Nevada Hospital Association

Safe Patient Handling and Mobility: A Toolkit for Program Development

Section 5
Hazard Control & Prevention
SPHM Solutions

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The ***Safe Patient Handling and Mobility: A Toolkit for Program Development*** offers comprehensive guidance and resources to assist hospitals and other healthcare organizations in establishing and sustaining effective safe patient handling and mobility (SPHM) programs.

The complete toolkit can be accessed at **https://www.nvha.net/safe-patient-handling-and-mobility-toolkit/**

Reproduction and Use of Materials

Hazard Control and Prevention – SPHM Solutions

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Hazard Control and Prevention – SPHM Solutions

Introduction

This Section provides information about primary Engineering and Administrative Controls that can be used to mitigate the hazards and risks associated with manual patient handling tasks while enhancing patient safety ***(Refer to Hierarchy of SPHM Controls in Section 1).***

Engineering controls are designed to isolate the worker from a hazard and reduce the risk of caregiver injury to as low as reasonably achievable.

Tools that Support Content in this Section

5a. SPHM technology purchasing checklist

5b. Sling safety checklist and tips for users

5c. Sling & hanger bar compatibility picture guide

5d. Sling inspection checklist

5e. Point-of-care pre-mobility safety check

5f. Ergonomics best practices for SPHM

The use of SPHM technology such as powered mobile patient lifts, ceiling or overhead-mounted lifts, and friction-reducing devices serve to reduce biomechanical load on the musculoskeletal system associated with manual patient handling. However, the effectiveness of SPHM technology to achieve this goal varies. Evidence supports that powered patient lift and transfer equipment are more effective in minimizing biomechanical demands related to manual patient handling than non-powered small aids such as sliding sheets. (AIHA, 2024; Frey & Davis, 2024).

SPHM Technology is the core component of a successful SPHM program however, having sufficient technology available does not guarantee that caregivers will use it. Effective utilization depends on having a comprehensive ongoing SPHM program supported by a systemwide culture of safety to address and mitigate the risk of work-related musculoskeletal disorders (WMSDs).

Administrative controls are also a key program component that must be implemented to facilitate safe use of SPHM Technology. Administrative controls do not eliminate or change a hazard, but aim to reduce the duration, frequency, or intensity of exposure to hazards through changes in work practices.

This section reviews SPHM mobility assessment protocols that help plan safe care and choose suitable technologies to meet patients' mobility needs.

Other administrative controls are addressed in other sections of this Toolkit and include:

- Using unit-based SPHM champions/peer coaches to support change in caregiver behaviors i.e., to use SPHM technology and ergonomics work practices appropriately ***(Section 4).***
- Written SPHM policy and supporting procedures that are actively and positively enforced, followed, and maintained ***(Section 4).***

- Education and training programs that are customized to stakeholders' job responsibilities and role within the SPHM program and facilitate caregiver use of SPHM technology and best work practices ***(Sections 4 & 6).***

This toolkit does not cover specific SPHM technology and practices for patient populations with specialized SPHM needs including patients of size, pediatrics, or those with dementia. Please refer to ***Section 10*** for informational resources related to these topics.

Engineering Controls

The following provides descriptions of general categories of SPHM technology, including their purpose and specific features.

Information provided includes:

- General description
- How and where the technology can be used
- Advantages and disadvantages
- Weight capacity
- Storage considerations
- Maintenance
- Cleaning
- Determining quantity needed
- Standards and regulations related to design and use

The categories of SPHM technology outlined here are not exhaustive. This information serves as a *guide* for assessing and selecting suitable SPHM technology for a variety of care settings.

It is *essential* to consult the manufacturer's instructions and equipment manuals when selecting, utilizing, and maintaining SPHM technology. Caregivers *must* receive proper training in the use of all SPHM technology.

Non-mechanical small assistive aids, such as bed ladders, bed poles, and turning discs, are not addressed in this section. For more information about non-mechanical assistive aids see the Home Health, Long Term Care, and Emergency Medical Services resources in ***Section 10.***

Selection of SPHM technology should occur *after you* have identified the patient handling related hazards to be addressed e.g., the type of lift, transfer, movement or patient care task, the needs of the patient population (physical and cognitive abilities and clinical needs), the physical environment where SPHM technology is to be used, and the work systems the equipment is used within ***(Refer to Sections 2 - 4).*** Strategies for choosing, purchasing, and implementing SPHM technology are discussed in ***Section 7.***

Table 5.1 provides a summary of the general categories of SPHM technology described in this Section that may be used for lifting, repositioning, transferring, and mobilizing patients together with examples of the activities they can be used for.

This section also covers additional categories of health care equipment that support SPHM-related activities including beds, stretchers, exam tables, transport assistive devices, stretcher chairs, and selected ergonomic hygiene equipment.

