clip (top) and loop (bottom) sling attachments



Marie Martin (Guldmann)



Marie Martin (Arjo)



Arjo

Hanger bars with two attachment points with loop design



Marie Martin (Arjo)



Marie Martin (Arjo)



Arjo

Hanger bars with two attachment points with clip design

Figure C-2: Hanger Bars and Attachments (continued)



Marie Martin (Molift)

Hanger bar with four sling attachment points, with loop design



Marie Martin (Guldmann)

Hanger bar for an expanded capacity lift with four attachment points with loop design.

Note: This expanded-capacity lift design uses a double motor for individuals of size. Some expanded-capacity lift designs use single motors.



Marie Martin (Tollos)

Hanger bar with six sling attachment points with loop design



Hillrom-Liko

Hanger bar with twelve attachment points for supine slings

Sling Selection and Care

The health or residential care organization typically chooses sling types based on use requirements, infection control protocols, and methods and costs for laundering and reprocessing. Slings may be reusable or disposable, and reusable slings may be washable or wipeable.

Fabric types used for slings vary widely and have different characteristics; sling manufacturers continue to introduce new fabrics to better meet patient care needs. Some features of common fabrics are described here:

- Some fabrics are designed for durability in washing, while others may be designed for comfort.
- Polyester slings may respond well to washing.
- Net or mesh slings may allow more air through and prevent or mitigate heat buildup for the wearer, but some mesh slings may leave imprints on bare skin with prolonged use.
- Wicking fabrics have been offered in both reusable and disposable categories and may help with moisture management.
- Wipeable slings usually have a coating that keeps them from being breathable, which usually means they are not a good choice to leave under a patient.
- Disposable sling fabrics vary from nonwoven material to many textures of cotton, polyester, and/or polypropylene, among others, each of which may have its own effect on breathability and environmental footprint.

A plan should be implemented to supply slings reliably where and when they are needed, which means that reserve slings and a replacement plan should be in place to compensate for laundry delays and loss or degradation. In most cases, slings are not used for multiple patients without cleaning in between for reasons of infection control. Disposable slings are typically used for a single patient until the sling is soiled or the patient is discharged.

Slings need to be inspected before use for visible damage, such as cuts or tears, fraying, loose stitches, fabric wear from abrasion or heat, and label readability. If the sling is not structurally sound or the label is unreadable, the sling needs to be taken out of service. Some manufacturers have specific recommendations for caring for slings, which may include detailed periodic inspections. Washing or reprocessing instructions vary according to sling and fabric types, although many slings are damaged by high heat or bleach.

Sling Styles

The most common sling types are briefly described below, followed by a table intended to provide caregivers with information on sling use for specific patient handling tasks, criteria for sling use, and special considerations to take into account when choosing a sling. See Appendix C: Patient Handling and Mobility Equipment Categories for photographs of other slings.

Sling Styles for Full-Body Sling Lifts

Seated slings are made for lifting patients in a seated position with a full-body sling lift. They may also be known as universal or high-back slings. Many have separate leg straps, which facilitates removal once the patient is seated in a chair.

Many specialized seated sling designs are available, including:

- Hygiene slings, with a wider hip opening and more torso support such as a belt. These slings may or may not require ability to participate or cooperation from the patient.
- Hammock slings, with a solid sheet structure instead of leg straps. This sling type is meant to remain in place under patients seated in chairs.
- Amputee slings, with a smaller hip opening or no hip opening
- Comfort slings, with wider straps, which provide more leg support

Figure C-3: Seated Slings



Romedic
Seated sling



Marie Martin (Guldmann)
Seated sling



Molift
Hygiene sling



Marie Martin (Guldmann)
Hammock sling



Arjo
Amputee sling

Supine slings are designed to keep patients lying on their backs. Most supine slings require specific hanger bars with a greater number of sling attachment points than other sling types.

Figure C-4: Supine Sling



Hillrom-Liko

Figure C-5: Repositioning Slings



Arjo

Repositioning slings are made to reposition the patient side to side or up in bed or to lift or transfer the patient in a supine position. Most are intended to stay beneath a dependent patient all the time and may be treated as part of the bed linen. Some allow the position to be adjusted to keep the head up or allow use in chairs.

Figure C-6: Turning Sling



Guldmann



Guldmann



Guldmann

Turning slings are made only for turning patients, especially for access during cleaning, dressing wounds, or helping with installing other slings. They may look like a triangle or an hourglass.

Limb support/turning slings are designed to support a limb or other body part. Many designs can also be used to facilitate turning a patient in bed.

Figure C-7: Limb Support Slings



Marie Martin (Guldmann)



Guldmann

Walking or ambulation slings are designed to support patients and prevent falls during ambulation. They are meant for use with full-body sling lifts. Many designs are available, and each will support

Figure C-8: Walking/Ambulation Sling



Arjo

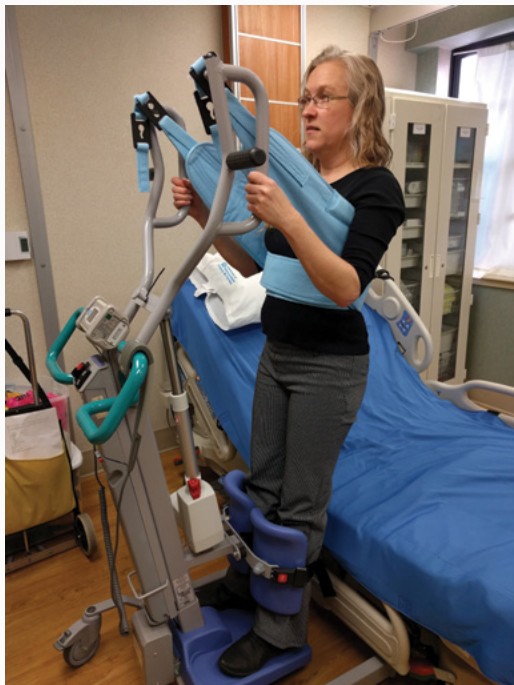
different parts of the body. Some expanded-capacity designs are built to support pannus tissue.

Sling Style Used for Sit-To-Stand Lifts

Standing slings are made for helping a patient stand with a powered sit-to-stand lift. They usually consist of a wide, padded belt that fits around the back and secures in the front. Some have high-friction fabric to keep the sling from migrating up the back or padding under the arms to prevent injury. Some sit-to-stand lifts also allow use of more supportive slings that provide hip support.

Some sit-to-stand lifts are used for ambulating patients. They have a more secure standing sling and the foot plate and knee plate are removable.

Figure C-9: Standing Slings



Marie Martin (Arjo)

Standing sling for lifting/transferring (not for ambulation)



Marie Martin (Arjo)



Arjo

Standing sling for lifting/transferring and ambulating

Table C-1: Slings Suitable for Different Patient Handling Activities

Activity	Sling Choices	Criteria	Special Considerations
Vertical transfers (To/from bed/ wheelchair/ commode/ dependency chair, etc.)	SEATED	Patient can tolerate sitting position and has adequate hip and knee flexion.	<ul style="list-style-type: none"> ▪ Consider presence of wounds for sling application and patient positioning. ▪ Consider precautions of total hip replacement patients.
	STANDING	Patient can grasp and hold handle with at least one hand, has at least partial weight-bearing capability, has upper body strength, and is cooperative and can follow simple commands.	<ul style="list-style-type: none"> ▪ Consider presence of wounds for sling application and patient positioning. ▪ Consider precautions of total hip replacement patients.
	WALKING	Patient has at least partial weight-bearing capability, has upper body strength, and is cooperative and can follow simple commands.	<ul style="list-style-type: none"> ▪ Consider presence of wounds for sling application and patient positioning.
Lateral transfers (To/from bed/ stretcher/ shower trolley/ gurney)	SUPINE	Patient cannot tolerate sitting position and has restricted hip and/or knee flexion. Patient can tolerate supine position.	<ul style="list-style-type: none"> ▪ Use clinical judgment if patient has respiratory compromise or if wounds present may affect transfers/positioning.
	REPOSITIONING	Patient can tolerate supine position.	<ul style="list-style-type: none"> ▪ Vary position as necessary and tolerated to account for wounds, comfort, and respiratory needs.
	SEATED	Patient can tolerate sitting position and has adequate hip and knee flexion.	<ul style="list-style-type: none"> ▪ Consider presence of wounds for sling application and patient positioning. ▪ Consider precautions of total hip replacement patients.

Table C-1: Slings Suitable for Different Patient Handling Activities (*continued*)

Activity	Sling Choices	Criteria	Special Considerations
Bathing	SUPINE	Patient cannot tolerate sitting position and has restricted hip and/or knee flexion. Patient can tolerate supine position.	<ul style="list-style-type: none"> Use clinical judgment if patient has respiratory compromise or if wounds present may affect transfers/positioning.
	REPOSITIONING	Patient can tolerate supine position.	<ul style="list-style-type: none"> Vary position as necessary and tolerated to account for wounds, comfort, and respiratory needs.
	SEATED	Patient can tolerate sitting position and has adequate hip and knee flexion.	<ul style="list-style-type: none"> Consider presence of wounds for sling application and patient positioning. Consider precautions of total hip replacement patients.
	LIMB SUPPORT	Patient can tolerate sustained holding of any extremity while bathing in bed.	<ul style="list-style-type: none"> Consider wounds, comfort, circulation, and neurovascular and joint conditions if task is of long duration.
Toileting	SEATED	Patient can tolerate sitting position and has adequate hip and knee flexion.	<ul style="list-style-type: none"> Consider presence of wounds for sling application and patient positioning. Consider precautions of total hip replacement patients.
	STANDING	Patient can grasp and hold handle with at least one hand, has at least partial weight-bearing capability, has upper body strength, and is cooperative and can follow simple commands.	<ul style="list-style-type: none"> Consider presence of wounds for sling application and patient positioning. Consider precautions of total hip replacement patients.
	WALKING	Patient has at least partial weight-bearing capability, has upper body strength, and is cooperative and can follow simple commands.	<ul style="list-style-type: none"> Consider presence of wounds for sling application and patient positioning.
Repositioning in chair	SEATED	Patient can tolerate sitting position and has adequate hip and knee flexion.	<ul style="list-style-type: none"> Consider presence of wounds for sling application and patient positioning. Consider precautions of total hip replacement patients.

Table C-1: Slings Suitable for Different Patient Handling Activities (*continued*)

Activity	Sling Choices	Criteria	Special Considerations
Repositioning up in bed	REPOSITIONING	Patient can tolerate supine position.	<ul style="list-style-type: none"> Vary position as necessary and tolerated to account for wounds, comfort, and respiratory needs.
	SUPINE	Patient cannot tolerate sitting position and has restricted hip and/or knee flexion. Patient can tolerate supine position.	<ul style="list-style-type: none"> Use clinical judgment if patient has respiratory compromise or if wounds present may affect transfers/positioning.
	SEATED	Patient can tolerate sitting position and has adequate hip and knee flexion.	<ul style="list-style-type: none"> Consider presence of wounds for sling application and patient positioning. Consider precautions of total hip replacement patients.
Turning a patient in bed	REPOSITIONING	Patient can tolerate supine position.	<ul style="list-style-type: none"> Vary position as necessary and tolerated to account for wounds, comfort, and respiratory needs.
	TURNING	Patient can tolerate being turned by the narrower sling.	<ul style="list-style-type: none"> Consider comfort and presence of wounds for sling application and patient positioning.
Making an occupied bed	REPOSITIONING	Patient can tolerate supine position.	<ul style="list-style-type: none"> Vary position as necessary and tolerated to account for wounds, comfort, and respiratory needs.
	SUPINE	Patient cannot tolerate sitting position and has restricted hip and/or knee flexion. Patient can tolerate supine position.	<ul style="list-style-type: none"> Use clinical judgment if patient has respiratory compromise or if wounds present may affect transfers/positioning.
	SEATED	Patient can tolerate sitting position and has adequate hip and knee flexion.	<ul style="list-style-type: none"> Consider presence of wounds for sling application and patient positioning. Consider precautions of total hip replacement patients.

Table C-1: Slings Suitable for Different Patient Handling Activities (*continued*)

Activity	Sling Choices	Criteria	Special Considerations
Functional sit-to-stand training/ support	STANDING	Patient can grasp and hold handle with at least one hand, has at least partial weight-bearing capability, has upper body strength, and is cooperative and can follow simple commands.	<ul style="list-style-type: none"> ▪ Consider presence of wounds for sling application and patient positioning. ▪ Consider precautions of total hip replacement patients.
	WALKING	Patient has at least partial weight-bearing capability, has upper body strength, and is cooperative and can follow simple commands.	<ul style="list-style-type: none"> ▪ Consider presence of wounds for sling application and patient positioning.
Dressing	STANDING	Patient can grasp and hold handle with at least one hand, has at least partial weight-bearing capability, has upper body strength, is cooperative, and can follow simple commands.	<ul style="list-style-type: none"> ▪ Consider presence of wounds for sling application and patient positioning. ▪ Consider precautions of total hip replacement patients.
	LIMB SUPPORT	Sustained holding of any extremity while dressing in bed.	<ul style="list-style-type: none"> ▪ Consider wounds, comfort, circulation, and neurovascular and joint conditions if task is of long duration.
Pericare	STANDING	Patient can grasp and hold handle with at least one hand, has at least partial weight-bearing capability, has upper body strength, and is cooperative and can follow simple commands.	<ul style="list-style-type: none"> ▪ Consider presence of wounds for sling application and patient positioning. ▪ Consider precautions of total hip replacement patients.
	SEATED / HYGIENE	Patient can tolerate sitting position and has adequate hip and knee flexion.	<ul style="list-style-type: none"> ▪ Consider presence of wounds for sling application and patient positioning. ▪ Consider precautions of total hip replacement patients.
	TURNING	Patient can tolerate being turned by the narrower sling.	<ul style="list-style-type: none"> ▪ Consider comfort and presence of wounds for sling application and patient positioning.
	Replac		
	LIMB SUPPORT	Sustained holding of any extremity while dressing in bed.	<ul style="list-style-type: none"> ▪ Consider wounds, comfort, circulation, and neurovascular and joint conditions if task is of long duration.

Table C-1: Slings Suitable for Different Patient Handling Activities (*continued*)

Activity	Sling Choices	Criteria	Special Considerations
Ambulation training and support	WALKING	Patient has partial weight-bearing capability and is cooperative; consult doctor and/or therapist for readiness.	<ul style="list-style-type: none"> Do NOT use if wounds are present that affect transfers and positioning.
	STANDING	Patient can grasp and hold handle with at least one hand, has at least partial weight-bearing capability, has upper body strength, and is cooperative and can follow simple commands.	<ul style="list-style-type: none"> Consider presence of wounds for sling application and patient positioning. Consider precautions of total hip replacement patients.
Wound care/dressing	LIMB SUPPORT	Patient can tolerate sustained holding of any extremity while dressing/caring for wounds with patient in bed.	<ul style="list-style-type: none"> Consider wounds, comfort, circulation, and neurovascular and joint conditions if task is of long duration.
Surgical procedures	LIMB SUPPORT	Patient can tolerate sustained holding of any extremity while performing surgical procedure.	<ul style="list-style-type: none"> Consider wounds, comfort, circulation, and neurovascular and joint conditions if procedure is of long duration.
Fall rescue	REPOSITIONING	Patient can tolerate supine position.	<ul style="list-style-type: none"> Vary position as necessary and tolerated to account for wounds, comfort, and respiratory needs.
	SEATED	Patient can tolerate sitting position and has adequate hip and knee flexion.	<ul style="list-style-type: none"> Consider presence of wounds for sling application and patient positioning. Consider precautions of total hip replacement patients.
	SUPINE	Patient cannot tolerate sitting position and has restricted hip and/or knee flexion but can tolerate supine position. Used when there is a need for patient to remain flat.	<ul style="list-style-type: none"> Use clinical judgment if patient has respiratory compromise or if wounds present may affect transfers/positioning.

Adapted from A. Baptiste, M. McCleery, M. Matz, and C. Evitt, "Evaluation of sling use for patient safety," *Rehabilitation Nursing* (Jan.–Feb. 2008).

Appendix D

Clearances for Safe Use of Patient Handling and Mobility Equipment

Understandably, health care organizations attempt to make the best use of available space, and—especially in older facilities with multiple-bed wards—“working” space is sometimes quite limited. However, moving rolling equipment in tight spaces compounds already difficult patient handling tasks,^{1, 2} making provision of sufficient space to use safe patient handling and mobility (SPHM) equipment a critical aspect of facility design.

Biomechanical studies show the importance of having adequate space when lifting, moving, and maneuvering loads (for our purposes, patients/residents/equipment). The effects of space constraints are readily observable when staff are seen performing patient care in awkward positions, or when necessary patient handling assistive devices cannot be used as a result of inadequate space in a patient room or toilet room. In certain room layouts, staff members need to physically relocate beds and other patient furniture every time they transfer a patient into a wheelchair or onto a stretcher. Nurses sometimes describe their jobs as “furniture movers.” Some rooms are

so small that patients must be moved in their beds into the hallway or an adjacent room for a safe lateral transfer onto a stretcher.

Using floor-based patient handling equipment in small spaces such as a toilet room has been found to cause shear forces on the spine that are significantly greater than those caused by simply pushing portable equipment in adequate spaces.^{3, 4} These findings for portable lifting equipment may be extrapolated to pushing/pulling other types of equipment, such as beds, patient room furniture, and other objects found in a patient room.

When caregivers must continually move items to provide proper patient handling, their risk of injury is compounded. As well, awkward postures resulting from lifting and moving patients in small spaces increase the risk of injury. Availability of adequate space enhances the quality of nursing by facilitating mobilization of patients, reducing strain-related injuries to staff, and increasing staff productivity.⁵

During development of the 2018 edition of its *Guidelines for Design and Construction* documents, the Facility Guidelines Institute (FGI) prioritized developing information to help design professionals properly design health care spaces (e.g., patient rooms, exam rooms, treatment rooms) that would assure provision of sufficient space for moving, lifting, maneuvering, and handling individuals of size. As part of their efforts, the FGI topic group on accommodations for individuals of size strove to develop design criteria for using patient handling equipment for patients of all sizes.

In 2015 the FGI topic group collaborated with Hillrom to develop minimum design/clearance standards for safe patient handling and patient transportation of individuals of size by conducting simulations of patient handling tasks from an expanded-capacity bed using a ceiling lift, expanded-capacity floor-based full-body sling lift, sit-to-stand lift, and stretcher. Necessarily, the equipment weight capacities were above the threshold used for defining individuals of size (300 lbs.). Among the patient handling tasks simulated using this equipment were transportation of a patient to and from a patient room and patient handling within the patient room, including

transferring a patient from stretcher to bed, from bed to wheelchair, and while lifting/transferring a patient from the bed into the bathroom. The simulation team included nurses, physical therapists, and occupational therapists (the clinical team) as well as architects, ergonomists, and biomechanists. Their goal was to determine minimum clearances for facilitating a safe environment of care for caregivers and for the patients/residents.

A similar simulation exercise was conducted in 2017 for standard-size patients using standard equipment, including a ceiling lift, floor-based full-body sling lift, and stretcher. The patient handling tasks simulated again were transportation of a patient to and from a patient room and patient handling within the patient room, including transferring a patient from stretcher to bed and from bed to wheelchair.

The 2015 and 2017 simulations identified “minimum” clearances for safe use of patient handling equipment that were incorporated into the 2018 FGI *Guidelines* documents.

These minimum clearances and explanations of the results from the simulations are described below.

Patient Handling Simulation Exercise for Standard-Size Patients

The key points derived from the simulation results for standard-size patients are these:

1. **SPHM considerations for room design.** The minimum space requirements needed vary according to the patient handling tasks being performed and the types of patient handling equipment being used. These variables must be taken into consideration when determining the clearances needed in rooms where patient handling equipment will be used.
2. **Standard patient room.** When planning for overhead lifts in the design of a standard patient room, the minimum clear

floor area for transferring a patient from bed to wheelchair using an overhead lift is 3 feet x 10 feet 6 inches. However, the minimum clearance required for a lateral transfer (e.g., transfer from bed to stretcher) in the same room drives determination of the minimum patient room clearances. For example, a lateral transfer requires a clear area of 5 feet 6 inches x 10 feet 6 inches, 2 feet 6 inches wider than required to move a patient from bed to wheelchair using an overhead lift.

Thus, when designing a standard patient room in which overhead lifts will be installed, the clearance required to care for and move these patients is 5 feet 6 inches x 10 feet 6 inches. If overhead lifts are not installed, and floor-based full-body sling lifts must be used, the clearance required is 6 feet x 10 feet 6 inches.

Table D-1: Minimum Clear Space Measurements for Patient Handling Tasks with Standard-Size Patients in Patient Rooms

Patient Handling Task	Minimum Clearance
1. Transportation of patient to and from patient room using stretcher/gurney	48" clear door opening
2. Bed-to-stretcher transfer using lateral transfer device (air-assisted lateral transfer and positioning devices, friction-reducing device)	5'-6" x 10'-6" clear floor area
3. Bed-to-wheelchair transfer using floor-based full-body sling lift	6'-0" x 10'-6" clear floor area
4. Bed-to-wheelchair transfer using ceiling lift	3'-0" x 10'-6" clear floor area

3. **Clinical patient care/exam rooms.** When planning for overhead lifts in the design of patient care rooms where no lateral transfers will take place, 3 feet x 10 feet 6 inches would be adequate for transfer of a patient onto an exam table from a wheelchair using overhead lifts. However, if sit-to-stand lifts will be used, 5 feet x 10 feet 6 inches is required. When using expanded-capacity floor-based full-body sling lifts, the needed clear floor area increases to 6 feet x 10 feet 6 inches.

Use of an overhead lift rather than floor-based full-body sling lifts is strongly recommended in patient exam rooms due to the lift weight, large footprint, and difficulty in maneuvering a floor-based lift in a small space. Use of a floor-based full-body sling lift would increase the required clear floor area in an exam room.

4. **Location of clearances.** Provision of sufficient space to allow clearances on both sides of a patient bed is preferred.
5. **Cost.** In standard exam rooms, and less so in patient rooms, installation of overhead lifts is more economical than dependence on standard floor-based full-body sling lifts throughout a clinical unit/area when considering the effect on room size of the space needed to use these different lift types.
 - The minimum clear floor area required in patient rooms where floor-based full-body sling lifts will be used is 6 feet x 10 feet 6 inches; on the other hand, the minimum clear floor area required for patient rooms where overhead lifts are installed is based on lateral transfer clearances: 5 feet 6 inches x 10 feet 6 inches.
 - The minimum clear floor area required for exam rooms where floor-based full-body sling lifts will be used is 6 feet x 10 feet 6 inches, and the minimum for exam rooms where sit-to-stand lifts will be used is 5 feet x 10 feet 6 inches. In comparison, the minimum clear floor area for exam rooms with overhead lifts is 3 feet x 10 feet 6 inches.

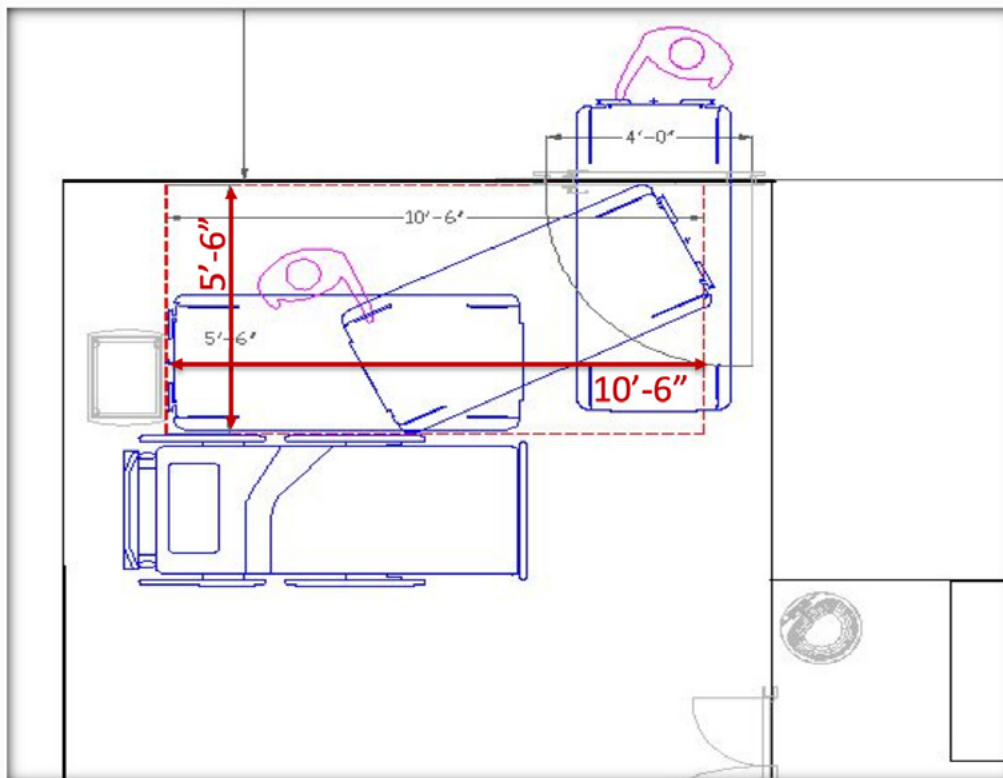
Following are descriptions and diagrams of the results of the simulation exercises for standard-size patients.

Patient transfer from bed to stretcher using a lateral transfer device (air-assisted lateral transfer and positioning or friction-reducing device)

Findings:

- A 30-inch stretcher required a clear floor area of 5 feet 6 inches x 10 feet 6 inches to perform a patient transfer.
- Clear floor area is preferably available on both sides of the patient bed to allow transfer at either side based on patient condition.

Figure D-2: Patient Transfer from Stretcher to Standard Bed Using a Lateral Transfer Device



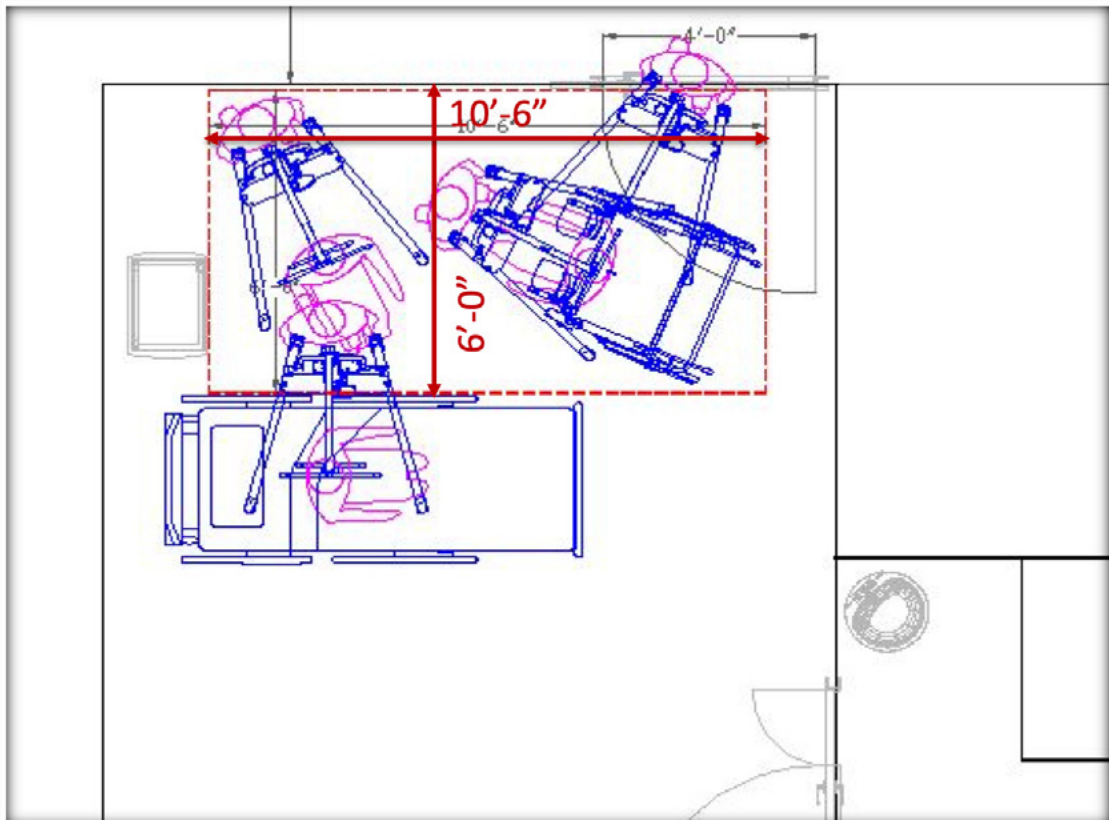
Note: It should be possible to perform this task from either side of the patient bed. The clear floor area defined must be no closer than 2 feet (2 feet 6 inches preferred) from the room's headwall and adjacent to the patient bed.

Patient transfer from bed to wheelchair using a floor-based full-body sling lift

Finding: The patient transfer using a floor-based full body sling lift required a clear floor area of 6 feet x 10 feet 6 inches to perform the task.

Note: This task should be performed at the caregiver side of the patient bed. The defined clear floor area must be no closer than 2 feet (2 feet 6 inches preferred) from the room's headwall and adjacent to the patient bed.

Figure D-3: Patient Transfer from Standard Bed to Wheelchair Using a Floor-Based Full-Body Sling Lift

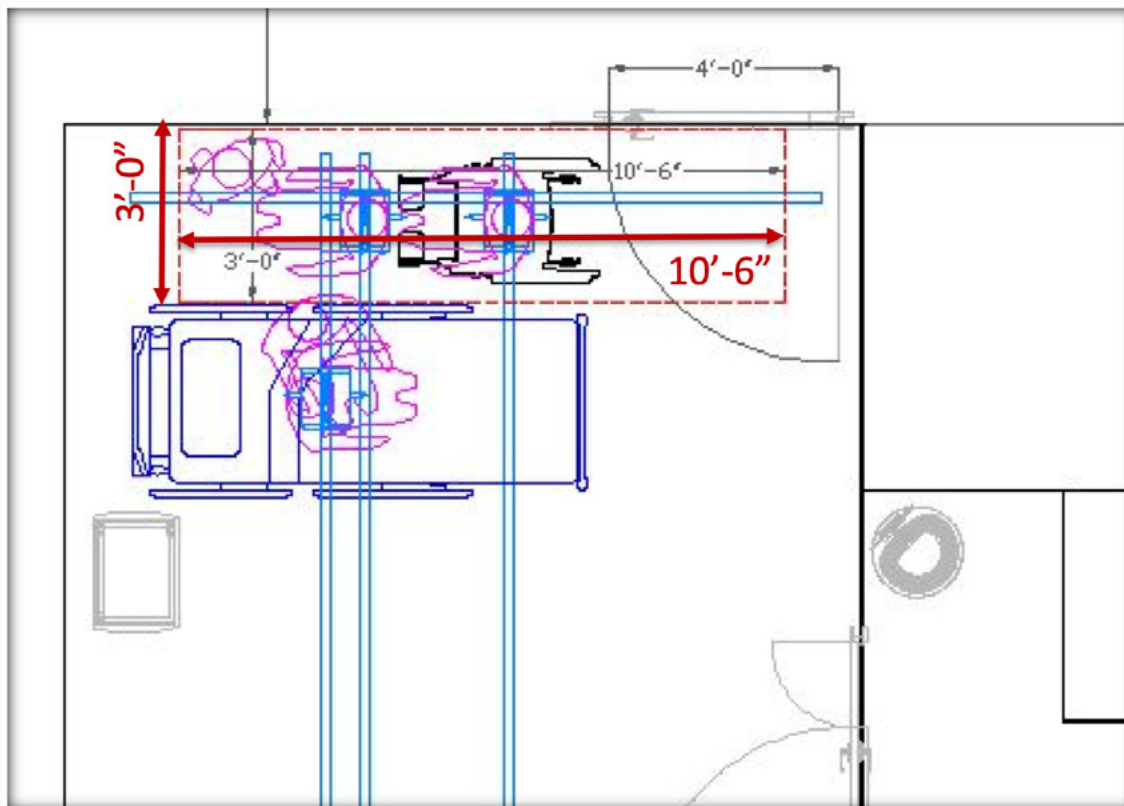


Patient transfer from bed to chair using an overhead ceiling lift

Finding: A patient transfer using an overhead ceiling lift required a clear floor area of 3 feet x 10 feet 6 inches.

Note: It must be possible to perform this task from either side of the patient bed. The clear floor area defined must be no closer than 2 feet from the room's headwall and adjacent to the patient bed.

Figure D-4: Patient Transfer from Standard Bed to Chair Using an Overhead Ceiling Lift



Patient Handling Simulation Exercise for Individuals of Size

Key points derived from the simulation results for individuals of size are these:

1. **SPHM considerations for room design.** The minimum space requirements needed vary according to the patient handling tasks being performed and the types of patient handling equipment being used. These variables must be taken into consideration when determining the clearances needed in rooms where patient handling equipment will be used.
2. **Patient room for an individual of size.** When planning for overhead lifts in a patient room to be occupied by individuals of size, the minimum clear floor area for transferring a patient from bed to wheelchair using an overhead lift is 5 feet x 10 feet 6 inches. However, the minimum clear floor area required for a lateral transfer (e.g., transfer from bed-to-stretcher) in the same room is 5 feet 6 inches x 10 feet 6 inches. Lateral transfers require an additional 6 inches in width, and this critical need must drive determination of the patient room clearance dimensions. Thus, patient rooms for individuals of size with overhead lifts must provide a clear floor area of 5 feet 6 inches x 10 feet 6 inches for caring for and moving these patients.

If overhead lifts are not installed and floor-based full-body sling lifts must be used, the clear floor area required is 7 feet x 10 feet 6 inches.
3. **Clinical patient care/exam rooms.** When planning for overhead lifts in the design of patient care rooms where individuals of size will be served and no lateral transfers will take place, 5 feet x 10 feet 6 inches would be adequate for transfer of a patient onto an expanded-capacity exam table from a wheelchair using overhead lifts and sit-to-stand lifts. When using expanded-capacity floor-based full-body sling lifts, however, the clear floor area needed increases to 7 feet x 10 feet 6 inches. However, use of an overhead lift is strongly recommended in patient exam rooms due to the weight and

very large footprint of floor-based lifts and the great difficulty in maneuvering in a small space.

Table D-2: Minimum Clear Space Measurements for Patient Handling Tasks Involving Individuals of Size

Patient Handling Task	Minimum Clearance
1. Transportation of patient to and from patient room using stretcher/gurney	58" clear opening
2. Bed to stretcher transfer using lateral transfer device (air-assisted lateral transfer and positioning devices, friction-reducing devices)	5'-6" x 10'-6"
3. Patient transfer from bed to wheelchair using floor-based full body sling lift	7' -0" x 10'-6"
4. Patient transfer from bed to wheelchair using ceiling lift	5' -0" x 10'-6"
5. Patient transfer/lift/other tasks using sit-to-stand lift	5' -0" x 10'-6"
6. Patient transfer to bathroom amenities using sit-to-stand lift	See #6 clearances.

4. **Location of clear floor area.** Provision of sufficient space to allow clearances on both sides of a patient bed is preferred.

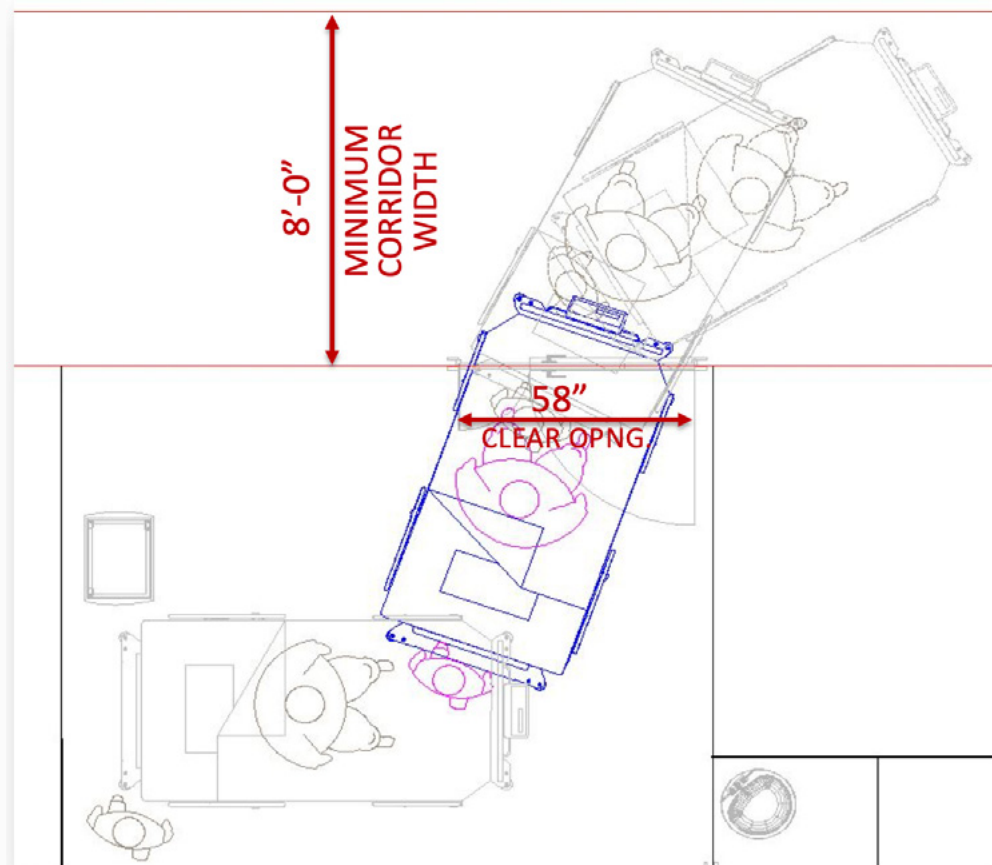
5. **Cost.** In patient rooms intended to accommodate individuals of size, installation of overhead lifts is more economical than use of expanded-capacity floor-based full-body sling lifts because of the reduced space needed for overhead lifts. In addition to the financial reasons, installation of ceiling lifts in these patient rooms is recommended for the safety of both patients and caregivers.

- The minimum clear floor area required for patient rooms using expanded-capacity floor-based full-body sling lift is 7 feet x 10 feet 6 inches.
- The minimum clear floor area for patient rooms for individuals of size using overhead lifts is based on the needed lateral transfer clear floor area of 5 feet 6 inches x 10 feet 6 inches.

Following are descriptions and diagrams of the results of the simulation exercises for individuals of size.

Transportation of individuals of size to and from patient room using expanded-capacity bed

Figure D-5: Patient Transport in Expanded-Capacity Bed



Findings:

- When the bed was not motorized, the team found it much more difficult to maneuver and thus recommended that motorized beds be required for moving individuals of size.
- Using an 8-foot wide corridor, the team experimented with varying door clearances and concluded that a 58-inch clear opening was needed for maneuvering the bed to and from the patient room.

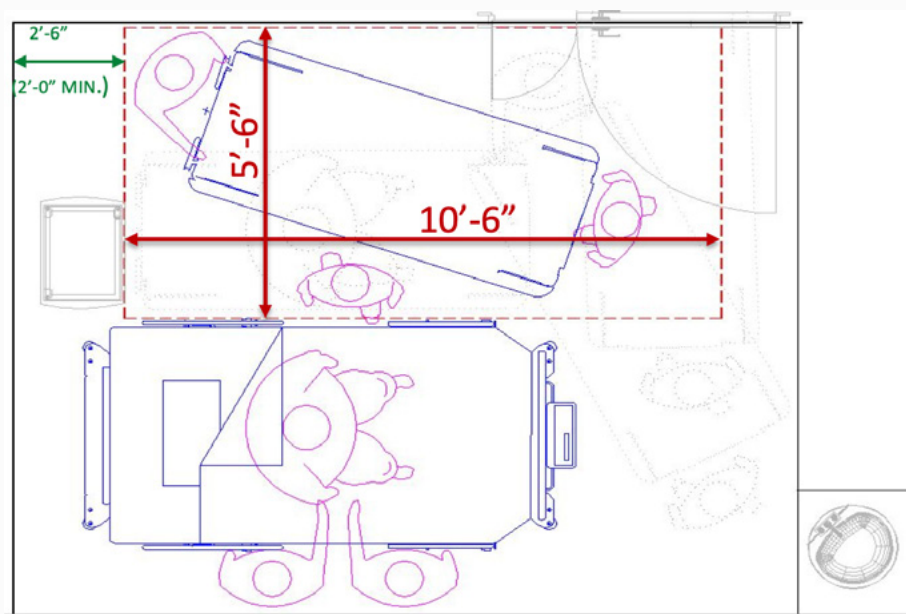
Note: The patient beds offered in today's market place vary in both length and width. The goal of the team was to be able to safely maneuver an

individual of size in a short period of time, simulating an emergency. It was important to determine whether the bed in its largest size could be manipulated successfully from room to corridor, but the team allowed for this task to take a bit longer knowing this case may be very rare. The caregivers on the team suggested they would likely decrease the size of the bed when it was in transport.

Patient transfer of individuals of size from bed to stretcher using lateral transfer device (e.g., air-assisted lateral transfer and positioning devices, friction-reducing device)

The clinical team informed the group this task is often performed by several caregivers, and the study involved as many as five caregivers.

Figure D-6: Transfer of Individual of Size from Bed to Stretcher Using Lateral Transfer Device



Findings:

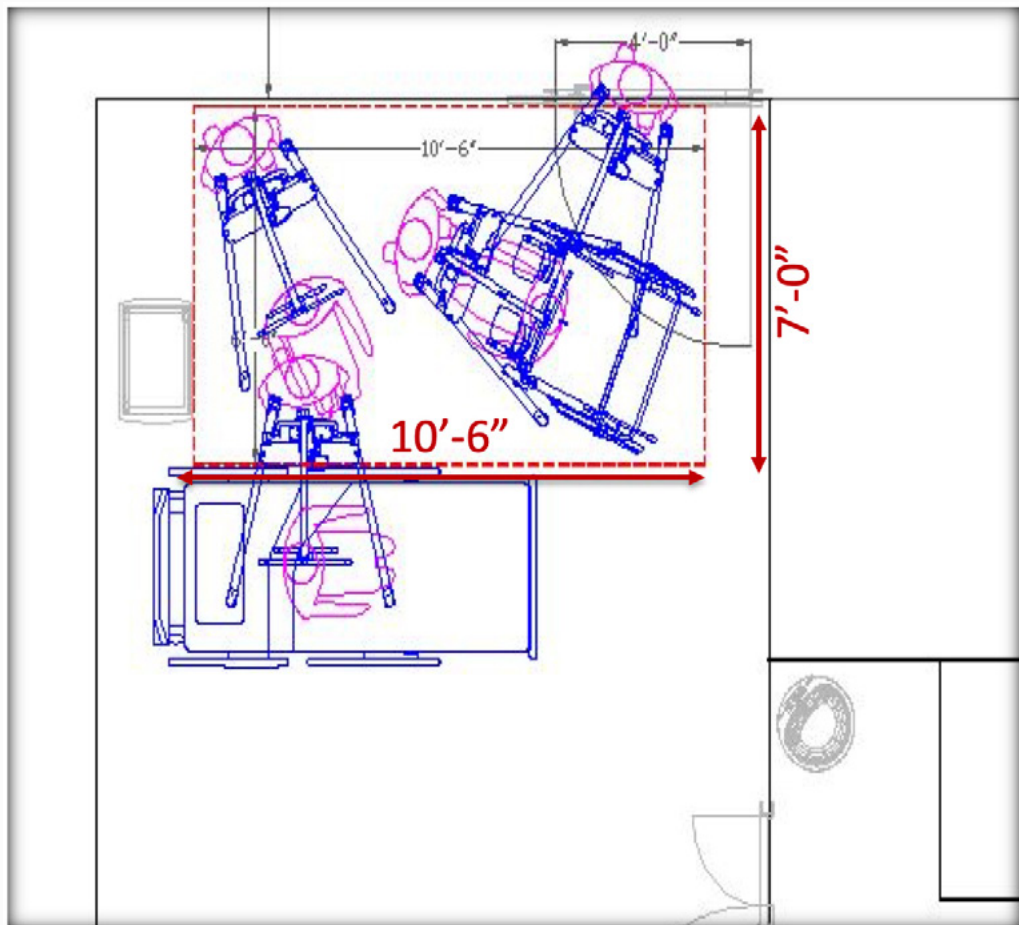
- For the patient transfer using a 30-inch stretcher, a clear floor area of 5 feet 6 inches x 10 feet 6 inches was required to perform the task.

- It is preferable for the clear floor area to be available on both sides of the patient bed to allow transfer at either side based on patient condition.

Note: *The clear floor area defined must be no closer than 2 feet (2 feet 6 inches preferred) from the room's headwall and adjacent to the patient bed.*

Patient transfer of individuals of size from bed to wheelchair using expanded-capacity floor-based full-body sling lift

Figure D-7: Transfer of Individual of Size from Bed to Wheelchair Using Expanded-Capacity Floor-Based Full-Body Sling Lift



The clinical teams informed the group this task is often performed by three caregivers but rarely fewer than two. Our study employed the more common instance of two caregivers.

Finding:

- The patient transfer using an expanded-capacity floor-based full-body sling lift required a clear floor area of 7 feet x 10 feet 6 inches to perform the task.

Note: *This task should be performed at the caregiver side of the patient bed. The clear floor area defined must be no closer than 2 feet (2 feet 6 inches preferred) from the room's headwall and adjacent to the patient bed.*

Patient transfer of individuals of size from bed to chair using overhead ceiling lift

Figure D-8: Transfer of Individual of Size from Bed to Chair Using Ceiling Lift

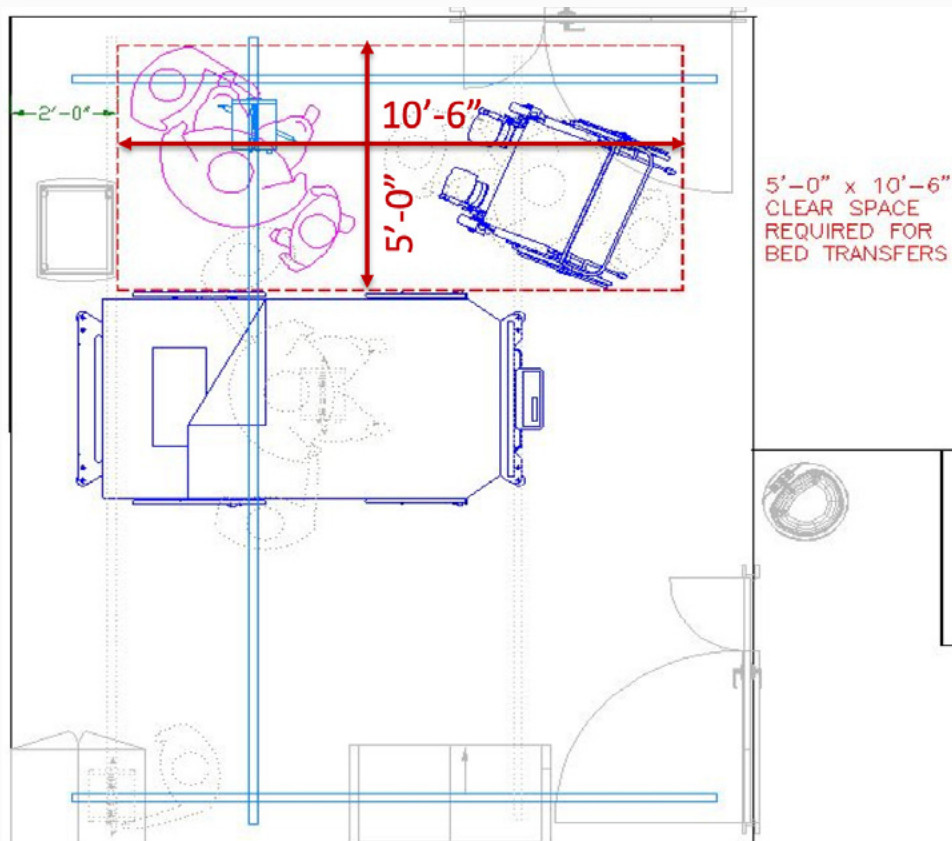
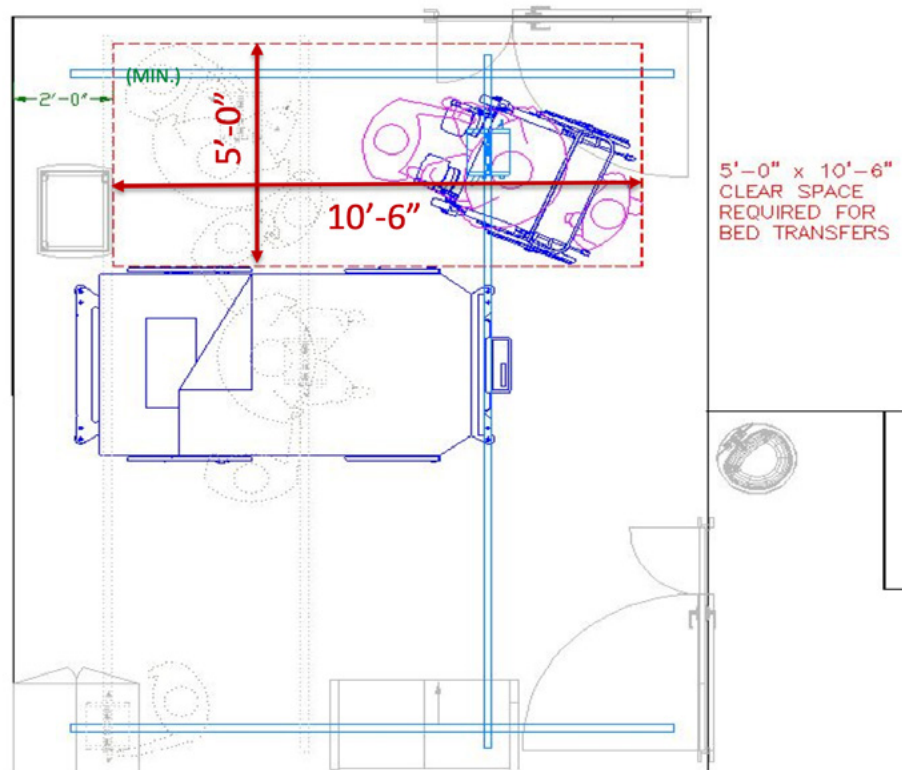


Figure D-8: Transfer of Individual of Size from Bed to Chair Using Ceiling Lift (*continued*)



The clinical teams informed the group this task can be performed by one caregiver, but it is recommended to have two so the study looked at the recommended transfer involving two caregivers.

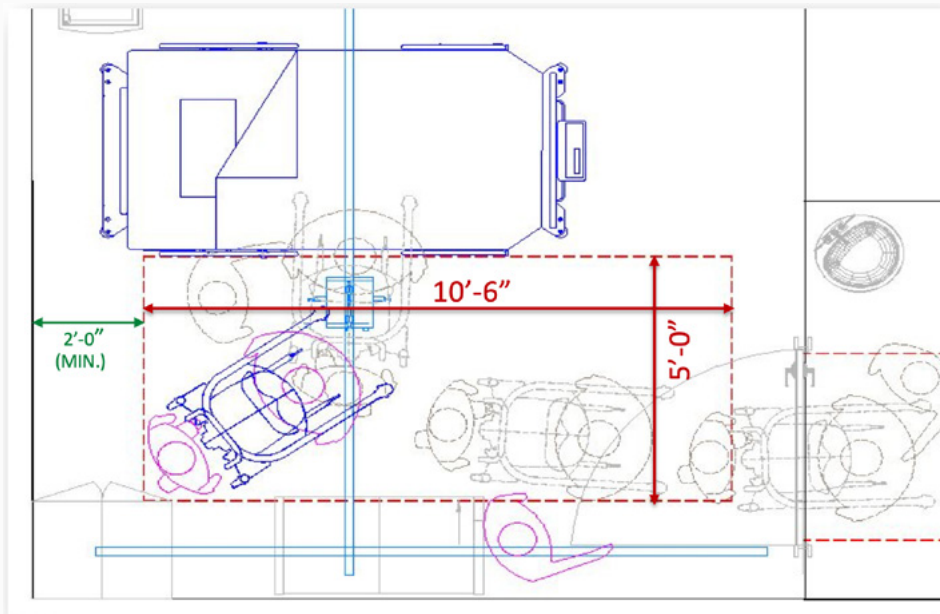
Finding:

- The patient transfer using an overhead ceiling lift required a clear space of 5 feet x 10 feet 6 inches to perform the task.

Note: This task should be able to be performed at either side of the patient bed. The clear floor area defined must be no closer than 2 feet from the room's headwall and adjacent to the patient bed.

Transfer/lift/other tasks using sit-to-stand lift for an individual of size

Figure D-9: Patient Transfer/Lift/Other of Individual of Size Using Sit-to-stand Lift



When using a sit-to-stand lift, the clinical teams recommended having a minimum of two caregivers participate, depending on the size, weight, and capabilities of the patient. The study involved two caregivers and a powered sit-to-stand lift. The group wanted to clarify the clearances needed within the patient room and those for toileting. The toileting clearances are addressed in Figure D-10.

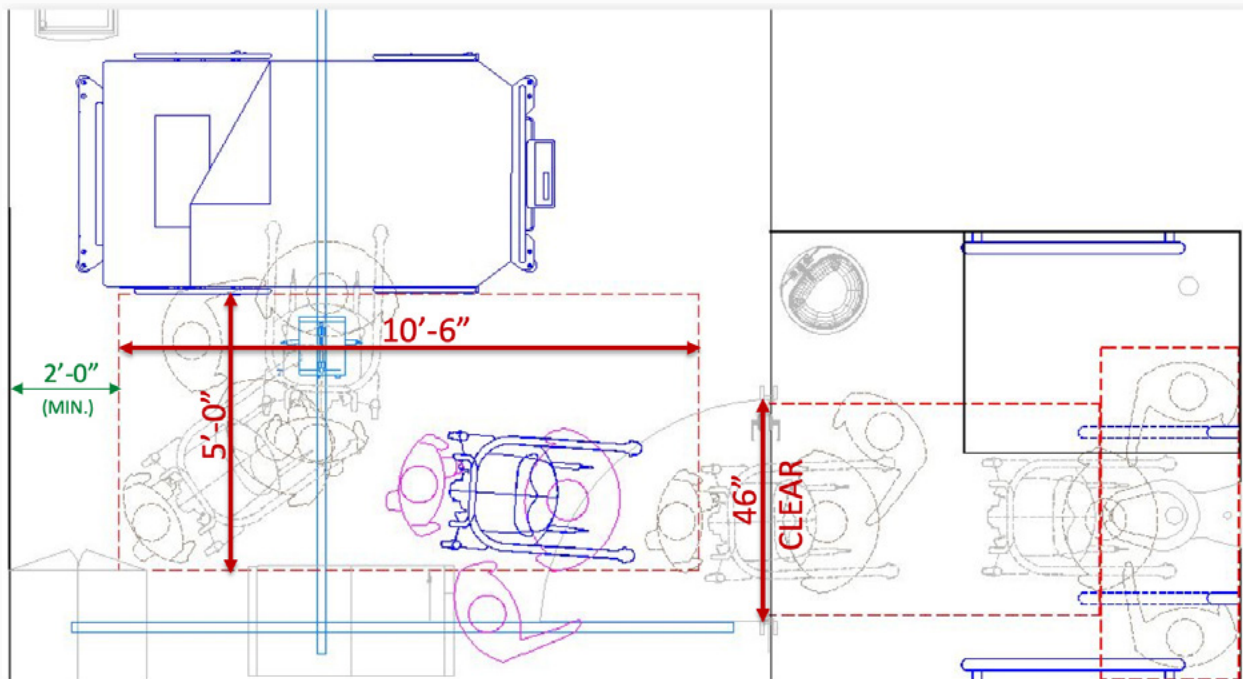
Finding:

- The patient transfer using the sit-to-stand lift required a clear floor area of 5 feet x 10 feet 6 inches on either side of the bed.

Transfer of individuals of size to bathroom using sit-to-stand lift

The clinical teams informed the group that this task is often handled by two caregivers using a powered sit-to-stand lift, so the study employed that scenario. The group wanted to clarify the clearances needed within the patient room and about the bathroom when transferring a patient to the toilet.

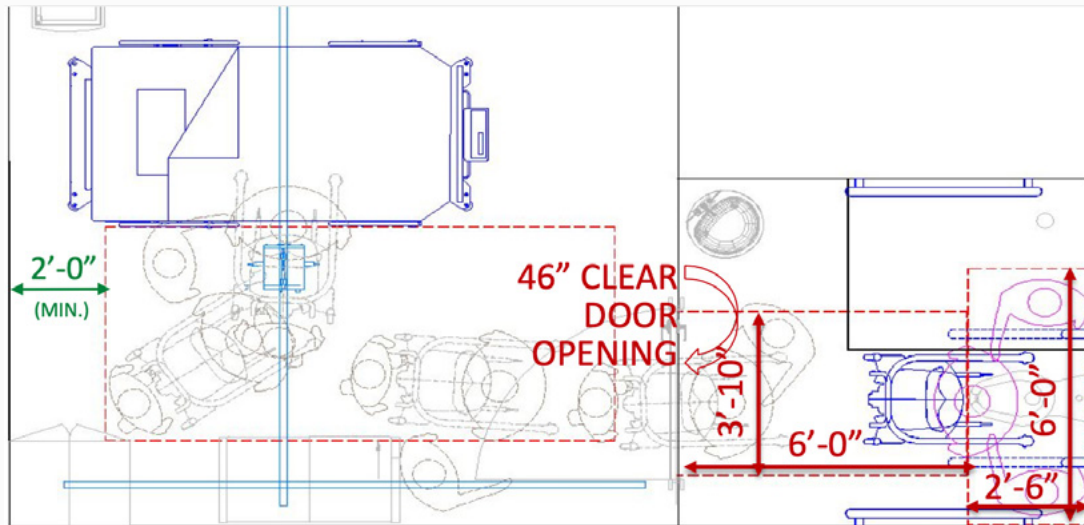
Figure D-10: Transfer of Individual of Size from Bed to Bathroom Using Sit-to-Stand Lift



Findings:

- The patient transfer using the sit-to-stand lift required a clear floor area of 5 feet x 10 feet 6 inches to perform the task within the patient room on either side of the bed.

Figure D-10: Transfer of Individual of Size from Bed to Bathroom Using Sit-to-Stand Lift (continued)



- The approach to the toilet using the lift required a 3-foot clearance from toilet centerline to make room for a caregiver at either side of the toilet. The 3 feet on either side totals 6 feet overall and needed to be maintained from the face of the toilet to the support wall, roughly 2 feet 6 inches.
- To make the transfer, the team required 6 feet in front of the toilet with roughly 4 feet of width.

Note: Staff should be able to begin this transfer from either side of the patient bed.

Endnotes

- 1 W. S. Marras, G. G. Knapik, and S. Ferguson, "Lumbar spine forces during manoeuvring of ceiling-based and floor-based patient transfer devices," *Ergonomics* 52, no. 3 (2009): 384–97.
- 2 M. S. Rice, S. M. Woolley, and T. R. Waters, "Comparison of required operating forces between floor-based and overhead-mounted patient lifting devices," *Ergonomics* 52, no. 1 (2009): 112–20
- 3 Marras et al., "Lumbar spine forces."
- 4 Rice et al., "Comparison of required operating forces."
- 5 M. Muir and L. Haney, "Designing space for the bariatric resident," *Nursing Homes/Long Term Care Management* (November 2004): 25–28.

Appendix E

Patient Care Ergonomic Evaluation Process

The patient care ergonomic (PCE) evaluation process is used to facilitate accurate purchase decisions for safe patient handling and mobility (SPHM) equipment and to generate recommendations for changes in policies and procedures to improve the safety of the patient care environment. The process outlined here is adapted from one developed by Guy Fragala, PhD, CSP. Other variations can be accessed from the resources listed at the end of this appendix.