SPHM Technology → / Task ↓	Overhead Lift	Powered Floor Lift	Powered Sit-to - Stand	Non-Powered Stand Aid	Air Assist Transfer Devices	Friction Reducing Sheets	Transfer Boards
Patients who can provide limited or no assistance to mobilize[1]							
Repositioning in bed/ on exam or treatment surface (e.g., to head of bed, side to side/ turning for pressure relief and hygiene/ wound care tasks	**X** With supine/ repositioning sling	**X** May be used with supine/ repositioning sling under appropriate circumstances as determined by a risk assessment			**X**	**X**	
Holding a patient on their side for hygiene and other care tasks	**X** With turning/holding sling/bands	**X** *(See above)* With turning/ holding sling/bands					
Limb holding e.g., during wound care	**X** With limb sling	**X** With limb sling					
Lifting a pannus	**X** With a pannus sling						
Placing patients in a prone position	**X** With supine/repo-sitioning sling	**X** *(See Repo-sitioning above)* With supine/repo-sitioning sling			**X**	**X**	
Placing an x-ray plate under a who is in bed/on a stretcher/exam table	**X** With supine/repositi oning or seated style sling				**X**	**X**	
Lateral Supine Transfers	**X** With supine/repo-sitioning sling	**X** *(See Repo-sitioning above)* With a rigid stretcher sling (some models)			**X**	**X**	**X** Slider/ roller boards
Seated Transfers	**X** With seated style sling; with supine/ repositioning sling in reclined position to reclining chair	**X** With seat style sling					

SPHM Technology → / Task ↓	Overhead Lift	Powered Floor Lift	Powered Sit-to - Stand	Non-Powered Stand Aid	Air Assist Transfer Devices	Friction Reducing Sheets	Transfer Boards
Patients who can provide partial assistance to mobilize[1]							
Moving patient to edge of bed/treatment surface (in seated position)	**X** With limb sling to support leg(s)					**X**	
Standing Transfers	**X** With ambulation harness		**X**	**X**		**X** With ambulation harness	
Ambulation Including intubated patients as determined by a risk assessment	**X** With ambulation harness	**X** Some models of floor lift with ambulation harness.	**X** Some models	**X** Some models			
Rehabilitation Tasks *Various*	**X** Multiple tasks with appropriate sling[2]	**X** Seated transfer & ambulation	**X** Stand, sit & balance therapies	**X** Stand, sit & balance therapies		**X** Assist with seated mobility tasks	**X** Short boards seated transfer
Other Miscellaneous Tasks							
Fall Recovery With no spinal injury - *Also Refer to Fall Recovery* in this Section for information about other fall recovery technology	**X** With supine/repo-sitioning or seated style sling (no injury) Some models with a rigid stretcher sling if injury suspected	**X** If lift boom lowers close enough to the floor, with full support seated style sling (no injury) Some models with a rigid stretcher sling			**X** With air assist *lift* device		
Weighing a Patient	**X**	**X**	**X** Some models				
Vehicle Transfers	**X** With seated style sling	**X** Specialty models of floor lift with seated style sling	**X** (patient can partially bear weight)	**X** (patient can partially bear weight)	**X** With air assist *lift* device		**X** Full body (immobile patients). Short board for seated transfers

1. Refer to ***page 5-99*** and ***Figure 5.45*** for more information about selecting SPHM technology based on a patient's ability to mobilize.
2. Rehabilitation tasks include gait training with weight bearing adjustment; interactive balance training; sit-to-stand maneuvers; traversing stairs, and entry into and/or assistance during water therapy; range of motion exercises for limbs.

Table 5.1*. Overview of SPHM Technology Categories and their Patient Handling & Mobility Applications.*

Overhead Lifts

Source: Alpha Modalities

Overhead lifts (also known as ceiling lifts or hoists) were developed in Scandinavia and first introduced into healthcare applications in the early 1980s (Mechan and Wright, 2015).

Overhead lifts are considered the gold standard in SPHM technology due to their versatility, ease of use, efficiency, and minimal storage needs, in addition to significantly reducing injury risk for caregivers and facilitating early safe and progressive patient mobility. (Lee and Rempel, 2020; Latvala and Masterman, 2020).

Patient handling tasks that can be completed with overhead lifts are detailed in ***Tables 5.1*** and ***5.2.***

Note: The term overhead lift is used in this toolkit because these lifts can be mounted on an overhead track that is attached to the ceiling or walls or on a free-standing gantry system in a patient care area.

General Description

An overhead lift consists of a motor that is attached to an overhead track or support bar via a trolley or device with rollers that allows the motor to be moved along the track either manually by the user or via powered control.

A strap that can be raised and lowered mechanically, connects the motor to a hanger bar (also known as a spreader or carry bar). The hanger bar is connected to a sling, that is used to support the patient's body. The caregiver uses a handset controller to raise and lower the hanger bar to move the patient. ***Figure 5.1*** illustrates examples of overhead lift motors and basic components. Overhead lifts are powered using a rechargeable battery system.

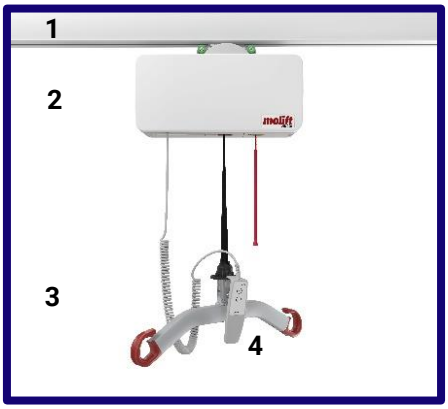
Some overhead lift motors incorporate the hanger bar or attachment points for a sling into the body of the motor ***(Figure 5.2).*** *Refer to* ***page 5-17*** *for information about hanger bars.*

The track system that supports the lift motor can be permanently connected to the building infrastructure in the ceiling, such as an I-beam or concrete floor or deck above the ceiling (ceiling-mounted) or attached to the structural components of a wall (wall-mount).

Overhead lift motors can also be connected to a free-standing gantry system that is composed of vertical supports and a support bar that can be placed over a bed or in a work area where patient care is to be provided.

An overhead lift motor that is mounted on a ceiling or wall-mounted system track or freestanding gantry system with a *single track* can only move in 2-directions (i.e., side to side) along the track.