Introduction to Ergonomics

To understand why an ergonomic evaluation is necessary, a brief introduction to ergonomics may be helpful. Simply put, ergonomics is the study of work. More completely defined by Brian Shackel and Simon Richardson in *Human Factors for Informatics Usability*, it is the scientific study of the relationship between people and the work

A PCE evaluation should be conducted for all areas where patient handling, movement, and mobility occur: critical care and medical/surgical units, radiology/MRI/CT/nuclear medicine suites, therapy areas, labor/delivery suites, outpatient clinics, procedure areas, dialysis centers, the morgue, nursing homes, etc. PCE data collected from each patient care area must be analyzed separately so specific recommendations can be generated for each location.

(occupation/job) they do, the tools (equipment) they use in their jobs, and the characteristics of the environment in which they work (workplace). When any of these aspects of a person's work affects his or her musculoskeletal system, an ergonomic hazard is present. Ergonomic hazards are stressors, forces, and loads that impact the musculoskeletal system. When the forces exceed the body's biomechanical or physiological limits, injury occurs.

An ergonomic evaluation provides a step-by-step approach for ensuring that appropriate technology is in place to reduce musculoskeletal stress and strain and thus to reduce the risk of injury. The following outline briefly lays out a general approach to decreasing the risk of injury.

1. Evaluate jobs and tasks performed:
 - Identify jobs and job tasks that stress body parts.
 - Develop solutions to change the physical demands of these tasks.
2. Evaluate the workplace environment:
 - Review the design of the physical environment looking for aspects that add to the risk of injury.
 - Identify ways to reduce identified risks, remove barriers, minimize travel, etc.
3. Evaluate other factors that may influence ergonomic risk:
 - Consider other factors that affect work performance, such as lighting, noise, equipment storage, and maintenance issues.
 - Determine how to address the ergonomic risks caused by these factors.
4. Implement changes in the workplace.

The Patient Care Ergonomic Evaluation Process

The PCE evaluation has three phases: (1) before, (2) during, and (3) after the ergonomic site visit. Data is collected to give a snapshot of the ergonomic issues of each patient care area, information is gathered during the site visit and then confirmed, and recommendations are made to decrease ergonomic risk.

Before the Ergonomic Site Visit

Begin gathering information about the SPHM issues prior to the site visit and submit this data to the site visit team at least a week before the visit takes place.

Information collected should include the following:

- High-risk tasks performed in the patient care area. These can be ascertained by:
 - Surveying staff for their perceptions of the area’s high-risk tasks (See Tool 1: Perception of High-Risk Tasks Survey in Appendix H: Patient Care Area Characteristics and Ergonomic Issues Survey.)
 - Analyzing injury data for the patient care area (See Tool 2: Patient Care Area Incident/Injury Profile in Appendix H.)
- Patient care area characteristics relevant to ergonomic risk (See Appendix H.)
 - Space
 - Storage for SPHM equipment
 - SPHM equipment maintenance/repair
 - Patient/resident population characteristics
 - Staffing characteristics
 - High-risk patient handling tasks

- Staff injuries during at least one year
- Equipment inventory (Tool 3: Patient Care Area Patient Handling Equipment Inventory)

During the Ergonomic Site Visit

The following activities take place:

- Interview staff to confirm data collected prior to the site visit and acquire additional information, assess staff attitudes, and learn about staff concerns. **The information gathered from this interview is essential to ensuring recommendations made for equipment and policy/procedures are appropriate.** (See Appendix F: Patient Care Ergonomic Evaluation Staff Interview Template.)
- Observe the physical characteristics of the patient care area that are related to safe patient handling and mobility.
 - SPHM equipment
 - Availability
 - Accessibility
 - Use
 - Condition
 - Storage location(s) and capacity
 - Structural issues that affect use
 - Patient room and toilet room
 - Size and configuration
 - Ceiling characteristics
 - Location of HVAC vents/TVs/sprinklers
 - Showering/bathing facilities
 - Safety design issues (e.g., thresholds, doorways)
- Determine if any hazardous materials are located above the ceiling (e.g., asbestos) or in the walls (e.g., lead in paint, asbestos).

- Note how tasks are performed.
 - Showering/bathing process
 - Toileting process
- Document the results of interviews and observations. (See Appendix F: Patient Care Ergonomic Evaluation, Staff Interview Template.)
 - Existing/ordered patient handling equipment/slings
 - Occurrence of high-risk tasks
 - Percentage of dependent and extensive assistance and partial assistance patients
 - Percentage of patients who are individuals of size
 - Room configurations
 - Number of beds on the patient care unit and average daily census
 - Storage issues
 - Other pertinent information

After the Ergonomic Site Visit

Analyze information collected during the previous two phases, and use the results to generate equipment recommendations. For a comprehensive PCE evaluation, prepare a report that covers the following categories, if appropriate for the patient care area:

- Patient handling equipment and sling recommendations
- SPHM equipment storage recommendations
- Recommendations to alter design features that impact patient handling and mobility
- Repair/maintenance process recommendations
- Recommendations for facilitating injury reporting and the capture and analysis of injury data
- Suggestions for improving the facility SPHM program
- Methods for improving the facility SPHM program for individuals of size

Resources

Fragala, G. *Ergonomics: How to Contain On-the-Job Injuries in Health Care* (Chicago: *The Joint Commission*, 1996).

Nelson, A., ed. *Safe Patient Handling and Movement: A Practical Guide for Health Care Professionals* (New York: Springer Publishing Company, Inc., 2006).

Shackel, B., and S. J. Richardson, eds. *Human Factors for Informatics Usability* (Cambridge, U.K.: Cambridge University Press, 1991).

Veterans Health Administration, Center for Engineering and Occupational Safety and Health. *Safe Patient Handling and Mobility Guidebook* (January 2016). Available from <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.

Appendix F

Patient Care Ergonomic Evaluation Staff Interview Template

Unit/Description:		Facility:	Date:
Patient Care Ergonomic Issues	# Existing/ Ordered Unit Equipment/Notes	Patient Handling Equipment/Sling Recommendations	
Vertical transfers/lifts (dependent/extensive assistance patients)			
Vertical transfers/ lifts (partial assistance patients)			
Ambulation training			
Transportation			
Lateral transfers			
Repositioning side to side			
Pulling up to head of bed			
Repositioning in chair			
Wound care			
TED hose application			
Toileting			
Showering/bathing			

beds: _____ Average census: _____ Average % patients more than 250/300 lbs.: _____ Heaviest weight patient: _____

% total dependent/extensive assistance: _____ % total partial assistance: _____ % ambulating/undergoing rehab: _____

Room configurations:

Storage:

Notes:

Appendix G

SPHM Equipment Evaluation and Selection

It is critical for the safe patient handling and mobility (SPHM) equipment purchased by a facility to be user friendly, specific for the patient population under care, and easily maintained. Therefore, the results of the patient care ergonomic evaluation (PCE) should drive what equipment is selected and purchased. If the PCE is performed correctly and yields critical decision-making information, the equipment selected should facilitate user acceptance and compliance in use of the equipment.

Determining which is the most appropriate equipment vendor and which equipment to purchase must be more than a decision made by a person in a contracting office and should not be based solely on cost. However, once a decision has been reached, local contracting staff must be consulted to assist with negotiating the purchasing procedures.

The information contained in this appendix either reflects lessons learned from Veterans Health Administration experience in conducting equipment evaluations or is taken from the VHA's *Safe Patient Handling and Mobility Guidebook*, available from <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.

The involvement of staff in evaluating and selecting equipment is critical, as mentioned elsewhere. Consideration of the issues and implementation of the evaluation methods discussed in this appendix will lead to good equipment purchase decisions.

SPHM Equipment Evaluation Process

Equipment evaluations are typically used to compare the usability of competitive equipment types for a specific application. Therefore, development of an equipment evaluation protocol is highly dependent on the equipment types being considered and their expected application.

Preliminary Equipment Evaluation

This step is typically initiated by developing criteria for the desired product type and then identifying all products that could be used to perform the desired application in a reasonable and safe manner. A request for information (RFI) based on the criteria may be published in *Commerce Business Daily*. Local contracting staff can help with this process. Literature for each product type should then be requested from the product manufacturer.

Following an initial review of the product literature to eliminate products that would not be suitable for the intended application, the evaluation team approaches each manufacturer requesting information on any previously performed or ongoing field and laboratory-based equipment evaluations. Be aware that if the product manufacturer has performed the equipment evaluation, rather than an outside research facility, the findings of the evaluation might be biased or incomplete. A literature search of both peer-reviewed journals and newspapers/industry magazines should be conducted to determine if other information is available for each product.

Contracting staff should be involved early in the process and may assist with performance or cost-of-operation measures pertaining

to both the equipment and the vendor. Performance measures considered by contracting staff include:

- Special features of the product not offered by comparable products
- Trade-in considerations
- Probable life of the product compared to that of comparable products
- Warranty considerations
- Maintenance requirements and availability
- Past performance
- Environmental and energy-efficient considerations

Contracting staff may also look into the history of the equipment being considered. Information about equipment-related incidents and recall information is available from the Food and Drug Administration (www.fda.gov/Safety/Recalls/default.htm), the Consumer Product Safety Commission (www.recalls.gov), and the VA National Center for Patient Safety (<https://www.patientsafety.va.gov/professionals/alerts/index.asp>).

Discussion with vendor customers and equipment owners can also provide useful information for the evaluation process. If possible, meet with health or residential care organizations using the equipment you are considering for purchase. The purpose of such meetings is to view operation of the equipment, discuss it with facility staff and patients, and try to attain cost-of-operation information (e.g., maintenance and repair). An organization might even be willing to provide access to patients and staff for a field study of mutual benefit.

When evaluating equipment, it is important to look at multiple factors, such as the environments in which the equipment will be used, including the availability of storage; general patient activity level; cost; versatility; efficiency; maintenance; and maneuverability. The equipment also needs to be easy to clean, provide safety for patient and caregiver, provide comfort for the patient, and be easy to operate.

Focused Equipment Evaluations

Equipment evaluations that include staff, patients, and others who will interact with the equipment are an essential step in choosing SPHM equipment. A multidisciplinary group, including front-line nursing, biomedical engineering, facility management, patient safety, rehabilitation medical service/therapy, facility safety, and infection control staff as well as an SPHM program manager will provide a wide range of expertise.

Each caregiver or other member of the multidisciplinary team must consider their own area's patient characteristics and needs for safe patient handling and mobility. Multiple front-line staff should be involved as they provide care to a specific population every day and will be able to advise what will and will not work for the patients, workplace flow, and work environment.

Evaluations can be conducted as an equipment fair in a large meeting room or auditorium with many vendors and types of equipment or as a trial of a single piece of equipment in the clinical area where the equipment will be used. In any type of evaluation, relevant staff must complete a survey or questionnaire. Sample equipment surveys can be found at the end of this appendix.

Equipment fairs. To ensure an equipment or vendor fair conducted as part of its SPHM evaluation effort was successful, a VHA Safe Patient Handling and Movement (SPHM) Research Project engaged many individuals in a collective effort. Planning and coordination of multiple facilities, vendors, and staff members were required to orchestrate the event. Following is an outline of the steps taken to prepare for and conduct the fair:

1. Select the type(s) equipment to be evaluated and participating vendors.
 - a. A panel of SPHM experts selected equipment for inclusion based on a literature review and their familiarity with the products. Vendors selected were required to bring only the requested product(s).

- b. Approximately 15 pieces of equipment were selected for the fair. Vendors were contacted individually, told what items to present, and given a point of contact for each facility. No participation fees were solicited from the vendors, but travel costs were borne by the vendor.
2. Coordinate site logistics.
- a. The event was held at seven sites within a two-week period. Dates were chosen to accommodate individual facility needs and dictated to the vendors. All vendors chose to participate.
 - b. One individual in each facility was selected to coordinate the logistics for the fair at that location, including communication with vendors about their setup needs, arrangements for space, safety issues, and promotion of the event.
3. Promote the event.
- a. Various modes of communication were employed to promote the event, including email, promotional posters, discussion at nurse staff meetings, and education of key personnel.
 - b. Key personnel contacted included nurse managers, safety personnel, occupational health staff, nurse educators, union representatives, back injury resource nurses, engineering staff, and administrators.
 - c. The event was promoted to all staff and emphasized in high-risk patient care units. (A high-risk unit is defined as an inpatient hospital unit with a high proportion of dependent patients with frequent moves in and out of bed. It includes long-term nursing and spinal cord care units.)
 - d. In an effort to entice participation, compensation time was offered to high-risk nursing staff who did not work during event hours. Nurse managers were encouraged to offer nursing staff time away from the unit to participate.
 - e. Most facilities awarded one hour of patient safety training to participants and made sign-in sheets available.

4. Conduct the event on the designated day.
 - a. To provide all three shifts the opportunity to participate, most of the sites held the event between the hours of 7 a.m. and 4 p.m.
 - b. VHA police were notified of the activity in advance. Vendor setup time was prearranged with the SPHM program manager and averaged 1.5 hours. Five of the facilities held the event in a large auditorium; the other two used vacant patient rooms.
 - c. The facility SPHM program manager or a designee was responsible for coordinating events throughout the day.
 - d. A member of the research project's core team was present to facilitate the evaluation process and to ensure the vendors did not distract VHA staff members from completing the evaluation process.
5. Conduct the equipment survey during the fair.
 - a. Participants were asked to fill out an equipment rating survey for each piece of equipment. The survey sought to identify the equipment preferences and needs at the specific facility through a rating system based on five questions related to patient care.
 - b. All facility staff members were allowed to complete the survey.
 - c. High-risk unit nursing staff members were directed to complete a color-coded survey packet and to place it in a designated area.
6. Collate and analyze the survey results.
 - a. Equipment rating survey results were analyzed to identify equipment most appropriate for each location.
 - b. Equipment purchasing decisions were based on the survey data, specific facility needs identified through on-site ergonomic analysis, and cost considerations.

Equipment trials. Equipment trials are usually held in the location where the equipment will be used; for example, a proposed overhead

lift would be installed in a patient room or a lateral transfer device introduced in imaging. Because the equipment is used on the actual patients in the clinical area of need, caregivers get a better feel for the equipment's match with their patient population.

Equipment may look or sound appropriate but may not work in the clinical area in need. Trials help ensure functionality within the environment, ease of use by caregivers and patients, usefulness for the patient population, storage needs, product safety, and product durability.

Trials may also reveal that equipment is not of good quality. It is best to find this out through a trial, rather than after purchase, training, and implementation. This is why it's important to test a product even if it is the only one that meets your criteria.

The length of an equipment trial allows more time to use and test the equipment, perhaps a week or even a month, than an equipment/vendor fair.

As with a fair, questionnaires or surveys should be used to analyze employee, patient, and others' reactions to the product. Sample product evaluation tools are found at the end of this appendix, which can be adapted to an organization's own trial process. Results from these survey tools can be tallied to determine if a product is right for a particular patient care area.

Issues that Determine Whether Equipment is Appropriate

The concerns described below will determine which SPHM equipment will be most functional in a particular care environment and for a particular patient population. Therefore, it is important to consider these issues before moving forward with a purchase. Compromising safety for efficiency, or storage for ease of use, will create roadblocks down the road that hinder equipment use and decrease the value of your investment.

Environments for equipment use. SPHM equipment can be introduced to provide safe patient care in multiple locations. In hospitals, these may include—among others—rehabilitation, surgery, pre/post-procedure, imaging, therapy, urgent care, and emergency service areas; ambulance bays; critical care units; areas for training caregivers in home care; and outpatient clinics. Even operating rooms have patient handling hazards that can be addressed with SPHM technology. SPHM technology may also be needed in general care areas, such as hallways, bathrooms, spa rooms, pool areas, and common areas.

The general rule of thumb is that anywhere patient care takes place, some form of SPHM technology can be incorporated to support provision of safe, holistic care, while protecting both the patient and the caregiver from injury. Representatives from all these areas must be involved in the equipment evaluation to be sure their patients and area or unit needs are represented.

General patient activity level/type of patient care area. Each area where SPHM equipment will be used needs to be looked at individually to examine patient flow, space, patient population needs, and utility availability. For example, patient needs in surgery vary considerably from the needs of patients on a rehabilitation unit or an intensive care unit.

Although many pieces of equipment can work interchangeably with patient populations, some pieces are more useful in certain areas than others. For example, air-assisted lifting devices work very well in behavioral health areas where installation of overhead lifts is not allowed.

Some areas may benefit from use of multiple types of equipment. Rehabilitation units will need floor-based equipment, such as sit-to-stand lifts with ambulation capability, to help patients with rehabilitation in their rooms, but overhead lift tracks installed down the hallway in these units can also help with ambulation practice.

Cost. Cost is always an important consideration, although it should not be the only one. Just because a type of equipment meets cost

needs does not mean it will meet functionality and environmental needs. If employees do not like the product or feel it is unsafe, too cumbersome, or inefficient, they are less likely to use the product, in which case money invested will be lost. It is best when evaluating SPHM technology to choose equipment that both meets your needs and is cost-effective, not one or the other.

Technical evaluators may not see price offers and must specify technical factors early in the evaluation process. For this reason, specified technical factors must address all needs identified during trials or market research to provide the most value to purchasing decisions.

Efficiency and reliability. Purchasing equipment that is easy to use, safe, and functional will ensure greater efficiency for patient care staff and greater compliance with organizational SPHM protocols.

Staff are more likely to use equipment that is easily accessed and operated. With patient care staff demands, quick and easy is what employees need so it is important to choose a product that caregivers feel comfortable using.

Equipment reliability may vary between manufacturers or models. Past performance information may be available from other users, and recall information (see sources listed under the Preliminary Equipment Evaluation head) may also be available to point out past safety problems. Good battery life, a warranty, and predictable maintenance requirements can help ensure purchased SPHM equipment is available when needed.

Several types of powered lift equipment are available. Many pieces are battery-operated, and battery life may depend on the care and charging of the equipment. Some lift equipment must be plugged into an outlet to ensure the battery is charged when the lift is needed and some must be unplugged to use. Some have dual batteries so that when one battery is in use, the other can be charging. Some items must be plugged in during use, while others have a battery pack option that charges when not in use; such a battery pack can be taken anywhere with the lift even where no electrical outlets are

available. Overhead lifts may have a docking station for charging or a continuous charge capability (charging anywhere on the tracking system). Other overhead lifts must be manually plugged into an outlet to charge. Ease of charging affects availability and staff willingness to use the equipment.

Reliability may vary between manufacturers or models. Past performance information may be available from other users. FDA reports may also be available to point out past safety problems. Purchasing equipment that is quick and easy to use, safe, and readily available will ensure greater efficiency for patient care staff.

Maintenance requirements. Maintenance of SPHM equipment must be planned, whether it will be completed internally or contracted out. Maintenance costs can be calculated as part of anticipated life cycle cost and used to compare equipment.

Some products require periodic maintenance, such as changing belts, fluids, or batteries and verifying weight-lifting capacity. The Veterans Health Administration (VHA) suggests that regularly scheduled preventive maintenance be provided for all ceiling-mounted lifts to ensure they remain safe. VHA National Center for Patient Safety (NCPS) Patient Safety Alert 14-07 provides checklists that must be completed after performing most types of lift maintenance. (See Appendix L: Checklists for Installation and Maintenance of Ceiling-Mounted Patient Lifts.)

Planned and unplanned maintenance can temporarily put equipment out of order and may require extra cost and additional products or services to complete. However, if periodic maintenance is not completed, this can create a safety risk for patients and caregivers, potentially resulting in injury.

The manufacturer may not take responsibility for equipment failure if maintenance is not completed appropriately. Some manufacturers will provide routine maintenance as an additional service. Read manufacturers' instructions and meet with relevant in-house staff to determine if the maintenance required for equipment being

considered is too much for engineering, biomedical, housekeeping, and/or patient care staff to handle.

Slings also require cleaning and inspection between patients to ensure they are safe to use. They may be cleaned on the unit or sent to housekeeping to be laundered; some organizations use external resources for cleaning. While slings are being cleaned, others will need to be available for use so a sufficient number of various styles should be kept in stock to meet this need. Slings will also be lost and need to be replaced, either from wear and tear or from loss during the laundering or distribution process.

Maneuverability. Overhead lifts provide the most maneuverability and least amount of strain on the caregiver's body during use. Maneuverability is especially important in small spaces (e.g., exam rooms, bathrooms, small patient rooms), making ceiling lifts—with their smaller space requirements—especially valuable in these rooms. Overhead lift tracking systems can extend into bathrooms over toilets and bathtubs or cover entire rooms, allowing for much easier maneuverability than floor-based lifts.

Lifting height is a factor as well; the lift must be able to lift a patient up from the floor to the highest surface necessary. For areas with low ceilings, specifying technical factors may help ensure maximum lifting height is available as low-hanging hanger bars; inline scales on the belt; or underhung, low traverse rails (below the static rails) may all reduce this height. Recessed rails may preserve or increase lifting height.

If floor-based lifts are necessary, caregivers prefer floor-based transferring/lifting equipment that is easily maneuverable in tight spaces, fits under beds/gurneys, supports larger weight capacities, and rolls easily. Larger wheeled floor-based lifts are more maneuverable than smaller wheels, which means a tradeoff between ease of movement and fitting underneath some equipment. Flooring also affects maneuverability. Carpet provides resistance when trying to move floor-based lifts, making them difficult to maneuver and putting employees at risk of injury.

Motor-driven lifts can reduce the forces required for use, but they can make movement more complicated. No motor-driven powered standing-assist devices currently exist.

According to the Centers for Disease Control and Prevention (CDC), projections indicate that half the U.S. population will be obese by 2030. Obesity in the adult population increased 65 percent between 1960 and 2014 and continues to increase, especially in the more severely obese populations. This increase in the population of individuals of size means health care facilities must have lifting capabilities to care for these patients. Unfortunately, many types of expanded-capacity equipment are bulky and difficult to maneuver or fit into rooms. Nonetheless, finding something that works well in a facility's environment and requires minimal effort to use is an important step in maintaining patient and staff safety.

Transport equipment is used to travel across long distances and may have to go up and down inclines. When assessing this equipment, the environment where it will be used must also be evaluated. Equipment location and room design are sometimes the only ways to address mobility space constraints for wheelchairs and other transport equipment. Many motorized stretchers provide easy turning and manageability and require only one caregiver to safely and easily provide transportation.

Storage requirements. When choosing SPHM equipment, consider the storage needs for each piece and its accessories. Storage locations (alcoves, closets, or rooms) are needed for any purchased equipment, slings, slides, and other accessories. Maintaining accessible storage locations in or near patient care areas is critical to provide quick and easy access for staff. Time is a factor in providing patient care, and the more central the location the more staff will use the equipment.

Storage accommodations must have electrical access for charging systems. When stored, lifts and slings must be easily accessible and not buried behind other equipment and/or under other items.

Manufacturers' instructions should be evaluated to ensure equipment can be safely stored at the proper temperature and humidity. Not all

equipment will function if the temperature is too hot or too cold. High humidity may also hinder use of some equipment.

Appropriateness for tasks and workplace design. Floor-based lifts must be able to pass through doors, move smoothly over flooring, make smooth transitions between rooms, fit in patient care areas, and be used for necessary tasks. Consider the space required for lift equipment, staff, and patients during transfers, ambulation, toileting, turning, and repositioning and pulling up in bed. Other high-risk tasks to plan for include picking a patient up from the floor, bathing, therapy services, holding extremities, and pronating.

Determining the pieces of equipment that are most appropriate for the tasks conducted in a particular area will provide the most versatility for the money spent.

Safety for patient and caregiver. The purpose of providing SPHM technology is to support safe and efficient mobility and care without causing harm to either patient or employee. To ensure this goal is achieved, each piece of equipment should be evaluated to determine whether it can prevent injury and reduce the likelihood of patient or staff harm.

Before SPHM technology is put into use, it is imperative to review each product being considered for product recalls and/or safety alerts that have not been resolved. Contacting the product's primary manufacturer and searching for any safety alerts, recalls, and advisories in the FDA, Consumer Product Safety Commission, and VA databases (cited above under the Preliminary Equipment Evaluation head) can help determine if there are components that need to be changed, education that needs to be incorporated into training, or if the product you are evaluating is unsafe for use. This research is especially important when purchasing products sold by secondary sources.

Consistency and/or compatibility with existing equipment are essential factors to consider in choosing new equipment. Buying similar lifts that provide the same or similar functions, instead of different types of lifts with different slings and attachments,

can impact employee competence, sling storage locations, sling applications, and ultimately patient and employee safety. For instance, using more than one overhead lift manufacturer in a patient care area, or even in a facility, can lead to uncertainty in sling selection and lift use, placing both caregivers and patients at greater risk.

If circumstances necessitate use of more than one equipment manufacturer, safety can be maintained by avoiding mismatched parts, ensuring accessories are compatible, and making sure all caregivers are comfortable with the variety of equipment they must use. In choosing equipment for an area, always consider the risk and expense associated with incompatible slings and additional training costs as well as the risk of confusion in emergent and non-emergent situations when staff must choose from a variety of products.

Comfort provided to patient. The goal in purchasing SPHM technology is to ensure its use to protect patients and caregivers. Sometimes equipment can be used for an extended period during treatment, transfer, bathing, or another task. Thus, products that are selected should be relaxing and comfortable for the patient. As well, it should not compromise skin integrity or increase fall risk. Trials and pressure testing can help guide this decision.

Ease of operation. Ensuring equipment under consideration is easy for caregivers to learn to use and easy to operate is essential in product selection. Minimal steps required for use will help the learning process and ensure steps are not missed during use that could lead to dangerous consequences. Equipment chosen also should not pose risk to staff from manual manipulation.

Functionality/versatility. Equipment from different vendors may provide different functionality. For example, many pieces of equipment can be used to pick patients up from the floor, so when evaluating equipment, be sure to assess its usefulness in a fall recovery.

Although many overhead lifts can reach all the way to the floor, if a patient falls in a hallway or location without an overhead lift, other equipment must be available to pick the patient up from the floor.

Floor-based, full-body lifts and air-assisted lifting devices are good alternatives.

A variety of pieces of equipment can be used for transferring, lifting, rehabilitation, and transfer to and from a car. Finding equipment that meets all or most patient handling and mobility needs can save money, space, and time.

Environmental considerations. Environmental conditions can be an issue in choosing SPHM equipment. If a lift will be installed in a pool area or bathroom, make sure it will work with the temperature and humidity in that location. When planning storage for equipment, make sure the storage conditions comply with the manufacturers' instructions. Access to electrical power is necessary in some instances, either to charge switchable batteries or to plug in the lift so it maintains a charge. For a lift in an ambulance bay, make sure the structural support is adequate and the lift is protected from the elements.

Manufacturers' cleaning instructions. The care organization must have the ability to clean purchased equipment and accessories. Some products require special cleaning materials that may need to be purchased. All cleaning must follow manufacturers' instructions. Each product manual should contain cleaning instructions, and some even require a certain cleaning process to maintain the integrity of the product.

Reusable slings require cleaning between patients, and a system must be set up for cleaning them. At some facilities, slings are washed at the point of use unit, while at others they are sent to housekeeping to be laundered or external resources are employed for their cleaning. Enough sling styles and sizes will need to be purchased so slings are available for use at all times.

Criteria for Selection of Lifting and Transferring Devices

Equipment chosen for lifting and transferring patients should have the following characteristics:

- Appropriate for the task to be accomplished
- Safe for both patient and caregiver (stable and strong enough to secure and hold the patient). Use of the device should not subject caregivers to excessively awkward postures or high exertion of force when gripping or operating equipment.
- Comfortable for the patient (should not produce or intensify pain, contribute to bruising of the skin, or tear the skin)
- Managed with relative ease. Instructions for its use should be easy to understand.
- Efficient to use time-wise
- Requires minimal maintenance
- Reasonable storage requirements that will be accepted by the facility
- Maneuverable in a confined workspace
- Versatile
- Easy to clean and complies with infection control requirements
- Purchased in adequate numbers so that accessibility is not an issue
- Affordable

Adapted from Chapter 12, "Special Handling and Movement Challenges Related to Bariatrics," in A. Nelson, ed., *Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement* (Tampa: VHA Patient Safety Center of Inquiry, 2001 [rev. 2005]).

Equipment Rating Surveys

The simple questionnaires that follow have been prepared to assist in decision-making with respect to SPHM technologies. Below you will find instructions that can be sent to SPHM program managers and patient care area nurse managers/supervisors who will lead the survey process. The instructions focus on equipment/vendor fairs, but the questionnaires can also be used during equipment trials.

SPHM Program Manager Instructions

Please express to nurse managers and supervisors and other staff how important their cooperation is in completing these questionnaires. Their preferences will influence purchasing decisions for the facility. The more staff members who participate in the equipment evaluation and complete the questionnaires, the more reliable our purchase decisions will be.

Please be sure to provide enough copies of the evaluation forms so that all staff can evaluate each piece of equipment. Completed

forms should be handed back to you, the SPHM program manager, or your designee *before* staff leave the equipment demonstration hall.

These evaluation forms must be sorted or identified by patient care area.

You will probably be asked about the outcome of the survey. Inform staff how the survey results will be analyzed and that equipment selection decisions will also include cost considerations.

Patient Care Area Nurse Manager/Supervisor Instructions

The SPHM Equipment Day will be here soon. In preparation, we have developed a simple questionnaire to assist in decision-making with respect to SPHM technologies for the facility. Please review and discuss the questionnaire with staff so they understand what kind of feedback will be helpful.

Please express to your staff the importance of their cooperation in completing these questionnaires. Emphasize that staff preferences will greatly influence purchasing decisions. The more staff members who participate in the equipment evaluation and complete these questionnaires, the more reliable the decisions will be.

Let staff know they must hand in completed forms to the SPHM program manager or designee *before* leaving the equipment fair.

Product Feature Rating Survey (Caregiver)

Caregiver #: _____ Product letter (A-E): _____ Date: _____

Please examine the product very carefully and answer the following questions as they relate to this product ONLY. Answer each question using a scale from 0 to 10 by circling the number that matches your impression, where 0 indicates a very poor design and 10 indicates a very well-designed feature.

We encourage you to express any ideas you may have for improving the product design. Please make your comments alongside the appropriate feature rating.

1. How would you rate your **OVERALL COMFORT** while using this product?

Average

Very Poor 0 1 2 3 4 5 6 7 8 9 10 Very Good

2. What is your impression of this product's **OVERALL EASE OF USE**?

Average

Very Poor 0 1 2 3 4 5 6 7 8 9 10 Very Good

3. How **EFFECTIVE** do you think this product will be in reducing **DISCOMFORT/INJURIES**?

Average

Very Poor 0 1 2 3 4 5 6 7 8 9 10 Very Good

4. How **EFFICIENT** do you feel this product will be in use of your **TIME**?

Average

Very Poor 0 1 2 3 4 5 6 7 8 9 10 Very Good

5. How **SAFE** do you feel this product would be for the **PATIENT**?

Average

Very Poor 0 1 2 3 4 5 6 7 8 9 10 Very Good

Product Ranking Survey (Caregiver)

Caregiver #: _____ Date: _____

Please look at each of the products you have just used. Rank each product in order of preference. Place the letter assigned to each product (A–E) alongside the rank order you feel is most appropriate, where 1 is your most preferred design and 5 is your least preferred design. Note any comments you may have in the space provided. [*Note: This form can be revised if more or fewer than five products are being evaluated.*]

Overall comfort:	1: _____	2: _____	3: _____	4: _____	5: _____
------------------	----------	----------	----------	----------	----------

Comments: _____

Ease of use:	1: _____	2: _____	3: _____	4: _____	5: _____
--------------	----------	----------	----------	----------	----------

Comments: _____

Effectiveness:	1: _____	2: _____	3: _____	4: _____	5: _____
----------------	----------	----------	----------	----------	----------

Comments: _____

Efficiency in use:	1: _____	2: _____	3: _____	4: _____	5: _____
--------------------	----------	----------	----------	----------	----------

Comments: _____

Safety:	1: _____	2: _____	3: _____	4: _____	5: _____
---------	----------	----------	----------	----------	----------

Comments: _____

Product Feature Rating Survey (Patient)

Patient #: _____ **Product letter (A-E):** _____ **Date:** _____

This questionnaire examines ONLY the product you have just used. Please rate each of the following design features on a scale from 0 to 10 by placing a mark along the line, where 0 indicates a very poor design and 10 indicates a very well-designed feature.

We would appreciate hearing any ideas you may have for improving the product design. Please make your comments beside the appropriate feature rating or on the overleaf if you need more space.

1. Overall comfort

Average

Very Poor 0 1 2 3 4 5 6 7 8 9 10 Very Good

2. Security/safety

Average

Very Poor 0 1 2 3 4 5 6 7 8 9 10 Very Good

3. Other concern (please specify): _____

Average

Very Poor 0 1 2 3 4 5 6 7 8 9 10 Very Good

Product Ranking Survey (Patient)

Patient #: _____ *Date:* _____

Please look at each of the products you have just used. Rank each of these products in order of preference. Place the letter assigned to each product (A–E) alongside the rank order you feel is most appropriate, where 1 is your most preferred design and 5 is your least preferred design. Note any comments you may have in the space provided.

Overall comfort:	1: _____	2: _____	3: _____	4: _____	5: _____
------------------	----------	----------	----------	----------	----------

Comments: _____

Security/safety:	1: _____	2: _____	3: _____	4: _____	5: _____
------------------	----------	----------	----------	----------	----------

Comments: _____

Other concern (please specify): _____:					
	1: _____	2: _____	3: _____	4: _____	5: _____

Comments: _____

Endnotes

- 1 W. S. Marras, G. G. Knapik, and S. Ferguson, "Lumbar spine forces during manoeuvring of ceiling-based and floor-based patient transfer devices," *Ergonomics* 52, no. 3 (2009): 384–97.
- 2 Ibid.
- 3 Ibid.
- 4 U.S. Centers for Disease Control and Prevention, National Health and Nutrition Examination Survey: 1960–2010 (<https://www.cdc.gov/nchs/nhanes>); and M. Matz and J. Strauss, "Accommodations for Care of Patients of Size" (Facility Guidelines Institute webinar series on the 2018 *Guidelines for Design and Construction* documents, August 2018).
- 5 R. Sturm and A. Hattori, "Morbid obesity rates continue to rise rapidly in the United States," *International Journal of Obesity* 37 (2013):889–91.
- 6 National Center for Health Statistics, "Anthropometric Reference Data for Children and Adults: United States, 2011–2014," Vital Health Statistics Series 3, no. 39 (August 2016).

Appendix H

Patient Care Area Characteristics and Ergonomic Issues Survey

Unit/Area: _____ Facility: _____

Part 1: Space/Maintenance/Storage

a. Describe patient care area makeup:

Number of rooms with 2 beds: _____ 3 beds: _____ 4 beds: _____ private: _____

Please answer yes or no if the following are provided (specify if “other”):

In-room toilet: _____ Community toilet: _____ Tub: _____ Bathing chair: _____ Other: _____

b. Describe current storage conditions and problems you have with storage.

If new equipment were purchased, where would it be stored? _____

Are electrical outlets currently available in designated storage areas? _____

c. Identify anticipated changes in the physical layout of your unit, such as planned renovations *in the next two years*.

- d. Describe space constraints for patient care tasks and use of portable equipment; focus on patient rooms, toilet rooms, and shower/bathing areas.

Are typical room doorways narrow or wide? Is the threshold uneven?

- e. Describe any routine equipment maintenance program or process for fixing broken equipment. What is the reporting mechanism/procedure for identifying, marking, and getting broken equipment to shop for repair?

Is equipment on a product maintenance schedule?

- f. If the potential for installation of overhead lifting equipment exists, describe any structural factors that may influence this installation, such as structural load limits, lighting fixtures, HVAC vents, fire sprinklers, presence of asbestos, window, door, cabinetry placement etc.

Part 2: Staffing

- a. Peak lift load times. Think about the time of day that is the busiest. What is the number of patients that would be lifted/assisted at the same time?
- b. Discuss projected plans or upcoming changes in staffing, patient population, or bed closures in the next two years.

Physical Dependency Levels of Patient Population

___ **Total dependence:** Cannot help at all with transfers; needs full staff assistance for activity. Requires total transfer at all times.

___ **Extensive assistance:** Can perform part of an activity; usually can follow simple directions; may require tactile cueing; can bear minimal, if any weight; sits up with assistance; has minimal upper body strength.

___ **Limited assistance:** Highly involved in activity; able to pivot transfer and has some/considerable upper body strength; ability to grasp with at least one hand; bears some weight on at least one leg. Can sit up well but may need some assistance. Guided maneuvering of limbs or other non-weight bearing assistance may be necessary.

___ **Supervision:** Oversight, encouragement, or cueing provided.

___ **Independent:** Can ambulate normally without assistance. In unusual situations may need some limited assistance/patient handling aides.

Part 3: Patients/Residents

- a. Describe the average patient/resident on your unit (hospice, Alzheimer, traumatic brain injury, etc.) and the variability in this.
- b. Discuss proposed changes in the average daily census over the next two years.
- c. Identify typical distribution (%) of patients in your clinical area/unit by physical dependency level according to the definitions in the box on page 332. (*Base your answers on physical limitations, not on clinical acuity.*)

Part 4: High-Risk Tasks and Patient Handling Injuries

- a. Ask all staff, individually or as a group, to complete Tool 1: Perception of High-Risk Tasks Survey individually. Collate responses by patient care area and shift).
- b. Complete Tool 2: Patient Care Area Incident/Injury Profile.

Part 5: Equipment

- a. Complete Tool 3: Patient Care Area Patient Handling Equipment Inventory to provide an inventory of all patient handling equipment in the patient care area. This should include a description of the working condition of each piece of equipment and how frequently it is used.
- b. What percentage of high-risk tasks is completed using proper equipment? Please explain.
- c. Identify your problem areas.
- d. What equipment do you think you need?

Person completing report:

Name	Date
Title	Phone #

This survey form is adapted from Figure 3-3: Pre-Site Visit Unit Profile in Chapter 4, A. Nelson, ed., *Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement*, p. 24 (Tampa: Veterans Administration Patient Safety Center of Inquiry, 2001).

Tool 1: Perception of High-Risk Tasks Survey

Directions: Rank the tasks you consider most likely to contribute to musculoskeletal injuries for persons providing direct patient care from 1 to 10, 10 being the highest risk and 1 the lowest.

Consider the frequency of the task and the musculoskeletal stress. Delete tasks not typically performed on your unit, and add tasks not on the list.

Have nursing staff complete the form individually and summarize the data, or have each shift rank the tasks by consensus.

Patient Handling Tasks	Task Frequency H= high M= moderate L= low	Stress of Task H= high M= moderate L= low	Rank 10 = highest risk 1 = lowest risk
Transferring patient from bathtub to chair			
Transferring patient from wheelchair or shower/commode chair to bed			
Transferring patient from wheelchair to toilet			
Transferring patient from bed to stretcher			
Lifting patient up from the floor			
Transferring a patient into or out of a vehicle			
Ambulating a patient			
Weighing patient			
Bathing patient in bed			
Bathing patient in a shower chair			
Bathing patient on a shower trolley or stretcher			
Undressing/dressing patient			
Applying anti-embolism stockings			
Lifting patient to the head of the bed			
Repositioning patient in bed from side to side			
Repositioning patient in geriatric chair or wheelchair			
Making occupied bed			

Patient Handling Tasks	Task Frequency H= high M= moderate L= low	Stress of Task H= high M= moderate L= low	Rank 10 = highest risk 1 = lowest risk
Feeding bedridden patient			
Changing absorbent pad			
Transporting patient off unit			
Assisting patient with exercise in bed			
Assisting with range of motion			
Other task:			

Adapted from B. D. Owen & A. Garg, *American Association of Occupational Health Nurses Journal* 39, no. 1 (1991).

Tool 2: Patient Care Area Incident/Injury Profile

Facility: _____ Unit: _____

Dates included: _____ Date completed: _____

Patient Care Activity <small>(Reposition, bathe, transfer, etc.)</small>	Cause of Injury <small>(Pull, push, reach, struck, etc.)</small>	Type of Injury <small>(Strain/sprain, contusion, struck, etc.)</small>	Body Part(s) <small>(Upper/mid/lower back, legs, neck, etc.)</small>	Location <small>(Patient room, hall, sunroom, etc.)</small>	Lost Time <small>(# days)</small>	Modified Duty <small>(# days)</small>
<i>Example:</i> Repositioning (side to side)	Reaching, pulling residents all night—shoulder hurts	S/S	Shoulder	Patient room	No	4 days

#1 Activity: _____ #1 Cause: _____ Modified duty trend? _____

#2 Activity: _____ #2 Cause: _____ Lost time trend? _____

Tool 3: Patient Care Area Patient Handling Equipment Inventory

Unit: _____ Facility: _____ Date completed: _____

Patient Handling Equipment	Manufacturer/ Style/Name	Inventory (Total # in unit/ area now)	# in Working Order	% Being Used Now (Comment)	# Requested
FULL-BODY SLING LIFTS					
Overhead lifts (ceiling- or wall-mounted)					
Floor-based lifts, powered					
Car extraction lifts					
Bathing lifts					
Other					
SIT-TO-STAND LIFTS AND STANDING AIDS – FLOOR-BASED					
Sit-to-stand lifts, non-ambulatory, powered					
Sit-to-stand lifts/standing aids, ambulation-capable lifts, powered					
Standing aids, non-powered					
Other					
AIR-ASSISTED LIFTING DEVICES					
Air-assisted lifting devices					
Other					
LATERAL TRANSFER AND POSITIONING AIDS					
Air-assisted lateral transfer and positioning devices					
Friction reducing devices					
Slide boards/roller boards					
Transfer chairs					
Sliding boards (for independent transfer), other similar devices					

Standing assist and repositioning aids (non-powered)					
Other					
TRANSPORT ASSISTANCE					
Motorized stretchers					
Stretcher with 5th wheel					
Bed Mover (battery-powered)					
Wheelchair mover (battery-powered)					
Stretcher with power up/down head raising/lowering feature					
Other					
ERGONOMIC HYGIENE EQUIPMENT					
Ergonomic shower chairs					
Ergonomic shower trolleys					
Assistive toilet seats					
Flexible (vertical/horizontal adjustable) bathroom equipment (sink, grab bars, shower seat, etc.)					
Other					
HEIGHT-ADJUSTABLE SURFACES					
Height-adjustable exam tables					
Height-adjustable therapy tables					
Height-adjustable changing tables					
Other					

Versions of these tools can also be found in Chapter 3 of the *VHA Safe Patient Handling and Mobility Guidebook* at <http://www.tampavaref.org/safe-patient-handling/implementation-tools.htm>.

Appendix I

Overhead Lift Coverage Recommendations by Patient Care Area

Insufficient lift coverage will increase the risk of staff and patient injury when patient handling and mobility tasks are performed. Thus, determining overhead lift coverage for patients or residents in patient care areas is a vital step in implementing a safe patient handling and mobility (SPHM) program. This determination can be accomplished by referencing Table I-1: Overhead Lifts by Patient Care Area or by calculating the coverage as described under the second head below.

Determining Overhead Lift Coverage Using Table I-1 (preferred)

Table I-1 summarizes the best practice and preferred track configurations for overhead lift coverage for each included patient care area. The table also notes which patient care areas will require expanded-capacity lifts for individuals of size.

Best practices include provision of coverage over all patient/resident beds in nearly every inpatient care area. Such full coverage allows maximum flexibility on inpatient units. If the recommended coverage

level for overhead lifts cannot be attained during the initial planned construction or renovation, structural support that will be needed for later completion of the recommended coverage must be part of the project design and the initial construction. Then, when funds become available to purchase the additional lift systems, the structural support will already be in place, yielding considerable savings in renovation cost. In these circumstances, tracks may also be installed during initial construction so they are available when lift systems are purchased. However, because lift system equipment may change after the track is installed, installation of the entire lift system up front is preferable to installation of track alone.

When overhead lift coverage must be phased in, consider prioritizing areas with patients requiring more assistance, expanded-capacity rooms for individuals of size, multiple-patient rooms, and/or smaller rooms that cannot accommodate floor-based equipment.

For patient care areas in new construction projects, consult with staff from existing units undergoing renovation and/or staff who are aware of projected patient population characteristics for units included in the new construction. They will be able to provide information on the number and types of existing equipment and/or assist in calculating new equipment needs.

Calculating Overhead Lift Coverage

For areas where the recommendations in Table I-1 are not attainable initially or where coverage depends on patient flow and need, calculate the minimum number of overhead lifts required for each patient care area by following the steps below. Patient care area overhead lift coverage is based on (1) the type of patient care area, thus the dependency levels of patient/resident population, and (2) the number of private and semi-private rooms on a unit. (**Note:** Patient dependency level is based on physical limitations and need for assistance. It is not the same as clinical acuity or patient acuity.)

Step 1: Determine the highest percentage of patients requiring overhead lift system coverage in the patient care area.

Estimate the highest percentage of patients who need transfer, repositioning, limb lifting, or rehabilitation/mobility support. This is the **highest percentage of patients requiring overhead lift coverage**.

Step 2: Determine the number and configuration of rooms requiring overhead lift systems per patient care area.

- **For units with only private patient rooms:** Multiply the highest percentage of patients requiring overhead lifts by the number of patients to determine the number of private patient rooms that should have overhead lifts.
- **For units with only semi-private rooms:** Multiply the highest percentage of patients requiring overhead lifts by the number of patients, then divide the response by 2 to determine the number of semi-private patient rooms that should have overhead lifts.
- **For units with a mixture of room configurations:** Prioritize rooms that most frequently have patients in need of lifts, expanded-capacity rooms, and rooms that are too small for effective use of floor-based lift. Make sure to consider including airborne infection isolation rooms.

Sample calculation: A medical/surgical unit with 30 patients has eight private rooms, 11 semi-private rooms, and two three-bed rooms. On this unit, at most, 70 percent of the patients will require use of overhead lifts; therefore, this unit should have coverage for 21 patients (70% x 30 patients). For cost-effectiveness and if appropriate for unit needs, overhead lift coverage may be as follows: overhead lifts in nine semi-private rooms (covering 18 patients), and three private rooms (covering three patients) in order to have overhead lift coverage for 70 percent (21) of the patients.

Table I-1: Overhead Lifts by Patient Care Area

Note: Standard lifts should have a minimum weight capacity of 500 to 600 lbs., and the minimum weight capacity for expanded-capacity lifts for individuals of size should be the maximum weight capacity of standard overhead lifts (i.e., 750 to 1,000 lbs.). Consult with the safe patient handling and mobility program manager for departmental or region-specific weight capacity requirements. The greatly preferred overhead lift track design is a traverse design.

Behavioral Health Patient Care Areas

In psychiatric patient care areas, overhead lifts shall NOT be installed in behavioral health units with the potential for actively suicidal patients.

These statements do not apply to dementia care units or geropsychiatry units that do not treat actively suicidal patients and may need overhead lifts.

Critical Care Patient Care Unit (Intensive Care Unit)

For critical care units, overhead lifts on traverse room-covering tracks are recommended in all patient rooms. Scales should be part of the lift if not included in the bed.

Room Type	Recommended Lift Type	Comments
Critical care unit patient room	Standard/expanded-capacity	Every room does not need an expanded-capacity lift, especially if using 500–600 lb. weight capacity lifts, although one or more true expanded-capacity rooms may be necessary. <i>Note:</i> If an expanded-capacity unit capable of airborne infection isolation is provided, expanded-capacity isolation rooms are not needed in other units. Every bed should have a dedicated overhead lift with traverse track design. Lift should travel into toilet room, where provided.
Toilet/shower in critical care unit	Standard	Match lift type to paired patient room. Lift should travel from patient room into toilet room, where provided. Overhead lift should have traverse track design.
Airborne infection isolation (All) patient room	Standard/expanded-capacity	Every bed should have a dedicated overhead lift with traverse track design. The lift should travel into the toilet room if it is connected to the patient room. Include a scale in the lift if the bed does not have one. Provision of one expanded-capacity lift in either an All or PE room per CCU is probably sufficient, but consider the patient population.
Protective environment (PE) patient room		
Toilet/shower for All and PE rooms		

Dental Facility

Traverse tracks are recommended for flexibility of wheelchair location. Alternative equipment may include wheelchair tilters.

Room Type	Recommended Lift Type	Comments
Patient care station or exam room		A lift is recommended in one exam room.
Dental treatment room, special needs patient	Standard	
Pre/post-procedure patient care area	Standard/expanded-capacity	Consider patient population for need for expanded-capacity lift; install standard if not needed.
Oral surgery room	Standard/expanded-capacity	Consider patient population for need for expanded-capacity lift; install standard if not needed.

Dialysis Center

For hemodialysis treatment areas, overhead lifts on room-covering traverse and/or straight tracks are recommended wherever lateral transfer is necessary. Consider covering all beds and half of chairs with overhead lifts. One straight track or traverse over several bays in a row may be appropriate, as long as use of privacy curtains is not impeded. Inclusion of scales in lifts is recommended to allow weighing of patient before and after dialysis.

One expanded-capacity bed should be enough in dialysis if 500–600-lb. lifts are used.

Room Type	Recommended Lift Type	Comments
Renal dialysis patient care station (single-patient room)	Standard/expanded-capacity	Consider patient population for need for expanded-capacity lift; install a standard lift if not needed. Include a scale in the lift if the bed does not have one.
Renal dialysis contact precaution isolation patient care station or room	Expanded-capacity	Consider patient population for need for lift.
Renal dialysis patient care station (cubicle) with chair	Standard	May use one motor/lift for multiple chairs by extending track or traverse across multiple chairs (using curtain-crossing traverses).

Renal dialysis patient care station (cubicle) with bed	Standard/expanded-capacity	Consider patient population for need for expanded-capacity lift; install standard if not needed. May use one motor/lift for multiple beds by extending track across multiple beds (using curtain crossing traverses).
Toilet for patient care station (single-patient room)	Standard/expanded-capacity	Match lift type to paired private patient care station. Lift should travel from single-patient room into toilet room. Overhead lift should have traverse track design.

Emergency Department (ED) and Urgent Care Center (UCC)

In emergency department treatment rooms and urgent care exam rooms, overhead lifts are recommended over all beds. Lift placement over beds and/or in exam rooms will depend on varying trauma and dependency levels in each area in the department.

For emergency rooms in high demand, every bed should have a lift. Track design can be traverse or straight and may be designed to cover multiple bays, although traverse designs allow more flexibility that may save time during emergent situations.

Room Type	Recommended Lift Type	Comments
Exam or treatment room	Standard	Include a scale in the lift.
Negative pressure isolation exam/treatment room	Standard	Include a scale in the lift.
Positive pressure isolation exam/treatment room	Standard	Include a scale in the lift.
Exam/treatment room for individual of size	Expanded-capacity	Consider patient population to determine number of expanded-capacity rooms. If there is a procedure room with an expanded-capacity lift, one isn't needed in the exam room. Include a scale in the lifts.
Toilet for individual of size	Expanded-capacity	Lift should travel from patient room into toilet room. Overhead lift should have traverse track design.
Resuscitation room	Standard	
Procedure room	Standard/expanded-capacity	Consider patient population to determine number of expanded-capacity rooms needed. If there is a treatment or an exam room with an expanded-capacity lift, the procedure room does not require one. Include a scale in lifts.

Cast room, orthopedics	Standard	
Ambulance bay (outdoor)	Expanded-capacity	<p>A lift under a canopy in one ambulance bay or similar vehicle transfer area is recommended. A traverse track design will accommodate various vehicle locations. The lift, controller, and track must be protected from weather damage and from tall vehicles. Often this includes weatherproofing and a locked cabinet for the hanger bar and controller.</p> <p>Lift must be specially designed for extraction from cars and other vehicles. Avoid large hanger bars. Involve staff in design and placement of the lift.</p>

Endoscopy Facility (Digestive Diseases Facility)

Overhead lifts on traverse or straight tracks are recommended for an endoscopy facility; these should be positioned as necessary to support turning, holding, transfer, and repositioning.

Room Type	Recommended Lift Type	Comments
Endoscopy procedure room	Standard/expanded-capacity	Consider patient population for need for expanded-capacity lift; install standard lifts if not needed.
ERCP/endoscopic ultrasound procedure room	Expanded-capacity	Lifts shouldn't exceed the capacity of the fluoroscopy table. Depending on methods used, a system with two lifts that move independently may be desired.
Pre/post-procedure patient care area	Standard	If there is an expanded-capacity lift in the ERCP/endoscopic ultrasound procedure room, there should be an expanded-capacity lift in the recovery room.
Patient toilet room for pre/post-procedure patient care area	Standard	Should not need a lift here, but if one is included, use a standard lift.

Hospice Facility, Nursing Home, Rehabilitation, and Other Long-Term Care Facilities (Community Living Center)

For these facility types, overhead lifts on traverse room-covering tracks that connect with bathrooms are recommended in all patient rooms or resident bedrooms. Less coverage may be provided for units that primarily serve individuals with dementia or for areas with many independent residents. However, if not all rooms are covered, a plan must be in place to accommodate residents who need a ceiling lift when they are admitted.

Room Type	Recommended Lift Type	Comments
Patient room or resident bedroom	Standard/expanded-capacity	<p>Every bed should have a dedicated standard overhead lift with traverse track design. The lift should travel into the toilet room. Include a scale in the lift if the bed does not have one.</p> <p>When 500+-lb. overhead lifts are used, at least one expanded-capacity lift is also needed. Expanded-capacity lifts should meet the same requirements as standard lifts.</p>
Resident or patient toilet room (with shower)	Standard/expanded-capacity	Match lift type to that in the paired patient room or bedroom. The lift should travel from patient or resident room into toilet room. Overhead lifts should have a traverse track design.
Bathing suite	Standard	Ceiling lift needed on traverse track design to cover tubs, toilets, and shower areas. Not all communal bathrooms will need expanded-capacity lifts if 500–600-lb. lifts are used.
Hallway walking track, where appropriate	Standard	Consider locating lifts for physical/occupational/kinesiology therapy/recreation/restorative use. Lifts should be designed for ambulation, with high ceilings and hanger bar parking station to avoid head strike. Recommend free movement lift with no lateral motor to allow variable walking speed.
Community room, where appropriate		
Geri-psych areas	Standard	In geri-psych areas without actively suicidal patients, overhead lifts on traverse tracks are recommended. Extent of beds covered depends on patient population. Include staff in determining how many lifts and where they should be located. Include a scale in the lift if the bed does not have one.

Imaging Facilities (Radiology Facilities)

For imaging areas, overhead lifts on room-covering traverse and/or straight tracks are recommended in or near every modality. Overhead lift systems must be compatible with ceiling-mounted imaging equipment and able to accommodate at least the same weight capacity as the table. Design may vary by modality, and transfer and positioning requirements are addressed either with lifts, air-assisted lateral transfer devices, or a combination.

Where disabled patients are commonly transferred directly onto tables, overhead lifts are recommended over each table.

In ultrasound areas where disabled patients are seen, ceiling lifts are recommended over at least some tables for transfer and repositioning.

Where substantial obstacles prevent overhead lift use in rooms, overhead lifts for patient transfers are recommended in nearby holding/transfer areas.

Room Type	Recommended Lift Type	Comments
Class 1 imaging room—General radiology	Standard	Each room should have a lift if installation is feasible. Rooms with lifts should have a dedicated overhead lift with traverse track design, if possible. If traverse isn't possible, and straight track is, use straight track and make sure it is in the correct location for transfers.
Class 1 imaging room—CT scan	Standard	At least one room should have a lift. Rooms with lifts should have a dedicated overhead lift with traverse track design.
Class 1 imaging room—Ultrasound		
Class 1 imaging room—Bone density scan		
Class 1 imaging room—Angiography		
Class 1 imaging room—Swallow study		
Class 1 imaging room—Nuclear imaging (PET, SPECT)	Standard	Overhead lifts on room-covering traverse and/or straight tracks are recommended. If traverse design isn't possible, use straight track and make sure it is in the correct location for transfers.
Class 2 imaging room—Cardiac catheterization	Standard/expanded-capacity	Each room should have a lift if installation is feasible. Rooms with lifts should have a dedicated overhead lift with traverse track design, if possible. If traverse design isn't possible, use straight track and make sure it is in the correct location for transfers.

Class 2 imaging room— Electrophysiology	Standard	The room should have an overhead lift with traverse or straight track design positioned as needed for holding, transfer, and repositioning. If traverse isn't possible, use straight track and make sure it is in the correct location for transfers.
Class 2 or 3 imaging room—Fluoroscopy	Standard	Each room should have a lift if installation is feasible. Rooms with lifts should have a dedicated overhead lift with traverse track design, if possible. If traverse isn't possible, and straight track is, use straight track and make sure it is in the correct location for transfers.
Holding bay adjacent to MRI scanner room	Standard	An overhead lift on traverse or straight track is recommended adjacent to the MRI suite in an area designated as a patient transfer area. This allows transfer onto MRI-safe stretchers that can be used in the room with lateral transfer aids such as friction-reducing devices or air-assisted lateral transfer devices (with elongated tubes to keep the pump outside the room).
Patient stretcher in holding bay	Standard	Include lift in holding bay for any area where a ceiling lift cannot be installed inside the imaging room. For MRI areas, an overhead lift on traverse or straight track is recommended in an area adjacent to the MRI suite that is designated as a patient transfer area. This allows transfer onto MRI-safe stretchers that can be used in the imaging room with lateral transfer aids such as friction reducing devices or air-assisted lateral transfer devices (with elongated tubes to keep the pump outside the room).

Medical/Surgical Patient Care Unit

Overhead lifts on traverse room-covering tracks are recommended in all patient rooms.

Room Type	Recommended Lift Type	Comments
Patient room	Standard	Every bed should have a dedicated overhead lift with traverse track design. Lift should travel into toilet room. Include a scale in lift if bed does not have one.
Toilet/shower for patient room	Standard	Lift should travel from patient room into toilet room. Overhead lift should have traverse track design.

Airborne infection isolation (All) patient room	Standard/expanded-capacity	If no expanded-capacity room is designed for isolation, lifts capable of handling individuals of size can be installed in All and/or PE patient rooms. Every bed should have a dedicated overhead lift with traverse track design. Lift should travel into toilet room. Match lift capacity of patient room with toilet room. Include a scale in lift if bed does not have one. <i>Note:</i> Depending on patient demographics, if an expanded-capacity suite includes All and/or PE room(s), an All and/or PE suite may not need to meet expanded-capacity requirements.
Protective environment (PE) patient room	Standard/expanded-capacity	
Toilet/shower for All and PE rooms	Standard/expanded-capacity	If no expanded-capacity All or PE room is provided, lifts capable of handling individuals of size need to be installed in these rooms. Lift should travel from patient room into toilet room. Match lift capacity of toilet room with patient room. Overhead lift should have traverse track design.
Patient room for individuals of size (IOS)/person with disabilities	Expanded-capacity	Every bed should have a dedicated overhead lift with traverse track design. Lift should travel into toilet room. Include a scale in lift if bed does not have one.
Toilet/shower for IOS/person with disabilities	Expanded-capacity	Lift should travel from patient room into toilet room. Overhead lift should have traverse track design.
Hallway (for post-surgical unit with ambulation)	Standard	Designed for ambulation, with high ceilings and hanger bar parking station location to avoid head strike

Morgue

In morgue areas, overhead lifts on traverse or straight tracks are recommended, although traverse tracks are preferred for autopsy areas. The lift system should be able to assist in inserting and extracting trays into the cooler as well as lifting and moving bodies in the autopsy suite. These lifts need to include a supine lift frame or other appropriate attachment depending on morgue design. Designs vary widely and should be evaluated for ease of use and compatibility with the storage system.