XY Gantry or H-track overhead systems use a mobile traverse rail that is connected to two fixed tracks in the ceiling or on a gantry system, allowing the motor to be moved in 4 directions (i.e., side to side and front to back). This configuration increases functionality by allowing SPHM tasks to be performed in any location accessible to the lift motor within the range of the traverse track. ***Figure 5.3*** illustrates examples of how overhead track can be mounted in the ceiling or walls or free standing.



1. **Overhead track or rail**
2. **Lift motor**
3. **Hanger bar**
4. **Handset controller**
5. **Lifting strap**
6. **Sling attached to a hanger bar**

Figure 5.1 *Examples of Overhead Lift Motors and Basic Components Parts.*

Note: Design and location of controls vary by device manufacturer

Source: Etac/Molift; HumanFit, & Alpha Modalities

The size and orientation of the track system can be customized to fit the workspace such as a patient room, and the mobility needs of the patient population. For example, a track configuration with motor capacity up to 1000 lbs. to accommodate patients of size; or one that is installed to cross doorways or can follow a curve and/or change direction 90 degrees. *Examples of overhead track configurations are provided in* ***Table 5.5.***

Overhead lift motors may be *fixed*, that is, they cannot be removed from the overhead track unless for maintenance or repair, or *portable* where the motor can be detached from the overhead track and attached to a compatible ceiling/wall mount track or gantry system in another patient care room or area.

Portable motors can be useful in settings such as nursing or residential homes where need for use in one location maybe lower within a 24-hour period than in a hospital setting ***(Figure 5.4).***

Figure 5.2 *Overhead Lift with Integrated Hanger Bar.*

Source: Etac/Molift

1. **Ceiling mounted single track**

2. Ceiling mounted H-track

Source: Savaria

3. Wall mounted H-track

Source: HumanFit

4. Freed standing gantry with portable overhead

Source: Savaria

Figure 5.3 *Examples of Overhead Lift Track Mounting.*

Applications for Overhead Lifts

Overhead lifts can be used with a variety of sling types to allow caregivers to perform a majority of patient handling and mobilization tasks. They can be used to support patients who are dependent (passive) and need extensive assistance to be repositioned, lifted, or transferred, and to assist patients who are weight bearing and can participate in transfers (active) to meet mobility and rehabilitation goals.

Tasks that can be performed depend on the configuration of overhead track that the lift motor is mounted on, the style of hanger bar that is attached to the lift motor, the weight capacity of the lift system, and the type and design of sling available. Refer to ***page 5-41*** for information about slings.

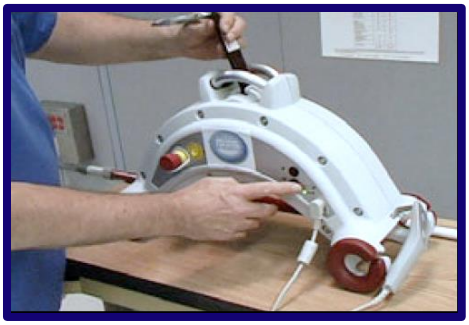


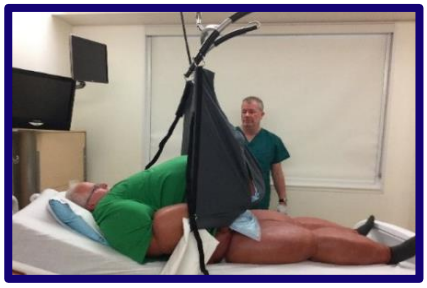
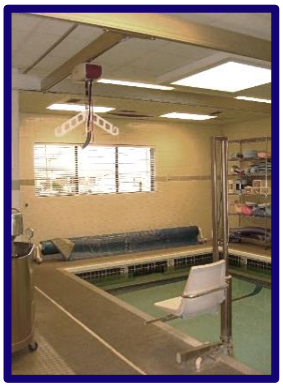
Figure 5.4 *Example of a Portable Overhead Lift Motor.*

Source: Etac/Molift

Table 5.2 summarizes the primary patient handling and mobility tasks that can be completed using an overhead lift with the appropriate sling that is designed for a specific task(s).

Overhead lifts can be installed in a wide variety of health care settings and environments ***(Refer to Table 5.3).***

Tasks Performed with Overhead Lifts	Tasks Performed with Overhead Lifts
Repositioning in a bed, other treatment surface and chair e.g., turning for pressure relief and hygiene/wound care tasks, boosting, moving a patient to/from supine or seated position in bed, to a sitting position on the edge of the bed, and cartridge placement for portable x-rays.  *Source: Guldmann*  *Source: HumanFit*	Limb holding during dressing changes; turning and holding a patient on their side for hygiene and other care tasks such as catheterization.   *Source: Baxter*
Lateral transfers in a supine or a semi-reclined position between two surfaces, e.g., bed and stretcher or exam table, bed and cardiac or other chair that is in a reclined position.   *Source: Alpha Modalities/ HumanFit*	Transfers in a seated position between two surfaces e.g., bed and chair, commode, or wheelchair; in and out of vehicles.  *Source: Baxter*

Tasks Performed with Overhead Lifts	Tasks Performed with Overhead Lifts
Fall recovery i.e., lifting a patient from the floor after a fall. *Refer to Fall Recovery on* ***page 5-81*** *for more information.*  *Source: Alpha Modalities*	Placing patients in a prone position.  *Source: Alpha Modalities*
Bathtub, shower and toileting activities.  *Source: Stock Image*	Supporting a panniculus to provide access for care tasks.  *Source: Alpha Modalities*
Standing transfers and ambulation.  *Source: Alpha Modalities/HumanFit*	Rehabilitation tasks such as, gait training with weight bearing adjustment; interactive balance training; sit-to-stand maneuvers; traversing stairs, and entry into and/or assistance during water therapy.  *Source: Guldmann*  *Source: HumanFit*

Not Shown – Weighing a patient. Lift motors can have scales incorporated in the motor or portable scale can be attached to the lift strap and hanger bar.