Room Type	Recommended Lift Type	Comments
Autopsy room	Cadaver lift	Cadaver lift design must be able to lift bodies between carts, drawers, and autopsy tables. Portable cadaver lifts often cannot be used for this purpose.
Isolation/teaching autopsy room		

Obstetrical Facilities		
Room Type	Recommended Lift Type	Comments
Multipurpose exam room	Standard	At least one exam room should have an overhead lift with traverse track design to allow flexible lifting locations and limb lifting.
Labor/delivery/recovery (LDR) room	Standard/expanded-capacity	<p>At least one LDR room should have an overhead lift with traverse track design to allow flexible lifting locations and limb lifting. Depending on patient population, provide one of the following:</p> <ul style="list-style-type: none"> ▪ One expanded-capacity LDR room (i.e., accessible to individuals of size). This room must have an expanded-capacity table and be adequately sized with necessary clearances. ▪ Installation of a 500-lb. overhead lift, which will be adequate for the vast majority of the population, and—depending on the table manufacturer—the room may not require an expanded-capacity exam table. <p>Use standard lifts for additional rooms.</p>

Outpatient Clinic

Outpatient primary care clinic requirements vary depending on patient population and flow. It is often appropriate to put one or more overhead lifts in a procedure room or an expanded-capacity exam room and redirect patients who need the lifts into those rooms. Consider the patient population to determine the number of standard and expanded-capacity lifts required.

Traverse tracks are recommended to allow flexible lifting locations and limb-lifting.

Room Type	Recommended Lift Type	Comments
Exam room	Standard	Not all exam rooms need lifts, but at least one exam room should have one. Rooms with lifts should have an overhead lift with a scale and a traverse track design.
Multi-specialty exam room		
Special care multi-specialty exam room	Expanded-capacity	Rooms with lifts should have a dedicated overhead lift with traverse track design. Include a scale in the lift.
Spinal cord injury exam room	Standard	All spinal cord injury clinic exam and treatment rooms should have a dedicated overhead lift with traverse track design. Include a scale in the lift.
Spinal cord injury treatment room	Standard	

Procedure room	Standard/expanded-capacity	Only one procedure room needs to be expanded capacity; others can be standard. Rooms with lifts should have a dedicated overhead lift with traverse track design.
Treatment/exercise area	Standard/expanded-capacity	Consider the patient population to determine the need for an expanded-capacity lift; install a standard lift if not needed. These overhead lifts should have a traverse track design over exercise mats and throughout except over parallel bars. If the area has parallel bars for ambulation, straight track should be installed over that walkway.
Ambulance bay (outdoor)	Expanded-capacity	<p>May be appropriate in outside outpatient clinics if clinic entrance is properly designed.</p> <p>In ambulance bays, a lift under a canopy in one ambulance bay or similar vehicle transfer area is recommended. A traverse track design will accommodate various vehicle locations. The lift, controller, and track must be protected from weather damage and from tall vehicles. Often this includes weatherproofing and a locked cabinet for the hanger bar and controller. Lift must be specially designed for extraction from cars and other vehicles. Avoid large hanger bars. Involve staff in design and placement.</p>

**(Pulmonary Medicine)
Respiratory Therapy Facilities**

Room Type	Recommended Lift Type	Comments
Physiology lab, pulmonary exercise	Standard or gait system overhead track	Therapists should be consulted for a decision on the use of a biodynamic system.
Bronchoscopy procedure room	Standard	Lift should have a traverse track design.
Sleep study room	Standard/expanded-capacity	Consider population when determining the need for lifts and lift type. A lift is not needed in every room or possibly in any room. Rooms with lifts should have a dedicated overhead lift with traverse track design.
Patient toilet/shower	Standard/expanded-capacity	If one or more sleep study rooms has an expanded-capacity lift, the patient toilet/shower should also have an expanded-capacity lift. Overhead lifts should have a traverse track design.
Pre/post-procedure patient care area	Standard	Lift should have a traverse track design.

Radiation Therapy Facilities

In radiation oncology, overhead lifts on room-covering traverse and/or straight tracks are recommended in or near every modality. They must be designed to avoid interfering with sensors and cameras.

Room Type	Recommended Lift Type	Comments
Radiation therapy room	Standard	Minimum of one lift. Rooms with lifts should have a dedicated overhead lift with traverse track design.
Patient stretcher in holding bay	Standard	Include a lift in a holding bay for any area where a ceiling lift cannot be installed inside the room.

Rehabilitation Facilities—Inpatient (Polytrauma Rehabilitation Center)

For rehabilitation units, overhead lifts on traverse room-covering tracks are recommended in all patient rooms. Consider installing a straight track down a hallway for fall protection while patients are ambulating.

Room Type	Recommended Lift Type	Comments
Single-patient room	Standard/expanded-capacity	Every bed should have a dedicated overhead lift with traverse track design. Lift should travel into toilet room. Include a scale in lift if bed does not have one. When 500+-lb. overhead lifts are used, at least one expanded-capacity lift is also needed. Patient rooms in new construction should be large enough to ambulate patients within the room.
Multiple-patient room	Standard	To cover both beds with one system, use an overhead lift with traverse track design that extends from wall to wall (front to back and side to side). To cover each bed individually, each bed should have a dedicated overhead lift with traverse track design that extends as far as possible beyond the bed frame. (If patient beds are side by side or on opposite sides of the room, extend track as close as possible to the three open walls and as close as possible to the midpoint of the room, depending on bed configuration.) Include a scale in lift if bed does not have one.
Toilet/shower for patient room	Standard/expanded-capacity	If this toilet/shower is part of a patient room, lift type should match paired patient room lift and should travel from patient room into toilet/shower room. Overhead lift should have traverse track design.

Inpatient unit shower room	Standard	Ceiling lift needed on traverse track design to cover tubs, toilets, and shower areas. Not all communal bathrooms will need expanded-capacity lifts if 500–600-lb. lifts are used.
Gym for rehabilitation therapy	Standard	Overhead lift track with traverse design or gait system should be provided. Consult therapists for decision on use of a biodynamic system.
Physical/occupational therapy evaluation room	Standard	Rooms with lifts should have a dedicated overhead lift with traverse track design.
Space for living skills training	Standard	Special design to cover appropriate parts of the space; consult therapy staff. In activities of daily living (ADL) training areas, overhead lifts on a traverse track are recommended, preferably lifts as similar as possible to the lifts typically issued for home use.
Hallway for rehabilitation with ambulation	Standard	Designed for ambulation, with high ceilings and hanger bar parking station location to avoid head strike. Recommend free-movement lift with no lateral motor to allow variable walking speed. Consider locating lifts for physical/occupational/kinesiology therapy/recreation/restorative use.

Rehabilitation Facilities—Outpatient

In physical, occupational or kinesiotherapy clinics, overhead lifts are recommended on all-encompassing traverse tracks, installed so that two or more motors can be used simultaneously on tracks that move independently. Alternatively, some therapists prefer a straight track over parallel bars or walking paths and a separate traverse track system covering treatment tables and activity areas.

Room Type	Recommended Lift Type	Comments
Gait lane	Standard	Therapists should consider requirements for biodynamic system. Gait lane may be elliptical or straight. If straight, it is often over parallel bars, in which case the lift track may be a straight design over the walking path. Check population for need for expanded-capacity lift and use standard lift if not needed. Note that full room coverage can cover large parts of a room, and multiple lifts can cover the same space.
Mat platform area	Standard/expanded-capacity	Consider patient population for expanded-capacity lift needs; install standard lifts if not needed. Expanded-capacity lifts may be necessary somewhere else in area, however. Note that full room coverage can cover large parts of a room, and multiple lifts can cover the same space.

Private therapy room with table	Standard	Overhead lifts that provide full room coverage can cover large parts of a room, and multiple overhead lifts can be used to cover the same space.
Full-immersion Hubbard tank	Standard	
Partial-immersion Hubbard tank	Standard	
Whirlpool	Standard	
Exercise area	Standard	
Wheelchair fitting area	Standard	
Accessible toilet	Standard	Only a toilet near a pool needs a lift, if the pool has a lift. Match toilet lift capacity to pool lift capacity. Toilets near group rooms do not need a lift.
Activities of daily living room	Standard	Large parts of a room can be covered by a single full-room-coverage overhead lift or by multiple overhead lifts.
Therapeutic pool	Standard/expanded-capacity lift or fixed patient pool lift	For all therapeutic and recreation pools, consider the patient population to see if expanded-capacity lifts are needed. Water therapy is particularly helpful for individuals of size. A single full-room overhead lift or multiple overhead lifts can be used to cover the same space.

(Spinal Cord Injury Unit)

In spinal cord injury (SCI) inpatient areas, overhead lifts on traverse tracks covering the whole bed and transfer areas on both sides of the bed are recommended. All inpatient bathrooms should also have overhead lifts on separate traverse track systems.

Room Type	Recommended Lift Type	Comments
Single-patient room	Standard	Each bed should have a dedicated overhead lift with traverse track design that extends from wall to wall (front to back and side to side). Include a scale in lift if bed does not have one.
Multiple-patient room	Standard	To cover both beds with one system, use an overhead lift with traverse track design that extends from wall to wall (front to back and side to side). To cover each bed individually, each bed should have a dedicated overhead lift with traverse track design that extends as far as possible beyond the bed frame. (If patient beds are side by side or on opposite sides of the room, extend track as close as feasible to the three open walls and as close as possible to the midpoint of room, depending on bed configuration.) Include a scale in lift if bed does not have one.

Patient toilet room	Standard	Match lift type to paired patient room. Toilet room should have overhead lift with traverse track design that extends from wall to wall.
Tub room	Standard	Room should have overhead lift with traverse track design that extends from wall to wall.
Exam/treatment room	Standard	Room should have overhead lift with traverse track design that extends from wall to wall.
Hydrotherapy	Standard	Room should have overhead lift with traverse track design that extends from wall to wall.
Patient toilet room in clinical area	Standard	Room should have overhead lift with traverse track design that extends from wall to wall.
Urodynamics: Cystoscopy	Standard	Room should have overhead lift with traverse or straight track design and positioned as needed for transfer and repositioning needs.
Urodynamics: Recovery	Standard	
Urodynamics: Patient shower	Standard	Room should have overhead lift with traverse track design that extends from wall to wall.
Occupational/ physical/kinesiology therapy	Standard	See Rehabilitation Facilities—Outpatient
Home environment learning	Standard	Special design to cover appropriate parts of apartment; consult therapy staff. In activities of daily living (ADL)/apartment training areas, overhead lifts are recommended on a traverse track, preferably as similar as possible to the lifts that are typically issued for home use.
Therapeutic pool	Standard lift or fixed patient pool lift	

Surgery Facilities—Inpatient and Ambulatory Surgery Center

In postoperative patient care areas, including PACU, overhead lifts on traverse tracks that cover all beds to allow repositioning are recommended. The tracks may be designed to cross curtain tracks to allow use over multiple beds.

In cardiac catheterization and electrophysiology labs, overhead lifts on traverse or straight tracks are recommended if they can be made compatible with other equipment mounted on the ceiling. Alternatively, a patient transfer area similar to that for MRI can allow preparation for use of air-assisted lateral transfer equipment in the operating room.

Room Type	Recommended Lift Type	Comments
Preoperative holding/ Phase II recovery	Standard/expanded-capacity	Only one lift is needed in this holding room; check with staff as to how the room will be used for best location. If expanded-capacity lift is required in the PACU, preoperative holding/Phase II recovery should also have expanded-capacity lift.
Procedure room	Standard/expanded-capacity	In operating rooms, traverse or boom-mounted lifts can be designed to work around other ceiling-mounted equipment and to have enough coverage for lateral transfer, lifting appendages, and repositioning. Consider patient population for need of expanded-capacity lift; install standard lift if expanded-capacity lift is not needed.
Operating room, general	Standard/expanded-capacity	
PACU (Phase I recovery)	Standard/expanded-capacity	Consider patient population for need of expanded-capacity lift; install standard lift if expanded-capacity lift not needed. Traverse track is preferred. May use one motor/lift for multiple beds by extending track across multiple bays (using curtain-crossing traverses).

Note: This table has been adapted from the VA document “Principles of Safe Patient Handling & Mobility: Criteria for Design and Construction” to align with FGI terminology and room names/types. VA terms are included in parentheses, for reference.

Appendix J

Floor-Based Lift Coverage Recommendations by Patient Care Area

The number of floor-based full-body sling lifts (see Figure J-1), sit-to-stand/standing assist lifts (see Figure J-2), and stand-assist aids (see Figure J-3) required for each patient care area can be determined using Table J-1: Minimum Number of Floor-Based Lifts by Patient Care Area. However, when deciding how much portable equipment to purchase, be sure to consider the needs of each shift during peak patient handling, movement, and mobilization periods.

For renovation projects, consult with staff from the existing patient care area. For new construction, consult with staff who are aware of projected patient population characteristics. Staff will be able to provide information on the number and types of existing equipment

Figure J-1: Floor-Based Full-Body Sling Lift



Romedic

Figure J-2: Sit-to-Stand/ Standing Assist Lift



Arjo

Figure J-3: Stand-Assist Aid



Arjo

and/or assist in calculating needs for new equipment.

Floor-based full-body sling lift recommendations are based on overhead lift coverage as specified in Table I-1: Overhead Lifts by Patient Care Area in Appendix I: Overhead Lift Coverage Recommendations by Patient Care Area.

- Where the overhead lift coverage provided in a facility is less than recommended in Table I-1, floor-based full body sling lifts can make up the difference, which means more storage space will be required.
- Where the recommended overhead lift coverage is provided, floor-based full-body sling lifts may be shared by adjacent patient care areas, decreasing the number of these lifts required and thus decreasing storage space requirements.
- Where floor-based full-body lifts are used instead of overhead lifts, construction costs will be higher due to the greater clear space requirements needed to use these lifts.

Other factors can influence calculations for sit-to-stand/standing assist lifts and stand assist aids:

- The patient populations who use sit-to-stand lifts and stand-aids overlap. For this reason, in patient care areas where both lift types are used, fewer lifts may be needed than the calculations below would indicate.
- For many outpatient or procedure areas, health care organizations may choose to use either a sit-to-stand lift or a stand-assist aid, depending on the physical environment and their population needs.
- The recommendations in Table J-1 apply when there is no other means of risk control for the patient characteristics and activities being addressed (e.g., toileting, dressing, peri-care, vertical transfers of partially dependent patients).
- The quantity of sit-to-stand lifts needed (and associated space requirements) may decrease when new technologies are used or become available.

Table J-1: Minimum Number of Floor-Based Lifts by Patient Care Area

Patient Care Area	Floor-Based Full-Body Sling Lift	Sit-to-Stand/Standing-Assist Lift (Powered)	Stand-Assist Aid (Non-Powered)
Critical care	1 per floor or unit ¹	1 per 8–10 partially weight-bearing patients ²	1 per 8–10 patients who can stand but require fall protection ²
Dental ⁵	1 nearby for emergencies or falls	1 depending on typical patient population	1 depending on typical patient population
Dialysis ⁴	1 nearby for emergencies or falls	1 depending on patient population and whether using chairs or beds	1 depending on patient population and whether using chairs or beds
Emergency department/urgent care	1 lift ¹ (Consider a supine sling and hanger bar system.)	1 per 8–10 partially weight bearing patients ²	1 per 8–10 patients who can stand but need fall protection
Endoscopy	1 per floor or unit	1 per floor or unit	1 wherever toileting of unsteady patients takes place
Imaging (e.g., X-ray, CT, cardiac catheterization, nuclear medicine, MRI) ⁵	1 per floor (Tables must accommodate lift base.)	1 per imaging area ² (Tables must accommodate lift base.)	1 per modality
Long-term care, hospice	1 per floor or unit ^{1, 2}	1 per 8–10 partially weight bearing residents ²	1 per 8–10 residents who can stand but not walk and require fall protection
Medical/surgical patient care	1 per floor or unit ^{1, 2}	1 per 8–10 partially weight-bearing patients ²	1 per 8–10 patients who can stand but require fall protection
Mental and behavioral health and geriatric psychiatry ⁶	1 per floor or unit ^{1, 2}	1 per 8–10 partially weight bearing patients ²	1 per 8–10 patients who can stand but need fall protection
Morgue ⁷	1 if overhead lift is not available		
Obstetrics	1 nearby for emergencies or falls	Either 1 powered or 1 non-powered stand aid for the unit	Either 1 powered or 1 non-powered stand aid for the unit
Outpatient/primary care ⁸	1 per clinic, may need additional lifts if clinics are not in close proximity to one another	1 per floor, may need additional lifts if clinics are not in close proximity to one another	0 or 1 as determined by staff for transfer between seated surfaces

Patient Care Area	Floor-Based Full-Body Sling Lift	Sit-to-Stand/Standing-Assist Lift (Powered)	Stand-Assist Aid (Non-Powered)
Rehabilitation—inpatient	1 per floor or unit ^{1, 2}	1 per 8–10 partially weight bearing patients ²	Possibly 1 for patients who can stand but need fall protection
Rehabilitation facilities—outpatient (occupational, physical, and kinesiology therapy clinics)	1 per clinic or as needed depending on overhead lift coverage and nearby floor-based full-body sling lifts	1 with ambulation capability, depending on population	As determined by therapists depending on population and tasks
Spinal cord injury—inpatient	1 per floor or unit ^{1, 2}	0 or 1 depending on patient population	
Spinal cord injury—outpatient	1 for the clinic	0 or 1 depending on patient population	
Surgery—operating room	1 if overhead lift coverage is not provided for positioning patient’s body and elevating limbs.		
Surgery—post-anesthesia care unit (PACU)	0 or 1 depending on proximity to operating room (OR) and whether OR area has a floor-based full-body sling lift ⁴	0 or 1 depending on patient population	0 or 1 depending on patient population
Areas for training staff in use of lifts	1 for the training area	1 for the training area	1 for the training area

¹ Recommendations for floor-based full-body sling lifts are based on overhead lift coverage as described in Table I-1: Overhead Lifts by Patient Care Area.

² J. Collins et al., “Safe Lifting and Movement of Nursing Home Residents,” DHHS National Institute of Occupational Safety and Health Publication Number 2006-117 (Centers for Disease Control and Prevention, Feb. 2006).

³ Dental chairs must be able to accommodate the lift base.

⁴ The chair must accommodate the lift base. Consider using a lift-integrated scale.

⁵ Specify X-ray tables without pedestals or with a pedestal design that can accommodate the wheels and base of floor-based lifts under the table and around the pedestal.

⁶ Accommodations must be made for immediate locked storage after use. This does not apply to dementia care units or geri-psychiatry units that do not treat actively suicidal patients.

⁷ The lift must be compatible with morgue equipment.

⁸ Exam tables must accommodate the base of a floor-based lift.

Appendix K

Design/Layout Considerations for Overhead Lift Systems

The information in this appendix is intended to assist in selection of the overhead (ceiling- and wall-mounted) lift track design and installation options best suited to a particular location and to ensure consideration is given to other decisions that will affect overhead lift design. Discussed are overhead lift charging options, track design options, track support and fastening options, and other track design/layout options.

Additional information related to overhead lift design and installation can be found in the VA *Principles of Safe Patient Handling and Mobility: Criteria for Design and Construction* to be published in fall 2019 in the VA Technical Information Library (TIL) (<https://www.cfm.va.gov/til>). Included in this VA document are checklists to ensure proper, safe installation and maintenance of overhead lifts. The VA requires completion of these checklists when such activities take place. These checklists can also be found as Appendix L: Checklists for Installation and Maintenance of Ceiling-Mounted Patient Lifts in this white paper, but please note they are VA documents with specific VA notations.

Overhead Lift Weight Capacities

Overhead lift weight capacities range from around 400 lbs. to expanded-capacity lifts for individuals of size (IOS) of 1,000 lbs. or more. Specification of overhead lifts with a 500–600 lb. capacity for patient rooms will accommodate the greatest range of patients. If admissions of individuals of size warrant, expanded-capacity lifts (greater than 600 lbs.) should also be purchased. As well, an adjustable spreader bar that can accommodate different IOS body types should be provided.

In addition to patient rooms, expanded-capacity lifts and accessories may be needed in emergency rooms, ambulance bays, wheelchair fitting rooms, imaging areas where individuals of size must be accommodated, and any other location where individuals of size need assistance. When purchasing equipment, allow for the estimated percentage of patients served by the facility who will need expanded-capacity lifts. Assume the population of individuals of size will increase over time.

When determining the weight capacities of overhead lifts, refer to Table I-1 (Overhead Lifts by Patient Care Area) in Appendix I: Overhead Lift Coverage Recommendations by Patient Care Area. This table gives some direction on the need for expanded-capacity lifts in patient care areas. However, to determine numbers of expanded-capacity patient rooms and lifts on a patient care unit, retrieve facility data for at least one to two years and identify trends related to patient weights. From this data, calculate the average percentage of patients on the unit who weigh more than 300 pounds. Use this information to calculate the number of patient rooms that should be made available for individuals of size. Note, though, that not all expanded-capacity rooms require expanded-capacity lifts. Once again, use facility data to determine the average percentage of patients who weigh more than 600 lbs. (or the maximum weight-bearing capacity of existing facility lifts) for a patient care unit. The average percentage of these individuals of size is used to calculate the number of rooms that need expanded-capacity lifts. Also record the greatest weight found on the unit and how often such persons

are admitted. If individuals of size weighing more than 600 lbs. are admitted on a regular basis, at least one expanded-capacity lift will be needed on the unit.

When projecting patient population trends, be sure to look forward at minimum 10 years and preferably 20 years. The Centers for Disease Control and Prevention (CDC) provides data trends for obese populations by geographic area (www.cdc.gov/obesity/data/prevalence-maps.html and http://nccd.cdc.gov/NPAO_DTM/). This information will help in estimating the number of expanded-capacity patient rooms and overhead lifts needed for particular locations.

To summarize, a calculation for the number of rooms needed for individuals of size for renovation of an existing building or design of a replacement hospital is determined by using existing facility data such as the average number of patients heavier than 300 lbs. admitted each week on specific units and the average length of stay on the units for those patients as well as information from the CDC obesity prevalence trends by geographic area. For new construction projects that have no existing data, CDC and community obesity prevalence data or projections for a specific geographic area can be used to drive needed room estimates. Use 600 lbs. as the threshold for rooms requiring expanded-capacity overhead lifts for all projects.

Overhead Lift Motor Charging Options

Overhead lifts require a source of power to recharge batteries between uses. Consult local electrical requirements, and consider whether power outlets are needed closer to the ceiling or above the ceiling and whether they should be hard-wired into standard or emergency power.

Electronic (Continuous) Charging System (ECS)

ECS track contains copper stripping that enables charging of the lift motor along the track at all times. This continuous charging occurs along the entire length of the track so no specific charging

station location is required. Use of this type of charging system is recommended because it decreases service problems caused by lifts that are not charged when they need to be used.

Enhanced Charging System

This type of continuous charge system charges when it is needed. For instance, when the motor reaches about 85 percent charge, the charging element inside the track will bring the motor back up to 100 percent.

Automatic Return to Charge System

This feature automatically returns the lift to the charging station when the caregiver pushes a button on the remote. This system requires a horizontal motor with four functions (up/down and right/left).

Stationary Charging System

A charging/docking station is attached to the track, and for charging to take place, the caregiver must return the lift motor to the station. This design can be problematic if the lift motor is not properly docked, preventing charging and making the lift unavailable for the next task. Usually, the charging station is located away from traffic areas.

Hybrid Charging System

This system provides most of the convenience of an enhanced charging station but includes a charging station at the intersection of the traversing track and the fixed track. When the motor is not in use, staff can move it to the side of the room where the fixed rail is located. This locates the motor/spreader bar out of the way, along the wall.

Overhead Lift Track Design Options

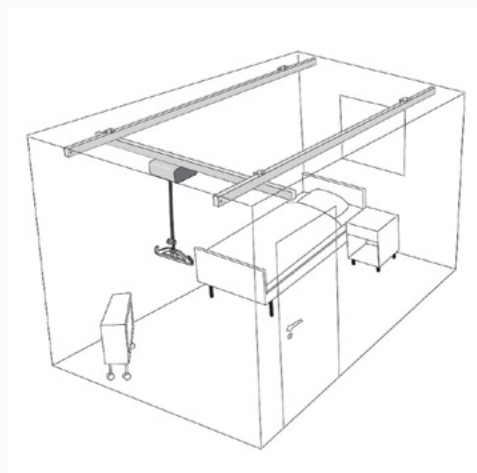
Research has demonstrated the positive effect on staff and patient injury prevention of extensive overhead lift coverage in a patient room. Designs that accommodate maximum room coverage and include tracking from the patient room into the patient toilet room are recommended. Connections between rooms may require special hardware such as gates or turntables.

Two track designs are commonly used: traverse (room-covering) and linear. Two other designs are used for special circumstances: curved and integrated.

Track Types

Traverse (room-covering) track. A traverse track design provides more lift accessibility in a room and, in most rooms, a traverse track gives staff more options for transfers and safe performance of many patient handling activities. This design also offers the patient more opportunity for rehabilitation and timelier patient handling assistance.

Figure K-1: Traverse Track Design



Hillrom-Liko

Traverse track in single-bed patient room



Arjo

Traverse track in shower/
bathing room



Hillrom-Liko

Traverse track in radiography
room

Figure K-1: Traverse Track Design (continued)



Gaius Nelson

Ceiling-mounted traverse track system



Ergolet

Wall-mounted traverse track system with short fixed tracks as wide as the bathroom to cover all destination points



Marie Martin (Guldmann)

Traverse track in cardiac cath lab



Marie Martin (Guldmann)

Traverse track in electrophysiology lab

Track design into toilet rooms commonly includes tracking through toilet room door headers. However, extensive coverage has been achieved using toilet room walls with a gap near the ceiling to allow one traverse system to cover both bedroom and toilet room.

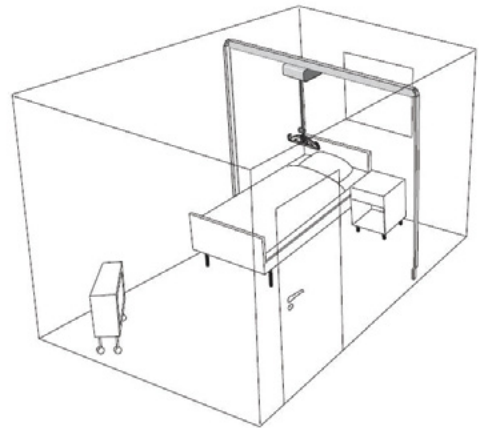
Even though structural and fire code restrictions may affect the ability to run ceiling track through toilet room doorways during renovation, the addition of tracking into the toilet room should be considered.

Traverse track designs may affect the use of privacy curtains. When including a traverse track, room design specifications must incorporate solutions that ensure patient privacy.

Linear (single/straight) track. A linear track configuration is only recommended in a patient room when the room is small and the straight track can reach all areas where patient handling and placement will occur (e.g., when the sink is in line with the bed, the

chairs have easy access to the bed). In most patient rooms, straight tracks impede patient repositioning, limb support, mobilization/ambulation, and lifting from the floor. However, straight tracks are appropriate in special areas such as over a row of chairs in a dialysis treatment area, over parallel bars in a physical therapy gym, in a cast room, or down a hallway on a rehab unit.

Figure K-2: Linear/Straight Track Design



Hillrom-Liko

Linear track design in single-bed patient room, limits access to destination points and performance of many patient handling tasks



Biodex

Linear track design assisting gait training, strengthening, and ambulation in physical therapy clinic

Curved track. Curved tracks are used for turns/transitions from one room into another or when ceiling obstructions such as lights, sprinklers, or other objects hang too low to accommodate a straight or traverse track. They are also used to ensure the motor/spreader bar is out of the way (e.g., in a corner of the room) of other daily activities that are not patient transfer related.

Figure K-3: Curved Track Design



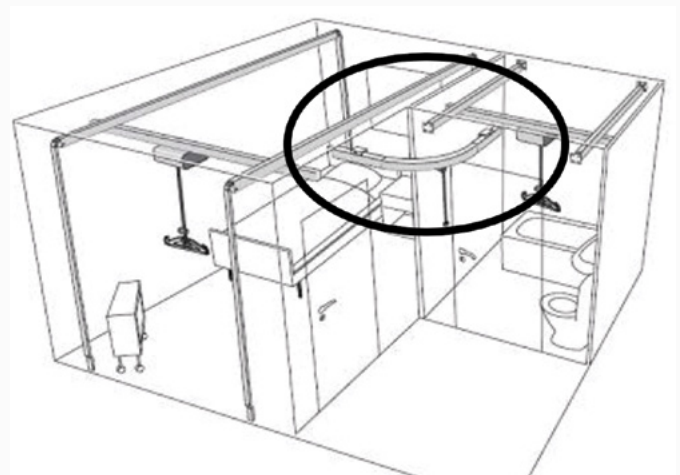
Hillrom-Liko

Curved track



Guldmann

Curved track connecting patient room and bathroom



Hillrom-Liko

Curved track connecting patient room traverse track into bathroom traverse track

Figure K-3: Curved Track Design (continued)



Arjo

Linear/straight track in patient room curves into bathroom. Lift motor storage location is not ideal for avoiding head bumps.



Biodex

Curved track in physical therapy clinic

Figure K-4: Integrated Track Design



AMICO

Integrated track in critical care unit

Integrated track. A fourth option is a track system integrated into a headwall or utility column; this system is most often found in critical care units.

Installation Methods

Ceiling lift tracks may be suspended from the ceiling or recessed into it. The recessed option is preferred for patient rooms as this style diminishes the aesthetic impact of the lift system. However, suspended tracks allow clearance for sprinkler heads, lights,

curtain tracks, and other items attached to the ceiling in rooms with a lot of obstacles. When a traverse track system is installed, both a suspended track and a recessed track are often included.

When recessed tracks are installed, the dropped ceiling grid must lie against the track. Note that a traverse system that includes two suspended tracks drops the lift motor height, potentially affecting staff ability to use a lift in a room with low ceilings.

The lift motor can be incorporated into either ceiling or wall-mounted tracks. The motor runs and moves inside a traverse rail, minimizing the attachment dimensions of a traditional motor and providing extra lifting height, a major benefit in rooms with low ceilings. These tracks can be installed on wall rails in all types of walls.