Table 5-2 *Examples of Tasks that can be Completed using an Overhead Lift.*

Healthcare Environments and Settings Where Overhead Lifts can be Used

Below are examples of healthcare environments where overhead lifts can be used if structural requirements permit.

Hospital Settings for example:

- Patient care units e.g., medical-surgical, intensive and cardiac care units, orthopedics, neurology/stroke etc.
- ED & Ambulance-vehicle bays

Source: Alpha Modalities

- OR
- Diagnostic imaging and treatment e.g., Magnetic Resonance Imaging (MRI) staging areas, Computer Tomography (CT), General Radiology (X-Ray), Radiation Oncology, Nuclear Medicine, etc.
- Procedural areas or suites, e.g., cardiac catheterization, gastrointestinal lab, infusion, dialysis, etc.
- Rehabilitation gyms
- Pediatrics

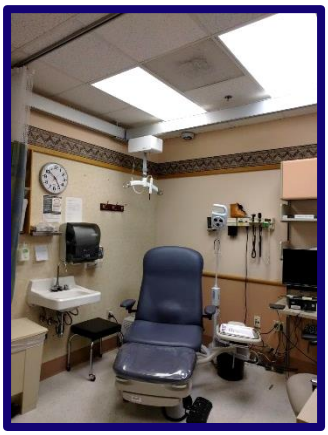
Source: Alpha Modalities

Source: Stock Image

Source: Stock Image

Healthcare Environments and Settings Where Overhead Lifts can be Used

- Labor and delivery
- Wound care and Hyperbaric Therapy



Source: VA, 2016

They can also be used in other healthcare settings, for example,

- Outpatient clinics
- Long-term care facilities e.g., in resident bedrooms, bathrooms and living and therapy areas
- Dental offices
- Home care and recreational vehicles
- Adult foster care
- Schools
- Mortuaries and funeral homes

Source: ARJO

Published research on the benefits of overhead lifts in hospital specialty departments and in non-hospital settings is detailed in ***Appendix A.***

Table 5.3 *Health Care Environments and Settings Where Overhead Lifts Can Be Used.*

Advantages of Using Overhead Lift Systems

Effectiveness at reducing the risk, incidence, and cost of WMSDS

The use of overhead lifts has shown to significantly reduce the incidence, severity, and costs, of WMSDs associated with patient handling and mobility (Abdul et al., 2023; Alamgir et al., 2008; Anyan et al., 2013; Chhokar et al., 2005; Jung & Bridge, 2009; Koppelaar et al., 2012; Miller et al., 2006; OHSA 2006; Ronald et al., 2002; Silverwood & Haddock, 2006; Tiesman et al., 2003; Vieira & Miller, 2008; Vinstrup et al., 2020).

Several studies indicate that overhead lifts are an effective and preferred solution to reduce caregiver injury when used as part of a multifaceted SPHM program (Weinel, 2008; Marras et al., 2009; Dutta et al., 2012; Lee & Rempel, 2020).

A study by Powell-Cope et al., indicates that increased access to overhead lifts, i.e., the number of beds with overhead lifts in a patient care area, is directly related to a decrease in WMSDs (Powell-Cope et al., 2014).

Overhead lifts reduce WMSD risk factors such as spinal compression and shearing forces more effectively than floor-based lifts. Floor lifts require greater application of force especially when moving a loaded lift over uneven or carpeted surfaces and/or in tight spaces ***(Refer to Floor-Based Lifts on page 5-30).***

Efficiency

There is evidence that overhead lifts require *less time* to complete patient transfers than floor-based lifts (Curran & Fray, 2019).

Efficiency is *improved* when using overhead lifts because they are accessible at point of care for caregivers to use in real-time, minimizing delays in patient care. They reduce the need to change workspace layout (i.e., move furniture etc.) which is required when using floor-based lift equipment so that it can be maneuvered around furniture and over floors. Floor lifts, unlike celling lifts, also require sufficient clearance under beds, stretchers and around chairs to be functional.

Overhead lifts eliminate the need for floor storage e.g., storage closet or alcove (Mechan, 2014; Alamgir, 2009; Latvala & Masterman, 2020; Lee & Rempel, 2020; Matz et al., 2019; Wiggermann et al., 2024).

As noted in ***Section 1***, time to retrieve SPHM technology is a key barrier to its use.

Wiggermann et al., reported that the 'use of ceiling lifts is particularly effective in supporting SPHM practices,' thereby enhancing caregiver adoption of SPHM protocols (Wiggermann et al., 2024).

The versatility of overhead lifts enhances efficiency compared to floor-based lifts or friction-reducing devices, which are limited in the range of patient handling tasks they can perform ***(Refer to Table 5.1).***

In some circumstances, overhead lifts may also allow for operation by a single caregiver (Dutta et al., 2012; Nightingale Hammerson et al., 2024). *Refer to Single-Handed Care in* ***Section 9.***

Anecdotally, it has been observed that overhead lift use is facilitated when:

- A repositioning sling remains under a patient in bed in a room with an overhead lift and
- Patients are boosted to the head of the bed with an overhead lift and repositioning sling while kept in a semi-reclined position (***Figure 5.5***). Once moved up in bed and with the patient lifted off the bed, turning is completed by placing pillows or wedges under one side of the patient prior to lowering the lift.

  Time to complete this task is reduced as the head of the bed *does not* need to be adjusted and intravenous lines and other medical devices that may be attached to the patient often require less management. In some cases, it was observed that caregivers can turn and boost dependent patients using this method in about *1 minute*.

  In comparison, the process of adjusting lines, lowering the head of the bed, positioning the bed in Trendelenburg to utilize gravity, manually repositioning the patient with a drawsheet, levelling the bed, raising the head again, and readjusting lines required approximately *4-5 minutes* to complete.

Figure 5.5 *Semi-reclined Position used for Boosting a Patient up in Bed Quickly or for Transferring a patient to a Reclining Chair or Stretcher.*

Source: Alpha Modalities

Overhead lifts may lower the risk of missed nursing care related to patient repositioning and ambulation due to their accessibility, ease of use and in some circumstances, the need for fewer caregivers.

Cost and return on investment

Research indicates that the return on investment (ROI) when installing overhead lifts is between 2 and 6 years, depending on whether only direct or both direct and indirect cost savings from fewer musculoskeletal injuries are measured. Indirect costs include items such as, the cost of temporary or permanent caregiver replacement, time to investigate incidents, and management of injury claims (Yassi et al., 2002; Chhokar et al., 2005; Joseph & Fritz, 2006; Alamgir et al., 2007; Dang et al., 2022).

A similar return on investment has been reported when implementing comprehensive SPHM programs that include overhead lifts and other SPHM equipment (Siddharthan et al., 2006). This is especially important considering that overhead lift systems can have a working life of 10 years or more if properly used and maintained.

Impact on patient outcomes

Research on patient outcomes related to the use of overhead lifts is limited. Alamgir et al., reported no positive or detrimental relationship was found between patient outcomes such as falls and pressure ulcers and overhead lift coverage, however, the use of overhead lifts was viewed as favorable by patients (Alamgir et al., 2009).

Weinel reported that patients rated overhead lifts to be comfortable, safe, and secure when used in a spinal cord injury unit at a Veterans Hospital (Weinel, 2008). Enos & Hess, 2011, reported similar findings when asking patients about their experiences prior to discharge from a Critical Access Hospital in Oregon (Enos & Hess, 2011).

Overhead lifts with the appropriate sling can safely mobilize patients of different physical and cognitive abilities, making them valuable for promoting safe, early, and progressive mobility and preventing patient falls.

Research shows that SPHM technology use in general is linked to positive patient outcomes, including fewer skin tears, less pain, improved dignity, better continence, and reduced aggression ***(Refer to Section 1)*****.**

Benefits for care of patients of size

Overhead lifts are recommended when caring for non-and partially mobile patients of size. Some models of overhead lifts have a load capacity of 1200 lbs.

Some floor-based lifts can support a load of 600-1000 lbs. but moving them under heavy loads requires more force and increases the risk of WMSDs ***(Refer to Floor-Based lifts on page 5-30)*****.**

More caregivers are often required when using a larger capacity floor lift and greater workspace is needed for safe maneuverability. They also require more storage space than regular capacity floor-based lifts (Muir & Archer-Heese, 2009; VHA 2015; Gallagher, 2015). Overhead lifts generally provide more clearance above beds, making repositioning and mobilization easier than with bariatric floor lifts, which may not have sufficient vertical lift clearance, or fit under bariatric beds or around chairs.

The Facility Guidelines Institute (FGI) Guidelines for Design and Construction of hospitals and outpatient facilities **(**https://fgiguidelines.org/**),** details specific requirements for designing patient care areas to

accommodate the patients of size including space required to perform SPHM tasks and the number of overhead lifts recommended (Matz, 2019).

Overall, several studies have indicated that overhead lifts are favored over floor lifts amongst nursing staff (Lee & Rempel, 2020; Dutta et al., 2012).

Overhead lifts offer key biomechanical and efficiency benefits, making them the preferred SPHM technology for addressing patient handling WMSDs whenever possible.

Disadvantages and Challenges with Installing and Using Overhead Lifts

Cost

The cost of purchasing and installing overhead lifts can be higher than purchasing other SPHM equipment such as floor-based lifts. This can be due to several factors including:

- The need to purchase an overhead lift for each patient room or treatment area versus using mobile floor-based equipment that can be moved from room to room. While portable overhead lift systems exist, they may be less convenient to move and transport than floor lifts.
- Overhead lift use is limited to the area of coverage, so other SPHM technology may be required for tasks outside their operational area.
- Structural deficiencies in existing buildings and especially in the overhead ceiling space, may prevent lift installation. For example, electrical wiring, HVAC systems, gas lines, sprinkler below the ceiling systems above the ceiling, and light fixtures, curtain and intravenous infusion support tracks, and fixed case work below the ceiling etc. These items can be costly to relocate to accommodate overhead lifts ***(Figure 5.6).***

Figure 5.6 *Examples of (1) Wall Mounted Equipment and Privacy Curtains and (2) Overhead Booms and Track that must be Considered when Installing Overhead Track.*

Source: HumanFit

- Other costs may include asbestos and lead abatement in older buildings, as well as compliance with life safety codes and state and/or local building code structural requirements e.g., seismic (earthquake) regulations.
- Installing overhead lifts in bathrooms within *existing* patient rooms is challenging, mainly because of fire code requirements and fire-rated walls between a room and the bathroom.