Figure K-5: Installation Methods



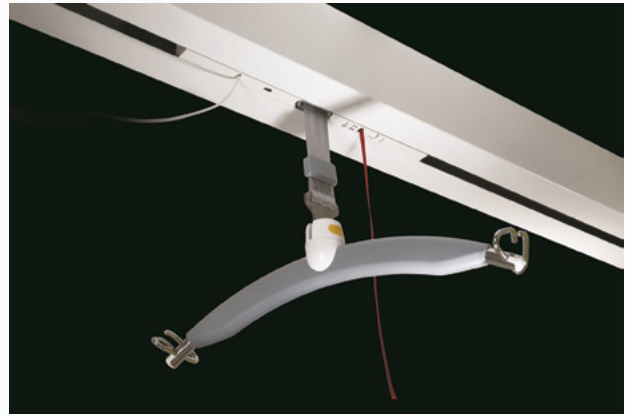
Hillrom-Liko

Suspended track design



Hillrom-Liko

Recessed track design



Guldmann

Motor within the track design

Track Support/Fastening Options

The structural element to which the lift is anchored must be capable of supporting the combined weight capacity of the lift, weight of the lift equipment, and all other superimposed loads. Both static and dynamic loads must be considered. A structural engineer should evaluate the capacity of the structural support.

Track design is best determined during the planning phase of a new construction project, when the height of the ceiling grid can be decided.

Two types of attachment options are described here—wall-mounted and ceiling-mounted; others may be available. Consult with overhead lift manufacturers for options specific for their tracks.

Wall-mounted system. This type of system is attached to the wall with a bracket and toggle bolts and/or supported with an upright member that causes the load to be borne by the floor as well as the wall. For a traverse track, the lift can be suspended in a wall channel track; this is an economical approach appropriate for renovation projects.

Ceiling-mounted system. For ceiling-mounted lifts, the interstitial space dictates the amount of lateral bracing required and the type of attachment method (rod or pendant) needed to achieve a stable system. For this reason, the support and fastening options for this type of system vary.

When pendants are used, a steel plate is bolted to an engineered metal framing system and anchored to the supporting structure. Lateral support is normally used when interstitial space is greater than 19.5 in. (see the manufacturer's specifications and instructions). Tracks can be fully or partially recessed into the ceiling.

When using threaded rods, the size of the rods is determined through structural engineering calculations. Threaded rods can be mounted using an engineered metal framing system attached to spanning beams or trusses. Tracks can be fully or partially recessed into the ceiling.

Figure K-6: Track Support/Fastening Options



Hillrom-Liko
Wall-mounted track attachment



Ergolet
Wall-mounted overhead lift in bathroom



Hillrom-Liko
Pendant attachment



Hillrom-Liko
Threaded rod mount

Overhead Lift Movement Options

Overhead lifts make it possible to lift and lower a patient vertically, to move a patient horizontally from side to side and in other ways. Overhead lifts can also be used to help patients ambulate.

The caregiver moves an overhead lift horizontally either manually using a non-motorized track or with a hand-held (remote) device using a motorized track. Another option is a lift setting that prevents lift movement. In this case, an immovable attachment point is provided for patients to perform therapy and other activities.

Non-Motorized Track

Some caregivers prefer to pull the lift horizontally by hand rather than press a button and wait for the lift to move to the desired location. Movement is quite smooth and easy with this design. If equipped with a charging/docking station, this system requires caregivers to manually position the lift at the recharging area. With an enhanced charging system, the lift can be charged at any location along the track.

Four-Function Motor (Up/Down and Left/Right)

This motorized track design enables the caregiver to use a hand-held (remote) device to move the lift horizontally along the track as well as to move the patient up and down vertically. If the lift has a charging/docking station and a four-function motor, a “return-to-charge” function can automatically move the lift to the station after a patient has been moved or lifted. Or, when part of an enhanced charging system, the lift can be charged at any location along the track.

Positioning Lock

This feature makes it possible to use the lift motor system for therapeutic strategies. With a traverse system design, the lift and/

Figure K-7:
Positioning Lock



Guldmann

Single positioning lock



Guldmann

Single positioning lock allowing patient to exercise with resistance bands

or the traverse rail can be secured in a given position, while with a single-track system, the lift motor can be secured in one location on the track.

Activating locks on parallel rails makes it possible to secure the sideways movement of a traverse rail, allowing it to function as a fixed single rail. The lifting motor can still be moved along the traverse rail, making it easier to use the system for gait training, for example. Activating all three locks secures the lifting motor in a fixed position, which is helpful when a patient is standing or exercising in bed or a chair.

Resistance bands can be hung on the fixed hoist's hanger, serving as a stationary anchor to help the patient perform exercises; the motor is secured over a treadmill for partial body weight supported training and many other mobility-focused activities.

Overhead Lift Layout Considerations

A number of factors affect the track layout for an overhead lift system. Some of these are general items and some are specific to a given patient care area.

Factors Affecting Lift System Layout

The following factors should be considered when designing a track layout:

- **Items mounted in the ceiling:** Light fixtures, HVAC diffusers, fire sprinkler heads, televisions, some imaging equipment, operating room lights, and other fixtures. Installing lifts on suspended tracks allows clearance for these items, but suspended tracks are not as aesthetically appealing as recessed tracks.
- **Items above the ceiling:** HVAC ducts, electrical conduits, plumbing chases, etc.

- **Wall-mounted barriers:** TVs, light fixtures, cabinets, and so on. This includes the door swing radius.
- **Structural materials in the building frame:** Building elements such as columns, joists, beams, etc.
- **Unique architecture:** Multi-level ceiling heights, vaulted ceilings, soffits, non-structural or radius walls
- **Headers and toilet room door walls:** Structural walls create more challenges in designing room-to-room tracking.
- **Fire/life safety code requirements**
- **Seismic considerations**
- **Ceiling height:** Ceiling height must allow the minimum lifting range required for use of the lift equipment. When calculating the minimum height needed, incorporate height loss for scales, rails, obstacles, and hanger bars. (Areas serving individuals of size or patients on procedure tables may need more height.) A ceiling height of 8 to 9 feet provides adequate clearance, although a nine-foot clearance is preferred. Confirm the clearance requirement with the lift manufacturer. Lower ceilings may lead to “drag,” depending on the installation method and surface height. Specialty beds and imaging or procedure tables may require more lifting height than standard beds and wheelchairs.
- **Motor maintenance accommodations:** If the motor must be removed for maintenance, allow enough space between the end of the track and the wall for removal of the motor.
- **Motor charging support:** Provide a code-compliant recharging location for the lift motor.
- **Storage space:** Provide storage space that allows immediate accessibility to the motor and hanger bar when they are not in use but keeps the equipment away from areas of foot travel. Aesthetically pleasing cabinets may be used for hiding and securing the lift motor.
- **Headwall design:** Some existing headwall designs prevent installation of tracks and thus use of overhead lifts, especially in critical care unit areas. During new construction or renovation, ensure headwalls allow use of overhead lifts.

Figure K-8: Location/Design of Privacy Curtains



Marie Martin (Guldmann)

Privacy curtain for exam/
procedure room



Marie Martin (Guldmann)

Privacy curtains for semi-private
patient room



VA (Hillrom-Liko)

Separate privacy curtain tracks over each
bed in semi-private patient room



VA (Arjo)

Wall-mounted privacy curtains that extend between
beds on a boom in semi-private patient room



Marie Martin (Guldmann)

Split ceiling lift rail with privacy curtain for multi-bay
coverage

- **Integration of overhead lift into design of procedure/surgery areas.** These areas need particular attention because of the other items attached to the ceiling in procedure and operating rooms.
- **Location/design of electrical outlets.** Overhead lifts require a source of power to recharge batteries between uses. Consult local electrical requirements and consider whether power outlets are needed closer to the ceiling or above the ceiling and whether they should be hard-wired into standard or emergency power. Consider the number and location of electrical outlets needed when using a turntable or gate, or

consider using a lift model that receives power from the battery inside the motor.

- **Location/design of privacy curtains:** The location and design of privacy curtains depends on whether the track is traverse, straight, or curved and whether the room is private or semi-private. Use of privacy curtains is most affected by the installation of traverse track designs. Use of privacy screens, curtains attached to booms, and other designs may be an acceptable alternative to curtains hung from the ceiling when a traverse track system is used. In some situations, privacy curtains can be split and then fastened with Velcro or buttons. Some traverse designs allow rails to be split so a curtain can pass. And some wall-mounted privacy curtains allow the motor/spreader bar to work around the curtain to ensure privacy.

Designs for Overhead Lift Coverage in Specific Patient Care Areas

See Table I-1: Overhead Lifts by Patient Care Area in Appendix I: Overhead Lift Coverage Recommendations by Patient Care Area for overhead lift track design recommendations for a variety of patient care areas.

One specific track design example is the extension of the patient room track into the toilet room. This installation is highly recommended for all patient rooms, although it is not always feasible. In determining whether to provide this functionality, consider the cost of cutting into the door header to allow the track to pass from one room to the next, the anticipated overall use the ceiling lift will get, and the showering and toileting needs of the patients expected to occupy the room.

Track design for patient/resident rooms that require overhead lift coverage connected into bathroom areas have alternative designs as seen in the illustrations in Figure K-9 (Track Design from Patient Room to Toilet Room).

Figure K-9: Track Design from Patient Room to Toilet Room



Guldman

Overhead lift straight track curving from patient room through gap in upper door frame to traverse system in bathroom



Gaius Nelson

Overhead lift with traverse track system connecting into bathroom through opening above bathroom door



Gaius Nelson

Overhead lift with traverse track system in patient room connecting into bathroom through opening above bathroom wall



Guldman

Wall-mounted overhead lift with traverse track system covering both bedroom and bathroom, with traveling rail moving through a gap in the separating wall

Source: Adapted from M. Matz, K. McCoskey, and M. Martin, "Safe Patient Handling and Mobility (SPHM) Technology: Coverage & Space Recommendations" (Veterans Health Administration, 2016). Retrieved 7/21/2019 from https://www.publichealth.va.gov/docs/employeehealth/Pt_Hdlg_Design_Equip_Coverage_Space_Recs.pdf#.

Appendix L

Checklists for Installation and Maintenance of Ceiling-Mounted Patient Lifts

Although use of patient handling technology is evidence-based and known to be beneficial for both patients and staff, issues surround the use of this equipment, especially lifting devices. The most significant of these is injuries to caregivers and/or patients due to improper use of lifts by caregivers or improper installation or maintenance of fixed equipment.

To ensure proper and safe installation and maintenance of overhead lifts, the U.S. Department of Veterans Affairs (VA) developed a checklist of tasks that must be carried out before, during, and after installation or relocation of ceiling-mounted lifts and a checklist of tasks that must be carried out during corrective and preventive maintenance of these lifts. VA facilities must complete these checklists whenever lift installation or maintenance takes place.

These checklists were developed by the VA for use by the VA and are included here as samples of such guidance. Information appropriate for your health care facility will be determined by your organization and/or construction processes. It is also important to

clarify that these checklists are specifically intended for engineers and technicians to use to verify the technical functionality of ceiling-mounted lift systems prior to patient use. SPHM facility coordinators and program managers should not complete these technical checklists or be involved in associated equipment testing.

Note: Although "ceiling-mounted" is used in the checklist titles, these lists should be used when installing or performing maintenance on all overhead lifts (ceiling-mounted and wall-mounted). To the extent they are applicable, the checklists can also be used for freestanding and gantry lifts.

Installation or Relocation Checklist for Ceiling Mounted Patient Lifts

The commissioning for a patient ceiling lift system(s) shall include, but not be limited to, the following points as components of the commissioning procedures.

NOTE: Ceiling mounted patient lifts are not to be installed in treatment units with actively suicidal patients.

Facility:	Work Order:	Manufacturer:	
Lift Location:		Model:	
VAMC Contact:		Serial Number:	EE Number:
VAMC Contact's Phone Number:		Mfgr Contact:	
Installer:		Mfgr Contact's Phone Number:	
Installer's Phone Number:		Date:	

Pre-Installation		COMPLETE
1	Perform site survey of the pre-existing conditions and as-built drawings above and below finish ceiling at the installation location to confirm existing structural and ceiling conditions.	<input type="checkbox"/>
2	Obtain structural and related engineering design drawings and calculations for the new lift installation. Design drawings shall be developed for specific lift installation under specific pre-existing conditions of the facility.	<input type="checkbox"/>
3	If the facility is located in a seismic area, as identified in VA Handbook H-18-8 Seismic Design Requirements, verify that the ceiling mounted patient lift system installation is in compliance with the requirements of VA Directive 7512 Seismic Safety of VA Buildings and VA Master Design Specification 13.05.041 Seismic Restraint Requirements for Non-Structural Components.	<input type="checkbox"/>
4	Verify that the lift is listed by the manufacturer to be installed and operated in the environment that the lift is operating under. (For example, water tight lifts shall be installed and operated in wet, damp or humid locations such as pools or bathrooms.)	<input type="checkbox"/>
5	Verify NFPA 13 compliance for fire sprinkler system (including but not limited to fire sprinkler heads and piping).	<input type="checkbox"/>
6	Verify NFPA 99 and NFPA 70 compliance for proper grounding and bonding.	<input type="checkbox"/>
7	Verify NFPA 99 and NFPA 70 compliance for access to electrical and safety systems.	<input type="checkbox"/>
8	Verify required access to mechanical, HVAC, and fire systems components within the lift installation area.	<input type="checkbox"/>
9	Verify minimum clearances for operation are compliant with manufacturer recommendations. (Ensure room clearance and that the ceiling height is adequate for lift usage.)	<input type="checkbox"/>
10	Perform pre-installation walkthrough to confirm full understanding and consensus of design drawing(s) and installation conditions.	<input type="checkbox"/>

NOTES:

Installation		COMPLETE
1	Verify proper connections of the lift's structural system to the building's structure (including seismic bracing if applicable).	<input type="checkbox"/>
2	Verify proper interface at the ceiling (hard deck or soft tile) and proper installation of all protective features around the support rods and rails/tracks.	<input type="checkbox"/>

3	Verify structural component sizing and physical installation to ensure that the correct structural system is in place and properly installed to support the lift.	<input type="checkbox"/>
4	Verify proper installation of electric motor per manufacturer's instructions to ensure operational rigidity of motor mounting.	<input type="checkbox"/>
5	Verify proper electrical connections per design drawings and manufacturer's instructions.	<input type="checkbox"/>

NOTES:

Post-Installation	COMPLETE
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1	Perform walkthrough to ensure compliance of the installation per the design drawing(s) and manufacturer's instructions.	<input type="checkbox"/>
2	Perform operational test to verify lift functionality.	<input type="checkbox"/>

NOTES:

Rails/Tracks and End Stops	PASS	FAIL
-----------------------------------	-------------	-------------

1	Verification that all fasteners and set screws are properly tightened on the trollies and rails/tracks.	<input type="checkbox"/>	<input type="checkbox"/>
2	Ensure that the rail/track is free of gaps (unless required by design). If included in installation, verify rail turntable function, exchanger function, gate alignment, and safety block installation.	<input type="checkbox"/>	<input type="checkbox"/>
3	Confirm track is clean and clear of all debris. (Use manufacturer's recommended cleaning materials to avoid damage to the motor case and other components.)	<input type="checkbox"/>	<input type="checkbox"/>
4	Verification that all manufacturer specified end stops or docking gates are properly installed.	<input type="checkbox"/>	<input type="checkbox"/>

NOTES:

Lift Unit and Straps	PASS	FAIL
-----------------------------	-------------	-------------

1	Inspection of lift unit casing for cracks and alignment.	<input type="checkbox"/>	<input type="checkbox"/>
2	Verification that the lift unit charges properly.	<input type="checkbox"/>	<input type="checkbox"/>
3	Inspection and activation of hand control for full operation (e.g., up, down, left, right) and "return to charge" function if applicable.	<input type="checkbox"/>	<input type="checkbox"/>
4	Confirm any and all lift unit indicator lights are functioning. (e.g., red service warning light, charging state light)	<input type="checkbox"/>	<input type="checkbox"/>
5	Inspection and verification of all emergency functions of the lift unit.	<input type="checkbox"/>	<input type="checkbox"/>

6	Full extension and inspection of lift strap for loose threads or frays.	<input type="checkbox"/>	<input type="checkbox"/>
7	Inspection of spreader bar and clips for cracks and for loose or missing rings or cotter pins.	<input type="checkbox"/>	<input type="checkbox"/>
NOTES:			
Load Testing		PASS	FAIL
1	Verification of any "soft start" or "soft stop" features and that lifting speed does not exceed 2.5 inches per second with "zero" load.	<input type="checkbox"/>	<input type="checkbox"/>
2	Verification of load testing and deflection testing at the manufacturer's specified maximum rated lift capacity.	<input type="checkbox"/>	<input type="checkbox"/>
3	Verification of any "soft start" and "soft stop" features and that lifting speed does not exceed 1.5 inches per second under maximum rated lift capacity.	<input type="checkbox"/>	<input type="checkbox"/>
4	Verification of function of emergency stop at maximum rated lift capacity.	<input type="checkbox"/>	<input type="checkbox"/>
5	Verification of emergency lowering feature at maximum rated lift capacity.	<input type="checkbox"/>	<input type="checkbox"/>
NOTES:			
Manuals		COMPLETE	
1	Confirm that the manufacturer's operating and maintenance manuals for this lift have been received.	<input type="checkbox"/>	<input type="checkbox"/>
NOTES:			
Training		COMPLETE	
1	Verify that manufacturer or manufacturer's representative has provided training on the use of patient handling equipment to clinicians and other staff who move and handle patients.	<input type="checkbox"/>	<input type="checkbox"/>
2	Verify that training and competency are documented prior to release for use with patients.	<input type="checkbox"/>	<input type="checkbox"/>
NOTES:			

Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts

The commissioning for a patient ceiling lift system(s) shall include, but not be limited to, the following points as components of the commissioning procedures.

NOTE: Ceiling mounted patient lifts are not to be installed in treatment units with actively suicidal patients.

Facility:	Work Order:	Manufacturer:	
Lift Location:		Model:	
VAMC Contact:		Serial Number:	EE Number:
VAMC Contact's Phone Number:		Mfgr Contact:	
Installer:		Mfgr Contact's Phone Number:	
Installer's Phone Number:		Date:	

Structure		Complete
1	Perform a visual inspection to verify proper connections of the lift's structural system to the building's structure (including seismic bracing if applicable).	<input type="checkbox"/>
2	Perform a visual inspection to verify proper interface at the ceiling (hard deck or soft tile) and proper installation of all protective features around the support rods and rails/tracks.	<input type="checkbox"/>
3	Perform a visual inspection to verify structural component sizing and physical installation to ensure that the correct structural system is in place and properly installed to support the lift.	<input type="checkbox"/>

NOTES:

Rails/Tracks and End Stops		PASS	FAIL
1	Verification that all fasteners and set screws are properly tightened on the trollies and rails/tracks.	<input type="checkbox"/>	<input type="checkbox"/>
2	Ensure that the rail/track is free of gaps (unless required by design). If included in installation, verify rail turntable function, exchanger function, gate alignment, and safety block installation.	<input type="checkbox"/>	<input type="checkbox"/>
3	Confirm track is clean and clear of all debris. (Use manufacturer's recommended cleaning materials to avoid damage to the motor case and other components.)	<input type="checkbox"/>	<input type="checkbox"/>
4	Verification that all manufacturer specified end stops or docking gates are properly installed.	<input type="checkbox"/>	<input type="checkbox"/>

NOTES:

Lift Unit and Straps		PASS	FAIL
1	Inspection of lift unit casing for cracks and alignment.	<input type="checkbox"/>	<input type="checkbox"/>
2	Verification that the lift unit charges properly.	<input type="checkbox"/>	<input type="checkbox"/>
3	Inspection and activation of hand control for full operation (e.g., up, down, left, right) and "return to charge" function if applicable.	<input type="checkbox"/>	<input type="checkbox"/>
4	Confirm any and all lift unit indicator lights are functioning. (e.g., red service warning light, charging state light)	<input type="checkbox"/>	<input type="checkbox"/>
5	Inspection and verification of all emergency functions of the lift unit.	<input type="checkbox"/>	<input type="checkbox"/>
6	Full extension and inspection of lift strap for loose threads or frays.	<input type="checkbox"/>	<input type="checkbox"/>
7	Inspection of spreader bar and clips for cracks and for loose or missing rings or cotter pins.	<input type="checkbox"/>	<input type="checkbox"/>

NOTES:

Load Testing		PASS	FAIL
1	Verification of any "soft start" or "soft stop" features and that lifting speed does not exceed 2.5 inches per second with "zero" load.	<input type="checkbox"/>	<input type="checkbox"/>
2	Verification of load testing and deflection testing at the manufacturer's specified maximum rated lift capacity.	<input type="checkbox"/>	<input type="checkbox"/>
3	Verification of any "soft start" and "soft stop" features and that lifting speed does not exceed 1.5 inches per second under maximum rated lift capacity.	<input type="checkbox"/>	<input type="checkbox"/>
4	Verification of function of emergency stop at maximum rated lift capacity.	<input type="checkbox"/>	<input type="checkbox"/>
5	Verification of emergency lowering feature at maximum rated lift capacity.	<input type="checkbox"/>	<input type="checkbox"/>

NOTES:

Inspector	COMPLETE
After the activities listed in the above checklist and in the manufacturer's installation/operations/owner's manual(s) have been completed, the inspector shall release the ceiling mounted lift installation to VA representative.	<input type="checkbox"/>
SIGNATURE:	DATE:
TITLE:	

VA Representative	COMPLETE
After the activities listed in the above checklist and in the manufacturer's installation/operations/owner's manual(s) have been completed, the VA representative shall review those items with the inspector prior to releasing the ceiling mounted lift back into service to ensure completion of all requirements.	<input type="checkbox"/>
SIGNATURE:	DATE:
TITLE:	

Manager of the Service Using the Ceiling Mounted Lifts	COMPLETE
After the activities listed in the above checklist and in the manufacturer's installation/operations/owner's manual(s) have been completed, the manager of the service using the ceiling mounted lifts confirms that the current staff have received initial training on ceiling mounted lifts and that there is a process in place to provide ongoing training on the proper use of ceiling mounted lifts.	<input type="checkbox"/>
SIGNATURE:	DATE:
TITLE:	

Appendix M

Storage Requirements for SPHM Equipment

This appendix provides information to help determine storage space requirements for safe patient handling and mobility (SPHM) equipment. Storage design should be planned so that lift equipment can be accessed without needing to remove equipment, gurneys, wheelchairs, or other items.

Location of Storage Areas for SPHM Technology

Accessibility of SPHM technology is critical to ensure its appropriate use. Storage near the point of need decreases the time required to complete the caregiving task, making it more likely staff will follow patient handling and mobility protocols. Thus, the practice some facilities have of storing their surplus slings in a centralized supply and distribution area is discouraged. Rather, slings should be stored and distributed in patient rooms and throughout patient care areas where they can be quickly and easily accessed.

In most cases, storage in nooks in hallways is faster for staff to access than central storage rooms. Other storage recommendations include:

- For small clinical areas or units, it may be preferable to locate multiple storage areas or nooks in a central spot.
- For large clinical areas or units, provide multiple storage locations throughout the space.
- When identifying and designing SPHM storage locations for lifts and other equipment, determine whether electrical outlets are needed to charge motors or whether spare batteries need a place to charge on the wall.
- Locate lift storage for behavioral health units where floor-based lifts are employed so lift equipment can be locked away immediately after use. (This does not apply to dementia care units or geri-psychiatry units that do not treat actively suicidal patients.)

Calculating Storage Space Requirements for Floor-Based Lifts

Decisions about space requirements for storage of floor-based lifts are based on the following:

- Type of clinical unit
- Number of patients on the unit
- Footprint/dimensions of floor-based lifts (Expanded-capacity lifts for individuals of size will take up more space and may need to be estimated based on actual manufacturer dimensions.)

Calculations for floor-based lifts as shown here yield the *minimum* storage space needed and do not take into account the space required to safely and properly place the lifts in or take them out of a storage room or alcove. Additional space will be necessary to allow easy movement of floor-based equipment in a storage area.

To determine minimum space requirements for storing floor-based lifts in each patient care area:

1. Multiply the number of sit-to-stand (STS) lifts required for the area (as derived from Table J-1: Floor-Based Lift Coverage Recommendations by Patient Care Area) by the space requirements for the lift(s) in use or to be purchased (see sidebar on lift storage space requirements).

STS lifts/area x 8 sf = sit-to-stand lift space requirement (sf)

2. Multiply the number of stand-assist aids (SAA) required for the area (as derived from Table J-1) by the space requirements for the SAA(s) in use or to be purchased (see sidebar re: space requirements).

SAA/area x 6.6 sf = stand-assist aid space requirement (sf)

3. Multiply the number of floor-based full-body sling (FBS) lifts required for the area (as derived from Table J-1) by the space requirements for the lift(s) in use or to be purchased (see sidebar).

FBS lifts/area x 10 sf = FBSL Space requirement (sf)

4. Add the space requirements for the sit-to-stand lifts, stand-assist aids, and floor-based full-body sling lifts to obtain the minimum storage space requirements for floor-based lifts.

STS lifts + SAA + FBS lifts space requirements = TOTAL MINIMUM storage space requirements for floor-based lifts

Lift Storage Space Requirements

- Use average (non-expanded base) dimensions (given below or from the lift manufacturer) to determine the minimum space necessary for the required number of all three types of floor-based lifts.
- Space requirements will vary with lift weight capacities. The footprint of expanded-capacity floor-based lifts will be greater than that of the standard lifts given below.

- Space requirements will depend on the storage arrangement (side by side, end to end, or a combination).

Lift Footprint/Dimensions

Consult with staff and/or the lift manufacturer for true dimensions.

- Average sit-to-stand lift = 27 in. wide x 43 in. long (~8 sf)
(Expanded base width = ~ 50 in.)
- Average stand assist aid = 27 in. wide x 35 in. long (~6.6 sf)
(Expanded base width = ~ 37 in.)
- Average floor-based full-body sling lift = 27 in. wide x 54 in. long (~10 sf) (Expanded base width = ~ 60 in.)

Example (Long-Term Care Unit)

One sit-to-stand (STS) lift or stand assist aid (SAA) is recommended for every 8–10 partially weight-bearing patients or residents, and one floor-based full-body sling lift (FBSL) is recommended for each unit or floor.

On a nursing home care unit with 60 beds and an average of 25 residents who are partially weight-bearing, storage accommodations for two STS lifts, one SAA, and one FBSL will be needed. Using the above average non-expanded base dimensions to determine space necessary for these four lifts, a minimum of 32.6 sf should be allotted.

STS lift space requirements: 27 in. x 43 in. = 8 sf x 2 STS = 16.0 sf

SAA space requirements: 27 in. x 35 in. = 6.6 sf x 1 STS = 6.6 sf

FBS lift space requirements: 27 in. x 54 in. = 10 sf x 1 FBSL = 10.0 sf

Total MINIMUM space requirements: ~32.6 sf

Storage for Other SPHM Equipment

Storage space must be provided for lift accessories for both overhead and floor-based lifts as well as for other types of patient handling equipment.

Sling and Hanger Bar Storage

Sling designs are available for a variety of patient handling tasks, and each patient care area may need different styles and sizes of slings. Refer to Appendix C: Lift System Components/Sling Selection, Use, and Care for more detail on various styles, including tasks appropriate for each, criteria for use, and special considerations during use.

Storage of surplus slings for floor-based lifts in the same location as the lifts is preferable. If this isn't feasible, slings may be stored in a clean linen room. Disposable slings may also be stored in other clean supply rooms.

Large hooks can be provided for hanging slings and/or shelving for storage of folded slings. Standard shelving is acceptable for storing an assortment of slings and extra lift hanger bars as well as other foldable patient handling equipment.

Slings assigned to a specific patient or resident should be stored in the patient or resident room to provide instant accessibility and ensure compliance in use. Large hooks for can be provided for this purpose outside the patient's or resident's closet, at bedside, or near the entry door.

In locations such as critical care units, the emergency department, medical/surgical units, and outpatient surgery facilities where repositioning slings may be handled as part of linen processing, these slings may be kept on a cart in the linen closet with the rest of the bedding linens.

Storage for Other Patient Handling Equipment

Storage is also needed for friction-reducing devices, air-assisted lateral transfer devices, air-assisted lifting devices, and any other devices or aids used in a patient care area. If possible, standard shelving should be provided for these in the same location as the sling and floor-based lift storage. Two-tiered carts are used to store air-assisted mattresses, with the mattresses in the top level and their

motors in the bottom level. Additional space may be necessary to store specialized carts for items used to care for individuals of size.

Storage for Infrequently Used Equipment

An equipment bank located in the basement or other out-of-the-way area of the health care facility is helpful for storing large, infrequently used equipment. This may include expanded-capacity beds, floor-based expanded-capacity (gantry) lifts, expanded-capacity and floor-based full-body sling lifts with an eight-point hanger bar for a supine sling, and extra lifts. Such an area should have an electric supply for charging batteries.

Appendix N

Infection Control Risk Assessment Matrix of Precautions for Construction and Renovation

Step 1: Using the following table, identify the type of construction project activity (Type A-D).

TYPE A	Inspection and non-invasive activities Include, but are not limited to: <ul style="list-style-type: none">▪ Removal of ceiling tiles for visual inspection only (e.g., limited to 1 tile per 50 square feet)▪ Painting (but not sanding)▪ Wallcovering, electrical trim work, minor plumbing, and activities that do not generate dust or require cutting of walls or access to ceilings other than for visual inspection
TYPE B	Small-scale, short-duration activities that create minimal dust Include, but are not limited to: <ul style="list-style-type: none">▪ Installation of telephone and computer cabling▪ Access to chase spaces▪ Cutting of walls or ceiling where dust migration can be controlled
TYPE C	Activities that generate a moderate to high level of dust or require demolition or removal of any fixed building components or assemblies Includes, but is not limited to: <ul style="list-style-type: none">▪ Sanding of walls for painting or wall covering▪ Removal of floor coverings, ceiling tiles, and casework▪ New wall construction▪ Minor ductwork or electrical work above ceilings▪ Major cabling activities▪ Any activity that cannot be completed in a single work shift
TYPE D	Major demolition and construction projects Include, but are not limited to: <ul style="list-style-type: none">▪ Activities that require consecutive work shifts▪ Heavy demolition or removal of a complete cabling system▪ New construction

Step 2: Using the following table, identify the patient risk groups that will be affected. If more than one risk group will be affected, select the higher risk group.