- The cost of obtaining architectural design drawings and installation permits also must be considered.

The cost of an overhead lift system also depends on the extent of lift coverage within a given room or area, and the features such as turntables that enable directional changes and access through doorways, which are needed to meet specific coverage and operational needs.

Other activities that should be considered when calculating the cost of installation include the time required to close patient rooms for lift installation and infection control requirements for terminal cleaning after installation.

For these reasons installing tracks in the ceiling or mounted on walls in an existing care area can be cost prohibitive or physically infeasible (Nelson et al., 2009). Thus, overhead lift installation in new facilities is cheaper than retrofitting older healthcare facilities ***(Refer to Section 9).***

Clearance and access

Sufficient vertical lift clearance

Whether overhead lifts are installed into ceilings or walls, or on freestanding gantry systems, there must be sufficient clearance to lift a patient fully off a bed or other transfer surface i.e., vertical clearance. Clearance needed is greater when lifting patients of size.

As a general rule, a minimum of 9 feet between the ceiling and floor is needed for overhead lift installation (VA, 2021). Items such as weigh scales attached to hanger bars, hanger bar configuration, combined lift motor and hanger bar dimensions, the ceiling installation method (recessed or suspended track), depth of traverse rail used e.g., jumbo or longer span rail, can all reduce lifting height. The height adjustability of beds and support surfaces should also be considered.

Challenges also occur when ceiling height differs between rooms where room-to-room tracking is desired. Vertical clearance and structural integrity of support surfaces required for lift installation can be especially challenging in older health care buildings and home environments.

Compatibility with other overhead-mounted equipment and bed accessories

Installing overhead lifts in other patient treatment or diagnostic areas such as the Operating Room and Diagnostic Imaging can be especially challenging when ceiling space is already taken with monitors, lamps, other vital equipment, and equipment tracks.

Other equipment compatibility considerations include safe use of an overhead lift with full bed trapeze frame apparatus or a bed that has a canopy attached to prevent patient falls. These fixtures limit physical access to a patient and often prohibit safe use of overhead lifts.

Other

Use with Certain Patient Populations

Overhead lift use is generally not advised in patient care areas such as Behavioral Health Settings and in acute care unit rooms that may accommodate suicidal or psychiatrically unstable patients. Overhead lifts and their support structures can provide a source of potential ligature points (Monaghan, 2011).

Overhead Lift Systems – Features and Configurations

Weight capacity

Individual overhead lift motors are available in a wide range of lift weight capacities from 350 lbs. to 1000 lbs. The common weight capacity for individual overhead lift motors in the US is 500-600 lbs.

For patients who weigh over 600 lbs., a single 1000 lbs. capacity motor mounted on one traverse rail or two 500 -600 lbs. overhead lift motors that are mounted on 2 separate traverse rails, can be used to perform SPHM tasks. Some overhead lift manufacturers utilize twin lift motors with individual hanger bars or with a shared hanger bar that are mounted on a rotatable turntable attached to the lift track. One handset typically controls the lift motors ***(Figure 5.7)***.

The advantage of a dual or twin motor system is that the patient position in space can be more easily adjusted, e.g., the patient's head and chest can remain elevated while keeping an open angle of the hips desired for patient comfort throughout a lift or transfer. This can be more challenging to achieve using a single-motor lift system.

Did You Know?

Weight Capacity

For the purposes of this document the weight capacity of SPHM Technology is the same as 'maximum load' which is defined by ISO 10535:2021 as the greatest permissible load that can be applied to a lift (excluding a sling), or a sling.

If the *maximum* load capacity of a sling, lift or hanger bar differ, the patient's weight *must not* exceed the *lowest maximum load capacity* of any of these individual component parts (ISO, 2021).

Charging

Overhead lifts are powered using a rechargeable battery system. Some systems require the lift motor and or the lift handset to be placed in a docking station to charge the battery. Others have an 'on-rail' charging system that allows the lift motor to be charged at a specific location on the rail.

Motors can be manually guided by the user to the charging station or on-rail charging location by moving the hanger bar, or by a powered return to charge that is activated via the handset lift controls. One disadvantage of a 'return to charge' design, is if the motor or handset does not 'dock' or sit correctly in the charging station, or the specific area for charging on the rail, the motor will not charge and thus may be unavailable for the next use.

This issue is avoided if continuous or 'on-rail' charging system is installed that allows a motor to charge in *any location* on the overhead rail to which it is connected. Continuous charging lift systems have become increasingly available in recent years. However, it is important that caregivers are trained *not to leave* the lift motor hanging where a patient can easily access it and inadvertently harm themselves.

Hanger bars

A hanger bar is used to connect a sling to either an overhead lift motor or a floor-based lift.

Hanger bars (also known as a spreader or carry bars) have rigid construction with more than one connection point, onto which a sling is attached. A hanger bar may attach to a flexible lifting strap that is attached to a motor or may be integrated with the lift motor itself ***(Figure 5.2).***

Hanger bars vary in shape and dimensions and the number of attachment points (also known as coupling points). They may have e.g., 2, 3, 4, 5, 6 and/or 8-point connections which vary in design (AASPHM, 2016). *Examples of different hanger bar styles and configurations are provided in* ***Table 5.4.***

Source: Baxter

Source: HumanFit

Figure 5.7 *Examples of (1) Dual Overhead Lift Motors on Rotating Turntable and (2) Dual Overhead Lift Motors Mounted on 2 Traverse Rails.*

The shape and width of a hanger bar can significantly affect patient positioning in a sling and should be considered when selecting a lift system.