Low Risk	Medium Risk	High Risk	Highest Risk
<ul style="list-style-type: none"> ▪ Medical offices 	<ul style="list-style-type: none"> ▪ Cardiology ▪ Echocardiography ▪ Endoscopy ▪ Nuclear medicine ▪ Physical therapy ▪ Imaging/MRI ▪ Respiratory therapy 	<ul style="list-style-type: none"> ▪ Emergency room ▪ Labor and delivery ▪ Laboratories (specimen) ▪ Medical units ▪ Newborn nursery ▪ Outpatient surgery ▪ Pediatrics ▪ Pharmacy ▪ Post-anesthesia care unit ▪ Surgical patient care units 	<ul style="list-style-type: none"> ▪ Any area caring for immunocompromised patients ▪ Burn unit ▪ Cardiac cath lab ▪ Central sterile supply ▪ Critical care units ▪ Negative pressure isolation rooms ▪ Oncology ▪ Operating rooms, including C-section rooms

Step 3: Match the:

Patient risk group (Low, Medium, High, Highest) with the planned ...

Construction project type (A, B, C, D) on the following matrix, to find the ...

Class of precautions (I, II, III or IV) or level of infection control activities required.

Class I–IV or **color-coded precautions** are delineated in the matrix that follows.

IC Matrix: Class of Precautions: Construction Project by Patient Risk

Note: Infection Control Department approval will be required when the construction activity and risk level indicate that Class III or Class IV control procedures are necessary

Patient Risk Group	Construction Project Type			
	TYPE A	TYPE B	TYPE C	TYPE D
LOW risk group	I	II	II	III/IV
MEDIUM risk group	I	II	III	IV
HIGH risk group	I	II	III/IV	IV
HIGHEST risk group	II	III/IV	III/IV	IV

Description of Required Infection Control Precautions by Class

	During Construction Project	Upon Completion of Project
CLASS I	<ol style="list-style-type: none"> 1. Execute work by methods that minimize raising dust from construction operations. 2. Immediately replace a ceiling tile displaced for visual inspection. 	<ol style="list-style-type: none"> 1. Clean work area upon completion of task.
CLASS II	<ol style="list-style-type: none"> 1. Provide active means to prevent airborne dust from dispersing into the atmosphere. 2. Water-mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Place dust mat at entrance and exit of work area. 6. Remove or isolate HVAC system in areas where work is being performed. 	<ol style="list-style-type: none"> 1. Wipe work surfaces with cleaner/disinfectant. 2. Contain construction waste before transport in tightly covered containers. 3. Wet mop and/or vacuum with HEPA-filtered vacuum before leaving work area. 4. Upon completion, restore HVAC system where work was performed.
CLASS III	<ol style="list-style-type: none"> 1. Remove or isolate HVAC system in area where work is being performed to prevent contamination of duct system. 2. Complete all critical barriers (i.e., sheetrock, plywood, plastic) to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. 3. Maintain negative air pressure within work site using HEPA-equipped air filtration units. 4. Contain construction waste before transport in tightly covered containers. 5. Cover transport receptacles or carts. Tape covering unless solid lid. 	<ol style="list-style-type: none"> 1. Do not remove barriers from work area until completed project has been inspected by the owner's safety department and infection prevention and control department and thoroughly cleaned by the owner's environmental services department. 2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 3. Vacuum work area with HEPA-filtered vacuums. 4. Wet-mop area with cleaner/disinfectant. 5. Upon completion, restore HVAC system where work was performed.
CLASS IV	<ol style="list-style-type: none"> 1. Isolate HVAC system in area where work is being done to prevent contamination of duct system. 2. Complete all critical barriers (i.e., sheetrock, plywood, plastic) to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. 3. Maintain negative air pressure within work site using HEPA-equipped air filtration units. 4. Seal holes, pipes, conduits, and punctures. 5. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site. 6. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area. 	<ol style="list-style-type: none"> 1. Do not remove barriers from work area until completed project has been inspected by the owner's safety department and infection prevention and control department and thoroughly cleaned by the owner's environmental services department. 2. Remove barrier material carefully to minimize spreading of dirt and debris associated with construction. 3. Contain construction waste before transport in tightly covered containers. 4. Cover transport receptacles or carts. Tape covering unless solid lid. 5. Vacuum work area with HEPA-filtered vacuums. 6. Wet-mop area with cleaner/disinfectant. 7. Upon completion, restore HVAC system where work was performed.

Step 4: Identify the areas surrounding the project area, assessing potential impact.

Unit Below	Unit Above	Lateral	Lateral	Behind	Front
Risk Group	Risk Group	Risk Group	Risk Group	Risk Group	Risk Group

Step 5: Identify specific site of activity (e.g., patient rooms, medication room, etc.).

Step 6: Identify issues related to ventilation, plumbing, and electrical systems in terms of the likelihood of outages.

Step 7: Identify containment measures, using prior assessment. What types of barriers (e.g., solid wall barriers) will be used? Will HEPA filtration be required?

Note: Renovation/construction area shall be isolated from the occupied areas during construction and shall be negative with respect to surrounding areas.

Step 8: Consider potential risk of water damage. Is there a risk due to compromising structural integrity (e.g., wall, ceiling, roof)?

Step 9: Work hours—Can or will the work be done during non-patient care hours?

Step 10: Do plans allow for an adequate number of isolation/negative pressure rooms?

Step 11: Do the plans allow for the required number and type of hand-washing sinks?

Step 12: Does the infection prevention and control staff agree with the minimum number of sinks for this project? (Verify against the FGI *Guidelines for Design and Construction* for type and area.)

Step 13: Does the infection prevention and control staff agree with the plans relative to clean and soiled workrooms?

Step 14: Plan to discuss containment issues with the project team (e.g., traffic flow, environmental services, debris removal—how and when).

Note: Identify and communicate the responsibility for project monitoring that includes infection prevention and control concerns and risks. The ICRA may be modified throughout the project. Revisions must be communicated to the Project Manager.

Steps 1-3: Adapted with permission from V. Kennedy and B. Barnard, St Luke Episcopal Hospital, Houston, Tex.; C. Fine, Calif.

Steps 4-14: Adapted with permission from Fairview University Medical Center, Minneapolis, Minn..

Forms modified/updated; provided courtesy of Judene Bartley, ECSI Inc. (updated 2009).

Infection Control Construction Permit

					Permit no:		
Location of construction:					Project start date:		
Project coordinator:					Estimated duration:		
Contractor performing work:					Permit expiration date:		
Supervisor:					Telephone:		
YES	NO	CONSTRUCTION ACTIVITY			YES	NO	INFECTION CONTROL RISK GROUP
		TYPE A: Inspection, non-invasive activity					GROUP 1: Low Risk
		TYPE B: Small scale, short duration, moderate to high levels					GROUP 2: Medium Risk
		TYPE C: Activity generates moderate to high levels of dust, requires greater than one work shift for completion					GROUP 3: Medium/High Risk
		TYPE D: Major duration and construction activities requiring consecutive work shifts					GROUP 4: Highest Risk
CLASS I		<ol style="list-style-type: none"> Execute work by methods to minimize raising dust from construction operations. Immediately replace any ceiling tile displaced for visual inspection. 			<ol style="list-style-type: none"> Minor demolition for remodeling 		
CLASS II		<ol style="list-style-type: none"> Provide active means to prevent airborne dust from dispersing into atmosphere. Water-mist work surfaces to control dust while cutting. Seal unused doors with duct tape. Block off and seal air vents. Wipe surfaces with cleaner/disinfectant. 			<ol style="list-style-type: none"> Contain construction waste before transport in tightly covered containers. Wet-mop and/or vacuum with HEPA-filtered vacuum before leaving work area. Place dust mat at entrance and exit of work area. Isolate HVAC system in areas where work is being performed; restore when work is completed. 		
CLASS III		<ol style="list-style-type: none"> Obtain infection control permit before construction begins. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 			<ol style="list-style-type: none"> Vacuum work with HEPA-filtered vacuums. Wet-mop with cleaner/disinfectant. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 		
Date		<ol style="list-style-type: none"> Complete all critical barriers or implement control cube method before construction begins. Maintain negative air pressure within work site using HEPA-equipped air filtration units. 			<ol style="list-style-type: none"> Contain construction waste before transport in tightly covered containers. Cover transport receptacles or carts. Tape covering shut. 		
initial		<ol style="list-style-type: none"> Do not remove barriers from work area until complete project has been checked by Infection Prevention and Control and thoroughly cleaned by Environmental Services. 			<ol style="list-style-type: none"> Upon completion, restore HVAC system where work was performed. 		

CLASS IV	<ol style="list-style-type: none"> 1. Obtain infection control permit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of duct system. 3. Complete all critical barriers or implement control cube method before construction begins. 	<ol style="list-style-type: none"> 8. Do not remove barriers from work area until completed project has been checked by Infection Prevention and Control and thoroughly cleaned by Environmental Services. 9. Vacuum work area with HEPA-filtered vacuums.
Date	<ol style="list-style-type: none"> 4. Maintain negative air pressure within work site using HEPA-equipped air filtration units. 5. Seal holes, pipes, conduits, and punctures appropriately. 	<ol style="list-style-type: none"> 10. Wet-mop with disinfectant. 11. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.
Initial	<ol style="list-style-type: none"> 6. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave the work site. 7. All personnel entering work site are required to wear shoe covers. 	<ol style="list-style-type: none"> 12. Contain construction waste before transport in tightly covered containers. 13. Cover transport receptacles or carts. Tape covering. 14. Upon completion, restore HVAC system where work was performed.
Additional Requirements:		
Date:	Exceptions/additions to this permit are noted by attached memoranda.	
Initials:	Date:	Initials:
Permit request by:	Permit authorized by:	
Date:	Date:	

Appendix O

Equipment Safety Checklist for Accommodating Individuals of Size

EQUIPMENT/AREA	CHECK FOR:
Hospital beds	Powered? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Side rail support: _____ lbs. Scale included? <input type="checkbox"/> Yes _____ lbs. <input type="checkbox"/> No Width: _____ in. Adjustable? <input type="checkbox"/> Yes <input type="checkbox"/> No Mattress type: <input type="checkbox"/> Foam <input type="checkbox"/> Pressure relief <input type="checkbox"/> Alternating <input type="checkbox"/> Rotational Other: _____
Wheelchairs	Powered? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Width: _____ in. Seat height: _____ in. Handle width: _____ in.
Stretchers/gurneys	Powered? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Length: _____ in. Side rail support: _____ lbs.
Bedside commodes	Powered? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Seat width: _____ in. Adjustable height? <input type="checkbox"/> Yes <input type="checkbox"/> No

Shower chairs	Powered? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Seat width: _____ in. Adjustable height? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Scales	Wheelchair scales available? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Width: _____ in. Standing scale weight limit: _____ lbs.	
Walkers	Weight limit: _____ lbs. Width: _____ in. Pannus sling hook available? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Bathrooms	Doorframe width: _____ in. Shower door width: _____ in. Toilet weight limit: _____ in. Wall-mounted grab bars? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Wall-mounted sink? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs.	
Chairs	Patient bedside chair? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Width: _____ in. Seat height: _____ in. Visitor chair? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Width: _____ in. Seat height: _____ in. Geri/cardiac chair? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: _____ lbs. Width: _____ in. Seat height: _____ in.	

<p>Lifting/transfer devices</p>	<p>Overhead lift (ceiling or wall-mounted)? <input type="checkbox"/> Yes <input type="checkbox"/> No Motor weight limit ____ lbs. Hanger bar: Weight limit ____ lbs.</p> <p>Emergency room overhead (ceiling/wall-mounted) lift? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: ____ lbs.</p> <p>Expanded-capacity slings available? <input type="checkbox"/> Yes <input type="checkbox"/> No Type: _____ Size: _____ Weight limit: _____ lbs. Type: _____ Size: _____ Weight limit: _____ lbs. Type: _____ Size: _____ Weight limit: _____ lbs. Type: _____ Size: _____ Weight limit: _____ lbs.</p> <p>Powered full-body sling lifts? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: ____ lbs. Goes to floor? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Powered sit-to-stand lifts? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: ____ lbs. Non-powered sit-to-stand aids? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: ____ lbs.</p> <p>Air-assisted lateral transfer and positioning device? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: ____ lbs. Width: ____ in.</p> <p>Air-assisted lifting device? <input type="checkbox"/> Yes <input type="checkbox"/> No Weight limit: ____ lbs. Width: ____ in.</p>
<p>Patient path of travel</p>	<p>Elevator: Depth of at least one will accommodate beds for individuals of size? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Door widths throughout the transport path will accommodate transport equipment for individuals of size? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Location/s of inadequate doorways: _____</p>

<p>Patient tables</p>	<p>X-ray table? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Weight limit: _____ lbs.</p> <p>Width: _____ in.</p> <p>CT table? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Weight limit: _____ lbs.</p> <p>Width: _____ in.</p> <p>MRI table? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Weight limit: _____ lbs.</p> <p>Width: _____ in.</p> <p>OR table? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Weight limit: _____ lbs.</p> <p>Width: _____ in.</p> <p>Exam table? _____ <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Weight limit: _____ lbs.</p> <p>Powered? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Scale included? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Procedure table? _____ <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Weight limit: _____ lbs.</p> <p>Powered? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Scale included? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>Other patient care equipment and supplies</p>	<p>Appropriate gowns, blood pressure (BP) cuffs, IV equipment, etc., available to care providers at all times?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>

Appendix P

Making Critical Connections for SPHM Program Success

SPHM programs will affect, or be affected by, nearly every department and area in a health or residential care facility. This broad reach means that—for successful implementation of a safe patient handling and mobility (SPHM) program—many people must become engaged in the process and the implementation team must develop good working relationships with all of them. As well, staff involved in any area of the SPHM program need education.

Successful SPHM programs should be found in all areas where patients are moved, mobilized, lifted, and transferred, including nursing units, diagnostic and treatment areas, and other patient care areas.

Safety/Environment of Care and Accident Review Committees/Teams

A win-win situation occurs when the facility SPHM leader is included in the facility environment of care or facility safety committee or the accident review board. Simple presentation of

status reports to these bodies, even when given by the SPHM leader as a guest, fosters program success by educating those who would not normally be aware of the SPHM program.

Such face-to-face meetings have many benefits, including keeping the committee or board apprised of the SPHM program's progress. Even more importantly, the facility departments that usually belong to bodies concerned with safety issues are those departments particularly important to the success of a safety program. Thus, these meetings provide a valuable opportunity to facilitate working associations between entities that can influence implementation of the SPHM program.

Risk Management Staff: Employee Safety, Occupational Health, and Patient Safety

Employee safety and occupational health staff are charged with providing a safe work environment for staff and a safe environment of care for patients and staff. In hospitals, patient safety staff focus on patients and the clinical outcomes associated with their hospital stay. Forging a close relationship with both staff safety and patient safety representatives is critical. When those responsible for staff and patient safety are already collaborating on issues, they may naturally work together in the interest of the SPHM program. During development and implementation of an SPHM program, their input can be valuable and should be pursued.

One of the most important contributions safety and occupational health staff members can make to the SPHM program is information on staff patient handling injuries in the facility. They will most likely be the source of accident reports for review, and they may assist in tracking injuries and developing reports for leadership. In addition, some safety staff members have formal education in ergonomics and may help facility coordinators understand the science of ergonomics and even assist in conducting ergonomic evaluations. Staff members who follow workers' compensation claims will also be helpful in pulling cost data for use in cost-benefit analyses.

That SPHM technology improves the quality of care for patients should pique patient safety interest and involvement in the SPHM program. These staff members can provide important data demonstrating the benefits of using SPHM equipment for patient outcomes, such as reductions in falls, skin tears, and other adverse patient events. This information may help the SPHM program manager make the case to further the SPHM program with application of more technology, as happened at a large hospital system in California.¹

Middle Management

Support or lack of support from frontline supervisors and other middle managers can make or break an SPHM program. Forging alliances and fostering good communication with these groups are essential. Always meet face-to-face and one-on-one with each of these key players to educate them and enlist their support. For successful program implementation, these managers must help the facility SPHM coordinator select patient care area peer leaders, allow employees to spend time performing their role as peer leaders, allow time for staff training on new equipment and SPHM program elements, and promote the ideals behind safe patient handling and mobility.

Frontline Staff

The time to introduce the concept of safe patient handling and mobility to frontline staff is early in the implementation process, not after the equipment has been introduced in a patient care area. A variety of techniques can be used to increase their awareness and interest:

- Provide an overview or awareness training prior to introduction/installation of the equipment.
- Have staff in each patient care area complete Tool 1: Perception of High-Risk Tasks Survey (in Appendix H: Patient Care Area Characteristics and Ergonomic Issues

Survey) by shift. Collate the results by shift and post them in each area.

- Ensure that staff members are involved in evaluating SPHM equipment during equipment trials and/or equipment fairs. Make sure they know their voices are being heard by having them complete the equipment rating survey forms in Appendix G: SPHM Equipment Evaluation and Selection.
- Involve as many staff members as possible in the patient care ergonomic evaluation process (see Appendix E: Patient Care Ergonomic Evaluation Process). Those who show keen interest may be good candidates for SPHM patient care area peer leaders.
- Implement SPHM safety huddles. Allow frontline staff to initiate these huddles when they feel it's necessary. Management **MUST** follow-through on staff recommendations generated during the safety huddles.

Education Staff

Because comprehensive training is critical for peer leaders and staff when a new SPHM program is introduced, inclusion of facility educators in training development is important. Who actually conducts and coordinates SPHM training varies from organization to organization. Remember to include educators for nursing, other medical, and facility staff, as training is required for all who move and handle patients—nursing staff, physical and occupational therapists, physicians, imaging technicians, and others.

Facility Procurement Staff

Communication with staff members responsible for organizational procurement and contracting must be involved early in an SPHM program for a number of reasons:

- Close association with procurement staff will help them understand why SPHM equipment must be selected with staff input rather than on a cost-only basis. (It is integral to

the philosophy of an SPHM program that staff who will use the SPHM equipment have input into purchase decisions as well as the program development process overall.)

- Include purchasing staff in preparations for equipment trials in a patient care area or during equipment fairs. Contracting staff usually make initial contact with vendors who will be asked to exhibit or test their equipment. (See Appendix H for information on holding equipment fairs and conducting equipment trials.)
- Purchasing or contracting staff are responsible for making the actual purchase of the equipment, but they may need the facility SPHM coordinator to develop a statement of work (SOW) or purchase order. Because facility coordinators often come from clinical backgrounds, this is new territory for them, and a good working relationship with contracting staff can be very helpful.
- Purchasing or contracting staff work with vendors all the time. They know how to make the best deals with them and how to follow appropriate organizational policies and procedures, most of which are unfamiliar to facility SPHM champions with clinical backgrounds.

Facility Management Staff

Facility management/engineering/project management staff members can be allies in implementation of an SPHM program in several ways, and it is important to have their involvement from the very beginning. Due to their expertise, they must be included, at minimum, in the activities discussed in this section.

Ergonomic site visit. It is important for facility management staff to accompany the patient care ergonomic site visit team as they walk through the facility and make recommendations for SPHM equipment. Facility management staff will be familiar with environmental issues (e.g., asbestos, lead) and structural issues that can affect lift track installation in certain areas. Knowing this information early in the planning process will ensure the structural integrity of the building is maintained if fixed lifts are installed.

Be sure to have facility management staff look at patient and toilet room space constraints and conflicts posed by existing ceiling-hung equipment. While they are with you, have them help find hidden storage areas. Often, it may be feasible to create additional storage for SPHM equipment and accessories by freeing up space that contains unused sinks or hoppers.

Equipment evaluations. Be sure to include facility management staff in equipment evaluations, and ask them to consider installation requirements and ease of maintenance and repair.

Lift installations. Facility management staff oversee the installation of fixed lift systems.

Equipment maintenance. SPHM equipment must be maintained in compliance with manufacturer requirements. Biomedical and/or facility management staff may be responsible for repair and annual maintenance of this equipment. An alternative to in-house maintenance is to contract with the manufacturer or a company that provides such services.

Environmental Services Staff

Environmental services staff will most likely be responsible for cleaning SPHM equipment in rooms where it is used, especially overhead lifts. From their point of view, installation of a lift system gives them “one more thing” to keep clean. Recognizing that reservations regarding a potential increase in workload are normal, work with these staff members to make this additional work as easy as possible.

Supply/Processing/Distribution Staff

SPHM equipment must be cleaned and distributed for easy access and safe use. Depending on the facility, supply/processing/distribution staff may be responsible for:

- Storing equipment and accompanying materials (e.g., slings, air mattresses)
- Laundering slings
- Cleaning SPHM equipment
- Distributing equipment to patient care areas as needed

Working with staff to develop well-thought-out procedures for these activities will improve the lives of all involved and facilitate use of SPHM equipment.

Infection Prevention Staff

Infection prevention professionals will ensure that SPHM equipment is suitable for its proposed use from an infection control standpoint and that disinfection/sterilization will be achievable. Bringing these staff into your planning process early will benefit both the SPHM program and the infection prevention effort.

Union Representatives

Union representatives, by definition, support staff rights and safety. For this reason, unions are generally very supportive of SPHM initiatives and can be significant partners in promoting a program with leadership and others.

As is their job, union representatives will be very protective of their workers and may want to review the method for selecting peer leaders to ensure that all who wish to become one are given an equal opportunity. Understandably, unions may resist collateral duty positions for peer leaders, not wanting to add responsibility without compensation or to overwork an employee.

Keep union representatives apprised of SPHM program activities from the beginning, and include union representation on your facility SPHM team.

Endnote

- 1 J. Celona, E. Hall, and J. Forte, "Making a business case for safe handling," presented at the 2010 West Coast Safe Patient Handling and Movement Conference.

Appendix Q

SPHM Program Elements

This appendix provides descriptions of the elements that make up a safe patient handling and mobility (SPHM) program.

Peer Leaders

Peer leaders have been identified as key to the success of an SPHM program.^{1, 2} These individuals obtain their expertise through extra training and through their work in the field. As staff resource persons and equipment “super users,” they are available to answer their co-workers’ questions about use of equipment and SPHM program elements. As well, in their role as mentors, their presence is crucial for staff compliance with use of SPHM equipment and tools.

A vital role of peer leaders is the transfer of knowledge. Knowledge transfer includes classroom and small group training as well as one-on-one training in the workplace. Safety huddles offer the opportunity to provide information to caregivers and for caregivers to relay their own expertise and knowledge. Peer leaders also serve as patient care area SPHM champions and, even more important,

as SPHM change agents in their areas, responsible for facilitating significant change in the way their co-workers perform their jobs. The value of peer leaders in this regard cannot be overstated. Finally, peer leaders can help assess how an SPHM program is progressing, and their feedback is critical to ensuring successful program implementation and sustainability. Appendix T: SPHM Peer Leader Care Area Activity and Program Status Log offers a means for capturing patient care area activity and SPHM program status in a peer leader's area of responsibility.

Although each is a leader in his or her own right, peer leaders as a group require a group leader, a role that should be assumed by the facility SPHM coordinator.³ Without someone in this position, peer leader programs tend to fade away, even if one or two facility peer leaders take on a broader leadership role. Without a dedicated program leader, the activity of peer leaders in patient care areas is usually limited and other SPHM program elements often lose their impact.

Peer leaders are frontline staff who work in patient care areas where patient handling and mobility occurs, including nursing units and imaging facilities, therapy areas, and other procedure and treatment areas. One peer leader per shift per care area is recommended to ensure availability around the clock. Because peer leaders may leave their care area, position, or organization, early thought must be given to succession planning to facilitate a smooth transition between peer leaders.

The VHA implemented a peer leader program as the first element in its SPHM program as a way to facilitate staff buy-in and assistance in program roll-out. Resources, such as an SPHM binder, app, or website with information specific to the care area to support peer leaders in program implementation, equipment tracking, and other SPHM issues, as well as other resources developed by the VHA are available in Chapter 7 of the VHA *Safe Patient Handling and Mobility Guidebook*. A comprehensive discussion of peer leaders is also found in *Safe Patient Handling and Movement: A Practical Guide for Health Care Professionals*.⁴

Safety Huddles⁵

At the VHA, after the SPHM peer leaders were in place, their first function was to train co-workers in the use of safety huddles. Safety huddles offer a venue for care staff to share ideas on patient/resident and staff safety issues, best practices, and solutions for problematic care area concerns. They provide a forum for reviewing near-miss and injury incidents with the goal of preventing their recurrence. Most important, they provide an opportunity for staff to both discuss problems and come up with solutions.

Brainstorming in a safety huddle is guided using these five questions:

1. What happened?
2. What was supposed to happen?
3. What accounts for the difference?
4. How could the same outcome be avoided in the future?
5. What is the follow-up plan?

Safety huddles do not gather information to serve as evidence for punishment; only solutions and recommendations are recorded. This approach facilitates candor and openness between staff members.

Some organizations, especially in the military, have used such knowledge transfer mechanisms very successfully. “After-action reviews,” as they are called in the military, are ingrained in the culture; consequently, few activities take place without an opportunity to debrief those who were involved in an incident and to review the incident with those who were not involved. The goal is to take information from one person or group and share it with others so that negative outcomes are not duplicated and positive actions are repeated.

The VHA found safety huddles beneficial in facilitating staff buy-in and achieving successful SPHM program roll-out. Safety huddle resources, such as a brochure and templates for collecting information, are found in Chapter 8 in the VHA *Safe Patient Handling and Mobility Guidebook*. A comprehensive discussion

of safety huddles and after-action reviews are found in *Safe Patient Handling and Movement: A Practical Guide for Health Care Professionals*.⁶

Patient Care Ergonomic Evaluations

After the VHA peer leaders were in place, ergonomic evaluations were conducted, and equipment recommendations were generated based both on information gathered from patient care area staff and the characteristics of the patient population of the care area under consideration. These recommendations were general ones, such as recommendations for ceiling lifts, sit-to-stand lifts, or air-assisted lateral transfer devices, and usually did not specify a particular company unless a one-of-a-kind piece of equipment was required. See Appendix E: Patient Care Ergonomic Evaluation Process for more information. Ergonomic evaluations are also discussed in Chapter 3 in the VHA *Safe Patient Handling and Mobility Guidebook*.

Patient Handling Equipment

Once a health care organization has decided to employ SPHM equipment, the next step is to choose, acquire, install, and introduce the equipment. After the equipment is in place, it is important to ensure staff are compliant in its use.

Selection. It is well-known that SPHM equipment and aids are key to reducing the risk of injury for caregivers and patients, improving the quality of care for patients, and increasing mobilization of patients. However, if the equipment is not appropriate for the patient population or is not easy to use, its purchase may turn out to be a costly mistake. For this reason, after general types of equipment have been decided on through the patient care ergonomic evaluation (PCE) process, staff should try out the equipment to determine what brand is the best for their patient population and the most user-friendly for them.

Equipment fairs and equipment trials ensure staff participation in the equipment selection process, which promotes staff acceptance

of the equipment and SPHM program. See Appendix B: SPHM Equipment Categories for descriptions of different types of equipment and Appendix G: SPHM Equipment Evaluation and Selection for information on making equipment purchase decisions. Chapter 2 also provides important design considerations for selecting equipment.

Procurement. Procurement staff are essential to the SPHM equipment purchasing process. Usually, contracting staff make the initial contact with vendors whose SPHM equipment is of interest, and they are involved in organizing testing of SPHM equipment during equipment fairs and patient care area trials. Procurement staff are ultimately responsible for making the actual purchases, but they should always work with SPHM coordinators to ensure the equipment identified for purchase is appropriate. Due to the great variability in procurement criteria and activities between organizations, it is best to connect with your purchasing department to ensure organizational policies are followed.

Introduction/installation. During this phase some or all of the following activities will take place, depending on whether the equipment is fixed or portable:

- Coordinate installation and/or arrangements for maintenance with facility management.
- Coordinate with supervisors/staff in areas where installation will occur.
- Confirm receipt of correct equipment.
- Check installation of correct equipment in correct patient care area.
- Check for satisfactory completion of installations. (See Appendix L: Checklists for Installation and Maintenance of Ceiling-Mounted Patient Lifts for a checklist to support safe lift installations.)

Maintenance/repair of equipment. Lift equipment should be on a recurring maintenance schedule and, if feasible, maintenance staff should be trained on its repair and how to handle emergency

situations. Organizations may use their own trained staff to maintain SPHM equipment, or they may opt to purchase a maintenance contract from the manufacturer or a manufacturer-approved company. Appendix L provides direction to make sure overhead lifts are ready for safe use after maintenance.

Compliance in use. Implementation of the SPHM program support measures described in this appendix should ensure staff compliance in use of equipment. However, to help management facilitate user compliance, technology is available to measure use of SPHM equipment. Software modules with key metrics associated with a lift's usage are available for viewing by management from any device with an internet connection. This allows management to follow macro trends in lift use at any time or to drill down to a particular room to check on lift usage if key circumstances are associated with that room's admission (e.g., patient weight, dependent mobility level). Such software reporting helps optimize resource planning and provide key data to support the SPHM program.

Each organization will have its own methods for facilitating the above activities. For a successful SPHM program, it is critical for SPHM facility coordinators to be familiar with them and to have in place those very important working relationships with facility management and other stakeholders. More information on selecting SPHM equipment and introducing it in a facility can be found in Chapter 4 of the VHA *Safe Patient Handling and Mobility Guidebook*.

Patient Assessment, Algorithms, and Care Planning for Safe Patient Handling and Mobility

Research has been conducted to identify patient handling and mobility tasks that put caregivers at greatest risk for injury; see Appendix A: High-Risk Manual Patient Handling Tasks by Patient Care Area for more information. These tasks have been the focus for development of ergonomic clinical algorithms and guidelines that recommend equipment interventions to decrease the risk of injury.