Sling attachment methods also differ, for example loop style or key clip. Hanger bars are designed for use with loops or with clip attachments only. A sling with a clip attachment ***must*** only be used on a hanger bar that is designed for a clip attachment. A sling with a loop attachment ***must*** only be used on a hanger bar designed for a loop system ***(Refer to Slings on page 5-41)***.

Attachment points for slings must be designed to prevent inadvertent detachment of the sling e.g., use of a locking device. Locking systems should not cause a pinch or entrapment point for the user (ISO-10535:2021).

Sling and hanger bar compatibility is discussed in table 5.7 and in Appendix F.

Some hanger bars may be detached from the lift strap via have a quick release system which allows caregivers to use a wider choice of hanger bars depending on the task to be performed and patient needs.

The weight and size of detachable hanger bars affect how easily caregivers can swap them with other hanger bar styles.

Hanger bars that are designed for overhead lift with 1000 lbs. capacity can be larger and heavier than hanger bars used with lower capacity lifts. Storage requirements for larger hanger bars should also be considered. Providing a cart for storage and transportation minimizes manual handling of heavier hanger bars and may facilitate use.

Hanger Bar Configuration

Two-point hanger bars

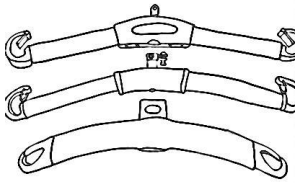
Hanger bars with 2-point attachment points. These are used with slings that have loop attachments only.

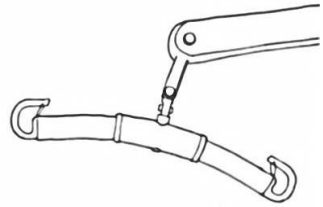
When used with a seated or repositioning style of sling, a 2-point hanger bars places the patient in a more 'closed or forward bent posture' which may not be comfortable for some patients e.g., patients of size or taller patients.

The width of a 2-point hanger bar influences how well a patient's shoulders can remain in a neutral position (to minimize discomfort) when being lifted and transferred especially when used with a seated sling.

Some 2-point hanger bars have adjustable width arms.

Portable overhead lift motors have 2 attachment points hanger bar integrated with the motor.



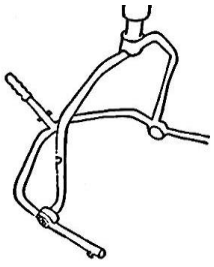


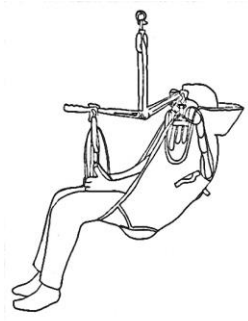
A portable motor with 2 integrated sling attachment points.

Source: Savaria

Four-point clip style hanger bars

This style of hanger bar is also known as a pivot or tilting hanger bar because patient positioning is adjusted i.e., to/from upright seated to a reclining position with the use of a 'handle' on the hanger bar versus having to adjust the length of the sling straps as is required with loop style slings. Some pivot style hanger bars have a powered positioning system which adjusts the patient's position. These hanger bars are more commonly found on floor-based lifts however, a few vendors also offer them for overhead lifts.





Seated or universal sling with key or clip attachments connected to a hanger bar with 4 attachment points for key or clip style slings.

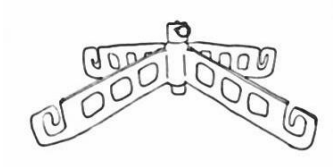
Hanger Bar Configuration

Four-point (H and X configurations) loop style hanger bars

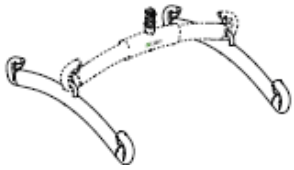
These hanger bars are used with slings that have loop attachments.

When using a seated or repositioning sling, a 4-point hanger bar lifts a patient in a more open posture. Some X-configuration bars have shorter and longer arms with variable widths to facilitate different lifting postures.

H-configuration hanger bars may have floating or fixed attachment arms.



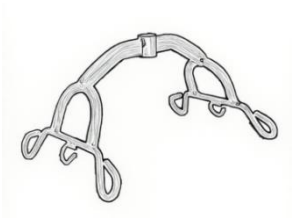
Hanger bars with 4 attachment points



Hanger bar with floating 4-point attachment

Multiple configurations (e.g., six, eight-point bar)

These hanger bars are used with slings that have loop attachments.



6-Point hanger bar

Source: Etac/Molift

Source: ARJO

Hanger bar with 8 attachment points used with a supine/repositioning sling

Table 5.4 *Examples of Hanger Bar Styles and Configurations.*

Overhead lift controls

An overhead lift motor may be operated via an electrically powered handset or an air supply (pneumatic function) handset. Handset controls may be attached to the lift motor or operated via wireless remote control. Overhead lift controls may be duplicated on a handset and on the motor itself e.g., emergency stop and emergency lower.

In accordance with ISO 10535:2021, the following are some of the essential controls and displays that must be present on any powered patient lift:

- An emergency stop, which allows the user to stop the motor if it does not function correctly and could pose a safety hazard. Emergency stop controls must be clearly identified and red in color, easily visible, and quickly accessible. Once activated, the emergency stop must remain engaged until manually reset, and the lift only restarts after a separate start signal is given.