Before these algorithms and guidelines can be utilized, however, an

assessment should be completed to determine patients' handling, moving, and mobility needs.^{7, 8, 9} When combined with algorithms specific to each type of high-risk task, such assessments help staff select appropriate patient handling and mobility technology for each patient's needs. Then, in care areas where patients' clinical status is relatively constant, written recommendations are generated to facilitate consistency in transfer of information from staff to staff and shift to shift.^{10, 11, 12} In care areas where patients' clinical status changes rapidly, education on the algorithms and guidelines is important, and suggestions for making them readily available when needed include posting them in patient rooms or break rooms or hanging laminated copies on SPHM equipment.

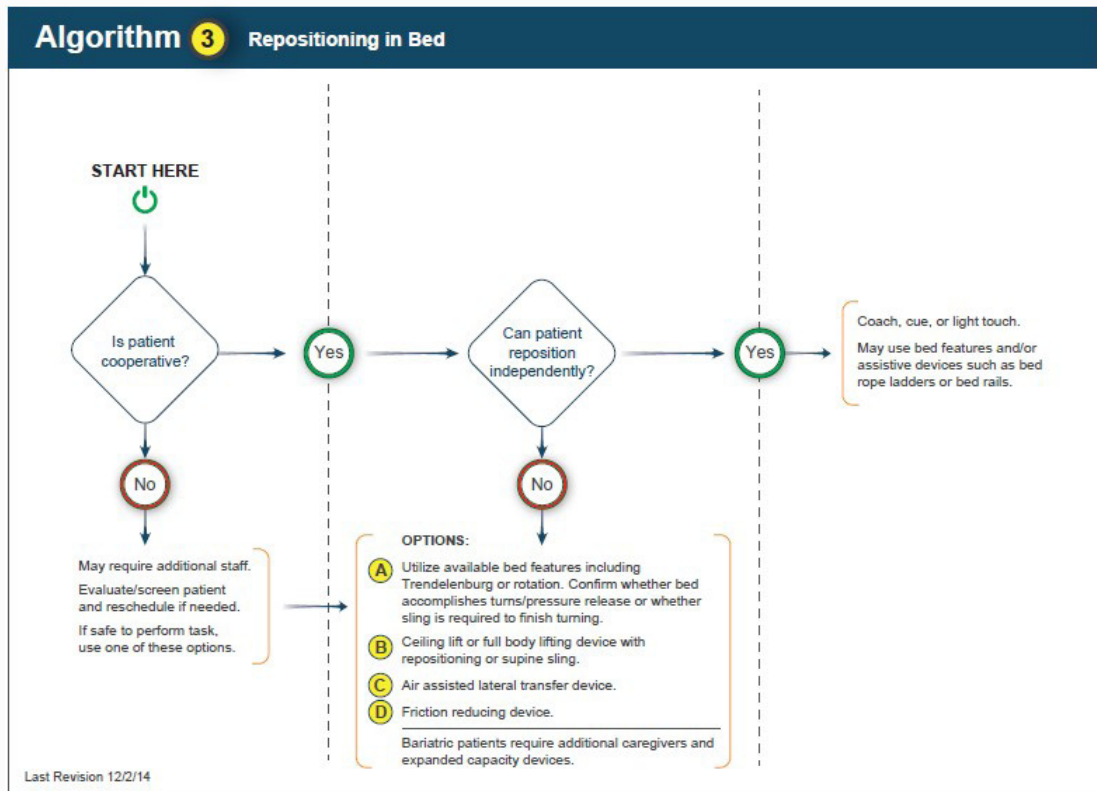
After SPHM equipment was introduced and staff trained, the VHA program put "patient assessment, care planning, and algorithms for safe patient handling and mobility" (the algorithms) into practice to help staff select the most appropriate SPHM equipment for each high-risk task based on specific patient characteristics and requirements.¹³ The original patient assessment tool and algorithms were significantly revised in 2014. The algorithm for each high-risk task has a full page of notes associated with the task. These notes are either specific to the task, general to all SPHM tasks, or focused on care of individuals of size. These revised algorithms and notes and patient assessment information are found in Chapter 5 of the VHA *Safe Patient Handling and Mobility Guidebook*.

Following are the revised algorithms developed by the VHA and published in its *Safe Patient Handling and Mobility Guidebook*; see Figure Q-1 for a sample application of one of the revised algorithms.

- Algorithm 1. Transfer to/from seated positions: bed to chair, chair to chair, chair to exam table
- Algorithm 2. Lateral transfer to/from supine positions: bed, stretcher, gurney, procedure table
- Algorithm 3. Repositioning in bed
- Algorithm 4. Reposition in chair: wheelchair, dependency chair, or other chair
- Algorithm 5. Transport in bed/stretcher/wheelchair

- Algorithm 6. Toileting
- Algorithm 7. Showering and bathing
- Algorithm 8. Floor/fall recovery
- Algorithm 9. Transfer between vehicle and wheelchair, powered wheelchair, or stretcher
- Algorithm 10. Ambulation
- Algorithm 11. Patient handling task requiring lifting of extremities
- Algorithm 12. Bariatric patient handling task requiring access to abdominal area
- Algorithm 13. Bariatric patient handling task requiring access to perineal area

Figure Q-1: Sample Revised Algorithm—Repositioning in Bed



From Chapter 5, Patient Assessment, Care Planning, and Algorithms for Safe Patient Handling and Mobility, in the VHA Center for Engineering & Occupational Safety and Health's *Safe Patient Handling and Mobility Guidebook*.

Since the initial VHA algorithms were introduced, staff with expertise in specific patient care areas have found they need ergonomic guidelines that are individualized for their care areas and patient characteristics. As a result, the Association of periOperative Registered Nurses (AORN)¹⁴ and the National Association of Orthopedic Nurses (NAON)¹⁵ developed ergonomic guidelines and algorithms. The current versions of both the AORN and NAON algorithms are shown in the sidebar.

The VHA, NAON, and AORN algorithms and ergonomic tools were designed to help caregivers determine the most appropriate SPHM equipment and technique for a specific patient handling task. However, caregivers also needed a tool designed to identify patient mobility deficits or challenges prior to attempting patient/resident handling tasks. The Bedside Mobility Assessment Tool (BMAT) facilitates this (see Figure Q-2).

The BMAT is a validated nursing assessment tool¹⁶ designed to identify patient weakness and prompt caregivers to select the most appropriate equipment to safely mobilize the patient early and often. The BMAT has four levels of patient mobility defined by ability to complete these actions:

AORN and NAON Algorithms

After the VA developed and implemented ergonomic guidelines (algorithms) for high-risk SPHM tasks, NAON and AORN developed ergonomic tools and algorithms specific for orthopedic and surgical high-risk patient handling and mobility tasks.

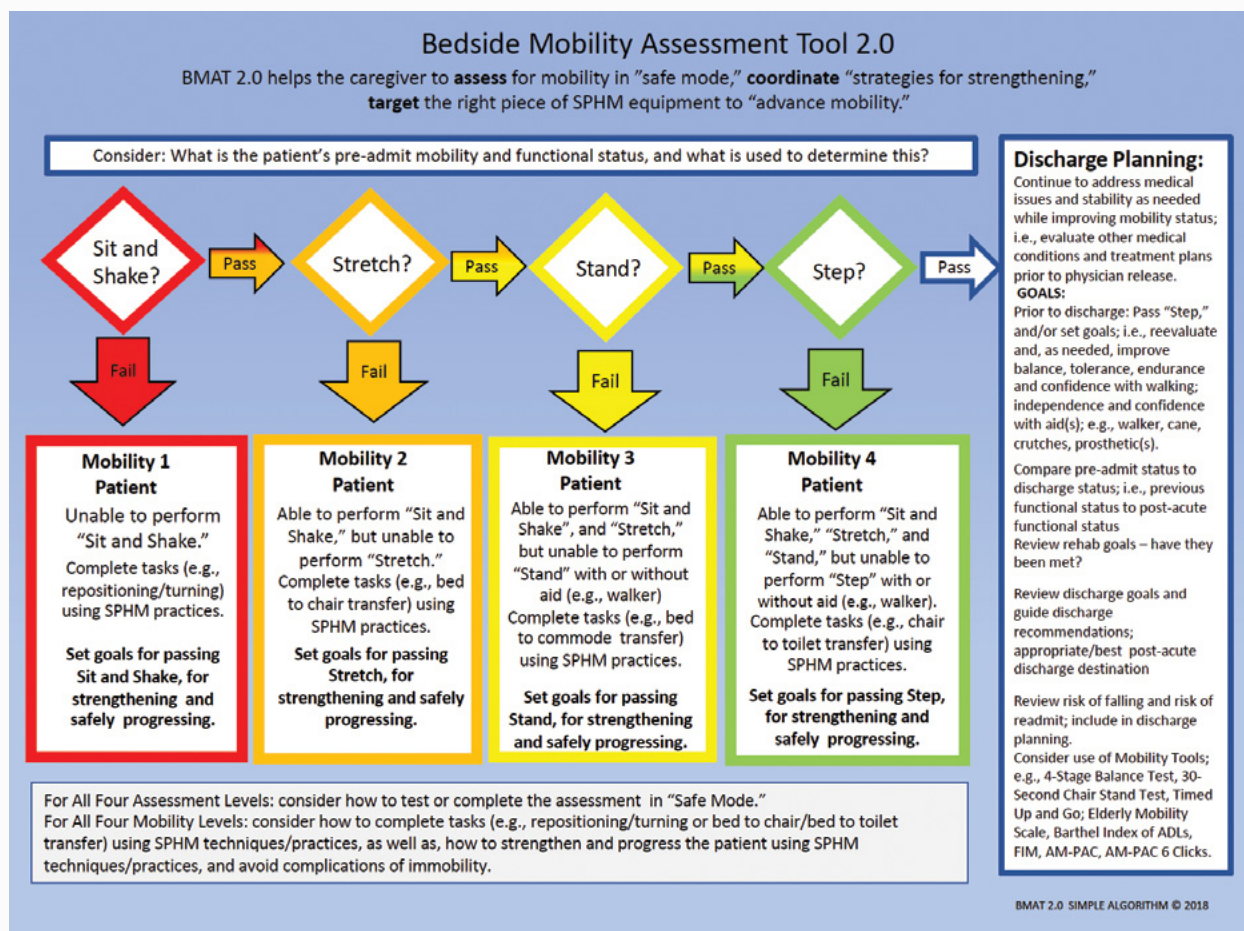
Safe Patient Handling and Mobility Algorithms for Adult Orthopaedic Patients

- **Algorithm 1** – Repositioning in Bed
- **Algorithm 2** – Vertical transfer of an orthopaedic patient with or without upper or lower extremity precautions
- **Algorithm 3** – Vertical transfer of an orthopaedic patient with an extremity cast/splint
- **Algorithm 4** – Ambulation

Ergonomic Tools for Perioperative Safe Patient Handling and Movement

1. Lateral transfers
2. Positioning/repositioning on OR bed
3. Lifting and holding legs, arms, and head
4. Prolonged standing
5. Retraction
6. Lifting and carrying supplies/equipment
7. Pushing, pulling, and moving wheeled equipment

Figure Q-2: Bedside Mobility Assessment Tool



Hillrom

1. Sit and shake.
2. Stretch (e.g., straighten leg/extend knee and perform ankle pumps).
3. Stand.
4. Step (march in place, advance step and return).

Each level requires the patient to perform a physical task or tasks, during which the individual's strength, coordination, balance, tolerance, and ability to follow directions are assessed. Patients who cannot perform the task stay at the lower ability level, while patients who can perform the task advance to the next level. If a patient is responsive, the assessment can be performed as part of routine physical and cognitive screenings.

The BMAT has been implemented at numerous hospitals throughout the United States as well as internationally and has shown promising benefits. Noted have been increases in standardized use of SPHM equipment; decreases in staff injuries; decreases in patient falls; timely, accurate referrals to rehabilitation services; and improved communication between nurses, aides, physical and occupational therapists, and ancillary services (e.g., imaging, transporters) regarding the safest methods for transferring and mobilizing a patient. The BMAT is used with critical care patients as part of an early, progressive mobility program and across the continuum of care with medical/surgical, orthopedic, and oncology patients and with patients on other units and in other settings. For further information on the BMAT, its fee-free licensing agreement, or training in its use, visit www.hillrom.com.

Others have also developed tools to assist caregivers in determining the most appropriate technology and techniques to use for individual patients/residents.¹⁷ Although the American Physical Therapy Association (APTA) does not have its own specific algorithms, APTA educational materials that relay how to safely move patients from the therapy perspective, plus other information, can be found at <http://www.apta.org/SafePatientHandling/>.

Safe Patient Handling and Mobility Policy

An SPHM policy ties all of the SPHM program elements together and gives strength to the program. Such a policy is developed prior to equipment introduction but cannot be put into practice and enforced until the SPHM equipment is in place and staff have been trained on its use and on program elements. A policy template can be found in Chapter 10 of the VHA *Safe Patient Handling and Mobility Guidebook*.

Lift Teams

A lift team has been defined as “two physically fit people, competent in lifting techniques, working together, using mechanical equipment to accomplish high-risk patient transfers.”¹⁸ However, lift teams

are often understood to be a team of (usually) men whose job is to manually lift and move patients. When such an *incorrect* interpretation of a lift team is the standard, staff involved are placed at great ergonomic risk. True lift teams are those with special education in patient handling and mobility and the use of SPHM technology. They are mandated to move patients only with proper patient handling assistive devices—never manually.

When properly implemented, lift team programs can be quite successful and allow busy nursing staff to complete nursing tasks other than moving and lifting patients. However, lift teams must be adequately staffed so their help and expertise is available on all shifts and in all locations of a hospital when needed. Otherwise, if nursing staff must expedite a patient transfer without the lift team (either before the team arrives or because the team is busy elsewhere), the result may be detrimental to the patient and/or to the staff member. The staff member may not have experience using the SPHM equipment on a day-to-day basis and thus use it without full competence, or choose to manually perform the patient handling activity.

With inadequate lift team staff, both staff and patients are at risk. However, hospitals with adequate numbers of lift team staff can make this approach work.

Endnotes

- 1 M. Matz, "Unit-based peer safety leaders to promote safe patient handling," in A. L. Nelson, ed., *Handle with Care: Safe Patient Handling and Movement* (New York: Springer Publishing Company, 2005).
- 2 H. Knibbe, "Ergonomic approach in the Netherlands: Experience," a presentation at the 5th Annual Safe Patient Handling and Movement Conference, St. Pete Beach, FL, 2005.
- 3 M. Matz, "Patient handling (lifting) equipment coverage and space recommendations" (Internal VHA document presented to Director, VHA, Occupational Health Program, 2007).
- 4 Matz, "Unit-based peer safety leaders to promote safe patient handling."
- 5 M. Matz, "After-Action Reviews" in A. L. Nelson, ed., *Handle with Care: Safe*

Patient Handling and Movement (New York: Springer Publishing Company, 2005).

- 6 M. Matz, "After-Action Reviews."
- 7 S. Hignett et al., "Evidence-based patient handling: systematic review," *Nursing Standard* 17, no. 33 (2003):33–36.
- 8 U.S. Veterans Health Administration, Center for Engineering and Occupational Safety and Health *Safe Patient Handling and Mobility Guidebook* (2016).
- 9 A. Nelson et al., "Algorithms for safe patient handling and movement," *American Journal of Nursing* 103, no. 3 (2003):32–34.
- 10 A. L. Nelson, ed., *Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement* (U.S. Department of Veterans Affairs, 2001).
- 11 Nelson et al., "Algorithms for safe patient handling and movement."
- 12 Ibid.
- 13 Nelson, *Patient Care Ergonomics Resource Guide*.
- 14 AORN Workplace Safety Taskforce, *Safe Patient Handling and Movement in the Perioperative Setting* (Denver: Association of periOperative Registered Nurses [AORN], 2007).
- 15 C. A. Sedlak et al., "Development of the National Association of Orthopaedic Nurses guidance statement on safe patient handling and movement in the orthopaedic setting," *Orthopaedic Nursing*, Supplement to 28, no. 25 (2009):2–8.
- 16 T. Boynton et al. "Implementing a mobility assessment tool for nurses: A nurse-driven assessment tool reveals the patient's mobility level and guides SPHM technology choices," *American Nurse Today* (September 2014):13-16.
- 17 J. Gozzard, "Scoring System Helps Choose Approaches and Devices for Safely Moving Patients, Leading to Fewer Staff Injuries and Lost Work Days," Service Delivery Innovation Profile published on the AHRQ website (2012). Accessed 8/6/19 from <https://innovations.ahrq.gov/profiles/scoring-system-helps-choose-approaches-and-devices-safely-moving-patients-leading-fewer>.
- 18 E. J. Meittunen et al, "The effect of focusing ergonomic risk factors on a patient transfer team to reduce incidents among nurses associated with patient care," *Journal of Healthcare Safety, Compliance and Infection Control* 2, no. 7 (1999):306–12.

Appendix R

SPHM Training Curricula Suggestions

This appendix provides suggestions for safe patient handling and mobility (SPHM) curricula for clinical staff, peer leaders, and facility coordinators. However, in each group there will be SPHM novices, competent practitioners, experts, and mentors. Therefore, each training session should be targeted to meet the needs of its audience and their competence level.

Staff

All staff members who move and handle patients should participate in SPHM staff awareness training. This training should include basic information about the rationale for using SPHM equipment, SPHM program elements specific to the facility's program, and available tools and resources. Various types of SPHM equipment, including lifts/slings, lateral transfer devices, motorized stretchers, and repositioning aids, should be shown and discussed. Training should also include information on sling selection and use as well as care for individuals of size.

If there is time and equipment is available, demonstrate a few key pieces of equipment during training sessions, knowing that further training will be provided for proficiency. Facility coordinators or education staff will be responsible for conducting competency training and verifying staff members' skills.

Staff SPHM awareness training objectives: On completion of a training program, participants should be able to:

- Explain why SPHM equipment must be used instead of manual techniques.
- Select the appropriate piece of equipment and slings for patients with a variety of medical and physical conditions.
- Describe the elements of the facility SPHM program.
- Provide safe and sensitive care to individuals of size.

SPHM Peer Leaders

Peer leaders should be offered special training that is more in-depth than staff training. This training should provide more detail, including scientific evidence for instituting SPHM programs (e.g., ergonomics, SPHM research outcomes) and the importance of thinking through the best and most sensitive approaches when using SPHM equipment with patients, especially individuals of size.

Peer leaders should have opportunities to practice use of SPHM program elements that are part of the facility's program. Sling selection and use should be covered, and various types of SPHM equipment should be demonstrated. Peer leaders should practice using the equipment.

In addition to the SPHM information provided, peer leader training programs should address these subjects: adult education, change management strategies, and coaching techniques. In particular, make sure peer leaders are aware of tools and resources that will facilitate their coworkers' acceptance of the program as well as promote safe patient handling and mobility.

Peer leader SPHM training objectives: On completion of this training program, participants should be able to:

- Relay the rationale for implementing an SPHM program.
- Describe the elements of the facility's SPHM program.
- Identify ergonomic and other hazards in health care environments.
- Explain the relationship between ergonomics and risk from patient handling and mobility activities.
- Facilitate the support processes needed for an effective program.
- Select and safely use the appropriate piece of equipment and slings for patients with a variety of medical and physical conditions.
- Institute strategies for safe and sensitive care of individuals of size.
- Apply change strategies to facilitate co-worker adoption of SPHM behaviors.
- Effectively coach and train co-workers.

Peer leaders will become SPHM equipment “super users” in their patient care areas. To attain this designation, peer leaders need hands-on training in the use of equipment. The best resources for this are equipment manufacturers, but such involvement is not always possible. Facility champions or care area peer leaders with advanced expertise may need to take on this training role.

Facility coordinators or education staff will be responsible for conducting competency training and verifying the skills of peer leaders. A sample template for tracking staff competencies can be found in Chapter 9, Enclosure 03, of the VHA's *Safe Patient Handling and Mobility Guidebook*.

SPHM Facility Coordinators

SPHM facility coordinators must be able to relay information required to train staff and peer leaders, and thus must have a higher level of knowledge than either. Such information can be obtained from this white paper and from journal articles, books, websites, and conferences. Training through conference attendance or by having on-site training with an experienced SPHM trainer/consultant is highly recommended.

The VA developed a successful mentorship program for new facility coordinators. Experienced facility coordinators near the same geographic area acted as mentors for the new coordinators. Often, they visited each other's home site and transferred information face-to-face, but also through many other communication modes.

For small health care systems or those with a single facility, experienced SPHM program managers may be available in the same area (or in other parts of the country) who are willing to act as a mentor/coach.

See Chapter 6, Resources, in this document for resources for SPHM facility coordinators/program managers. Of these, two VHA guidelines are highly recommended: the *Safe Patient Handling and Mobility Guidebook* and the *Bariatric Safe Patient Handling and Mobility Guidebook: A Resource Guide for Care of Persons of Size*.

Appendix S

SPHM Program Marketing Activities/Strategies Aimed at Staff

As noted elsewhere, safe patient handling and mobility (SPHM) efforts affect most areas of a health care facility and most areas of a health care facility influence the SPHM program. Despite this intertwined relationship, many employees of such facilities are not aware of the importance of an SPHM program. Marketing it to clinical staff and others will foster overall knowledge and understanding of the SPHM program and ultimately facilitate program success.

Peer Leader Patient Care Area Walk-Through

- Planning for a walk-through:
 - Identify/develop activities to include during the walk-through.
 - Determine date/time/length of activity.
 - Request peer leader participation in activity from supervisor.
 - Advise supervisors of date and time.

- Write down questions for peer leaders to ask staff during a walk-through.
- Order T-shirts or pins for peer leaders to wear.
- Order awards to give for knowledge and participation.
- Walk-through activities:
 - Walk through patient care areas.
 - Ask staff questions about equipment use and usability.
 - Ask staff if they have any equipment or related issues.
 - Conduct an activity that reinforces SPHM policies and equipment use.
 - Give rewards for answering questions correctly, etc.
 - After a walk-through, discuss findings with peer leaders, nurse managers, the SPHM facility team, demonstrating correct use of equipment, etc.

Vendor Equipment Fairs

See Appendix G: SPHM Equipment Evaluation and Selection for details on how to organize and hold vendor equipment fairs.

Skills/Equipment Fair

Skills/equipment fairs often take place during national nurses' week, but can be held at any time. These can be generic for a variety of nursing functions or specific to safe patient handling and mobility. They can provide a venue for staff who are not familiar with particular SPHM equipment to see the items and try them out. Skill checkoffs can be completed and competencies tested during such fairs.

Bulletin Boards

Post the following types of information throughout the facility and note peer leader involvement:

- Facility/patient care area patient handling injury data and injury reduction goal
- Results from the care area staff's completion of the Perception of High-Risk Task Survey Tool (in Appendix H: Patient Care Area Characteristics and Ergonomic Issues Survey)
- SPHM algorithms for determining equipment needs
- Photos of peer leaders
- Research data showing the effects of implementing an SPHM program
- Photo of nurse executive/administrator/staff in ceiling lift
- SPHM articles
- Quality data related to safe patient handling and mobility
- Information on conferences/meetings related to safe patient handling and mobility
- Safety huddle recommendations
- Best practices from peer leader meetings and other sources

Facility Newsletter/Emails

Write articles on a regular basis that promote peer leaders, the SPHM program, positive results from the program, and other information that reinforces its goals and successes.

Nurses' Week

Showcase peer leaders as part of Nurses' Week.

Letter/Email to Employees Launching Program

When an SPHM program is initiated, staff are likely to have seen co-workers appointed as peer leaders, been asked to complete SPHM surveys, and seen and heard when SPHM equipment has been installed or new portable SPHM equipment has been delivered to their area. They have probably heard many stories related to the

equipment and the program. Before the official launch of an SPHM program, then, it is helpful to squelch rumors and provide staff with information about why the program was implemented, what it will mean to them, and dates/times of any upcoming activities.

Open House after Installation is Complete

Hold an event to demonstrate a variety of lifts in use. Ask the facility director to be the first person lifted. Introduce facility peer leaders and the facility SPHM coordinator. Have the peer leaders speak about safe patient handling and mobility and its meaning to them. If implementation of the SPHM program is far enough along, tell stories of positive patient outcomes when SPHM equipment was used; otherwise, tell stories from other facilities. Provide refreshments.

Competitive Games

Set up games to engage staff in implementation of the SPHM program. Competition between patient care areas could be fun. Examples are:

- Game show
- Relay race
- Safe Patient Handling Jeopardy: Have peer leaders and staff write questions.

SPHM Walk

Organize a facility-wide “walk” for safe patient handling and mobility. This can be held indoors or outdoors. An award can be given to the patient care area with the most participants.

Promotion of Peer Leader Training

Prepare brochures, flyers, and posters to promote online and in-person peer leader training opportunities. Make sure the pieces include the following:

- Rationale for the training
- Content outline with brief description
- Notification of CEUs offered

Facility Peer Leader Video

Develop or produce a video for use in staff and peer leader training.

- Show the use of SPHM algorithms equipment (right way/wrong way).
- Keep the tone light-hearted and fun so the audience remains engaged.
- Medical media can be of help in producing and filming the video.

Promotional Items

Create promotional materials that will be recognized around the facility as related to the SPHM program. Suggestions include:

- SPHM program logo/title
- Peer leader logo/title
- Pins or stick-on notes saying things like “I got caught lifting safely,” “Lifting patients safely keeps staff healthy”
- Pens, pins, mugs, T-shirt, caps, buttons, banners, etc., with program logo
- Awards for attending the most peer leader meetings, being “caught” lifting safely, and other special contributions to the SPHM program

New Employee Orientation

This will be the first time new employees learn about the SPHM program so it is important to relay the value of the program.

- Involve peer leaders in development of SPHM information to be presented.
- Include information on the SPHM program, including the peer leader aspect.
- Have peer leaders conduct the SPHM training piece.
- Present this information to all new employees, not just those who will be working in patient care areas.

SPHM Poster to Promote Whole Program

- Include brief descriptions of your SPHM program elements.
- Use photographs of lifts and other equipment.
- Include pictures of peer leaders. This helps staff know who to approach if they are unsure of how to use a piece of equipment or need other SPHM assistance.
- Include quotes from patients/residents or staff.

Appendix T

Safe Patient Handling and Mobility Peer Leader Care Area Activity and Program Status Log

Patient care area: _____

Dates covered: Sunday_____ through Saturday_____ Peer leader: _____

Part I: Being a Peer Leader for Your Patient Care Area

1. Indicate the number of times during the past week:	NUMBER
a. One of your co-workers asked you for your advice about safe patient handling and mobility.	
b. You met in person with a nurse on a one-to-one basis about safe patient handling and mobility (SPHM) tasks.	
c. You met in person with staff in a group setting or meeting about SPHM tasks.	
d. You demonstrated the use of patient lifting equipment (e.g., portable or ceiling-mounted sling lifts, stand assist lifts).	
e. You demonstrated the use of other SPHM equipment (e.g., air-assisted lateral transfer and positioning devices, stand assist aids, transfer/dependency chairs).	
f. You were asked to deal with a problem in the operation of a lifting device.	

Part II: Other Activities Related to Being a Peer Leader

2. Indicate the number of times during the past week:	NUMBER
a. You demonstrated the use of the algorithms for safe patient handling and mobility or one of your co-workers asked you for your advice about SPHM equipment use.	
b. You were asked to evaluate a potential ergonomic/safety hazard in your patient care area.	
c. You performed an ergonomic hazard evaluation in your patient care area.	
d. You led a safety huddle.	
e. You participated in a safety huddle led by another.	
f. You attended activities related to being a peer leader, other than those listed above (e.g., meetings with a nurse manager, other peer leaders, the facility coordinator; training).	
g. You completed paperwork related to being a peer leader.	
h. You asked your nurse manager for support/info/help related to being a peer leader.	

Part III: Support and Interest

3. During the past week:	YES	NO
a. My nurse manager was enthusiastic about the Safe Patient Handling and Mobility Program and supported my efforts.		
b. Nursing co-workers were enthusiastic about the Safe Patient Handling and Mobility Program and supported my efforts.		
c. Patients, residents, and/or families were enthusiastic about the changes taking place or supported what they knew of our SPHM efforts.		

Part IV: Program Effectiveness

4. How effective do you think these SPHM program elements have been in preventing musculoskeletal incidents and injuries?						
	NOT AT ALL EFFECTIVE	SOMEWHAT INEFFECTIVE	NO EFFECT	SOMEWHAT EFFECTIVE	EXTREMELY EFFECTIVE	UNSURE
Patient care area peer leaders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety huddles/reviews	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of lifting equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ergonomic hazard analyses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safe patient handling and mobility policy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Algorithms for safe patient handling and mobility/bedside mobility assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix U

Safe Patient Handling and Mobility Equipment Use Survey

Patient care area: _____

Date: _____ Clinical staff: _____

How many times in a typical day would you say you use the following patient handling and mobility devices/aids?

1. Overhead/ceiling- or wall-mounted lifts

0-None 1 2 3-4 5-6 7-8 9-10 Greater than 10 N/A

2. Floor-based full-body sling lifts

0-None 1 2 3-4 5-6 7-8 9-10 Greater than 10 N/A

3. Sit-to-stand (stand-assist) lifts (powered)

0-None 1 2 3-4 5-6 7-8 9-10 Greater than 10 N/A

4. Stand-assist aids (non-powered)

0-None 1 2 3-4 5-6 7-8 9-10 Greater than 10 N/A

5. Transfer/stretchers chairs

0-None 1 2 3-4 5-6 7-8 9-10 Greater than 10 N/A

6. Air-assisted lateral transfer and positioning devices

0-None 1 2 3-4 5-6 7-8 9-10 Greater than 10 N/A

7. Friction-reducing devices

0-None 1 2 3-4 5-6 7-8 9-10 Greater than 10 N/A

8. Motorized stretchers

0-None 1 2 3-4 5-6 7-8 9-10 Greater than 10 N/A