  The emergency stop can also be used to lock out a lift motor to prevent use by patients and other non-caregivers as needed. However, it is important to note that in some designs of powered patient lifts, the lift battery *does not charge* when the emergency stop is activated.

- An emergency lowering function that is easily accessible to the lift operator which allows the user to lower the patient safely if the lift motor stops functioning e.g., the battery loses power.
- Power on, battery charging and low battery indicators.
- An automatic cutoff that prevents operation of the lift if the load exceeds 1.5 times the maximum load of the lift motor.

ISO10535:2021 also mandates the maximum velocity at which a hanger bar on any powered lift can be raised and lowered and stipulates other anthropometric requirements such as forces and torques for hands, arms, and feet that are required when operating a lift.

Tool 5a, SPHM Technology Purchasing Checklist lists the safety features that are required by ISO 10535:2021 that should be considered when selecting and purchasing an overhead lift system.

The integration of advanced computer chip technology in overhead lift systems has grown, offering a diverse range of features that improve system functionality.

Some or all of these features are available on various brands and models of overhead lifts and include:

- Angle sensors and limit switches to detect if the lift strap is used at an angle or is twisted etc.
- Integrated weigh scale
- Digital displays with built-in diagnostics that inform the end-user of technical errors and service reminders for preventative maintenance (PM) checks
- Lift counter to track use

Some manufacturers provide software to track lift usage and other metrics that can support SPHM program management.

Certain overhead lift manufacturers provide a feature enabling the caregiver to move the overhead lift motor along the traverse rail or track using powered controls. Some lift systems also include powered movement for the traverse rail in H-track configurations.

There are potential benefits and disadvantages of both the manual and the powered options. In laboratory and field studies conducted at the James A. Haley Veterans' Hospital in Tampa, staff preferred the two-function (up/down) lifts. Manually moving a motor along the overhead track was found to require minimal effort and allows the caregiver to maintain exact control over the speed of movement and positioning of the motor.

A powered return to charge option reduces potential physical effort required by the caregiver that can be experienced when manually moving the motor. This function allows independent transfers for some able patients e.g., in the home setting. However, the studies conducted at the Veteran's Health Administration showed that when offered the multi-functional systems with powered tracking, the nurses actually

worked against the motor and pulled the motor/lift because the powered tracking was too slow (VHA, 2016).

Overhead Lift Track Configuration

There are many types of lift track configuration. Choice of configuration depends on the existence of structural deficiencies and the intended function of the overhead lift system.

Refer to ***Table 5.6*** for more information about space requirements for overhead lift installation and other considerations related to track configuration. The table below summarizes common overhead track configurations **(**Nelson, 2009, Alamgir, 2009, Matz, 2019).

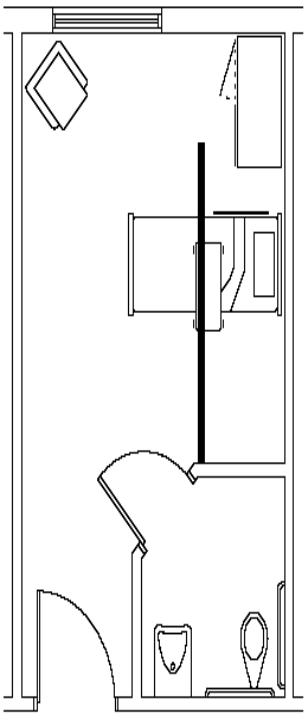
Overhead Lift Track Configurations

Single track overhead lift system

A lift motor can be moved along a single line of overhead track in a horizontal direction only. The track may be attached to a ceiling or gantry system.

This configuration of track is more limited in functionality as a patient can only be moved in the direction of the track e.g., from bed to stretcher or chair.

If other tasks are to be performed such as boosting in bed, the lift can be used to raise a patient in a sling, but the bed must be moved to position the patient towards the head of the bed. Moving a bed or other furniture to accommodate a single-track system increases task time which may reduce the likelihood of lift use by caregivers.



Straight track overhead lift systems can be effective in some patient care areas such as, diagnostic imaging where the imaging table can be moved into a desired position under the track, or in an imaging holding area if patients are only transferred to/from wheelchair/bed to an imaging stretcher.

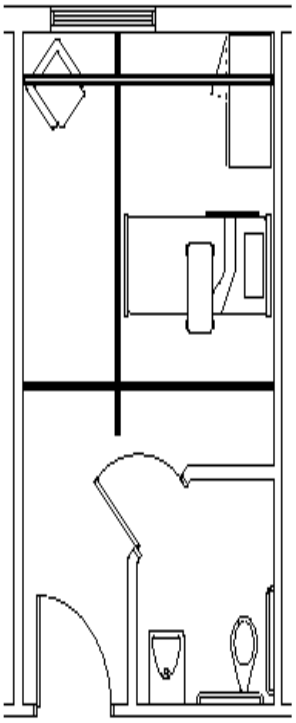
Source: Savaria

Overhead Lift Track Configurations

H-track ceiling and wall mounted systems (also known as X-Y track, traverse track or full room coverage systems)

A traverse rail is supported between 2 fixed parallel rails (H track) that are installed in the ceiling, or via support structures that are mounted to the walls of the room. Track installed in the ceiling may be recessed in the ceiling, mounted at or near the ceiling, and either suspended from the structure above, or on stand-off structural pilasters. A lift motor can be moved along the traverse rail and the traverse rail itself can be moved along the H track.

This configuration allows for greater functionality because the lift motor can be moved throughout the space covered by the traverse track allowing SPHM tasks to be performed in any space that can be accessed by the overhead lift motor.

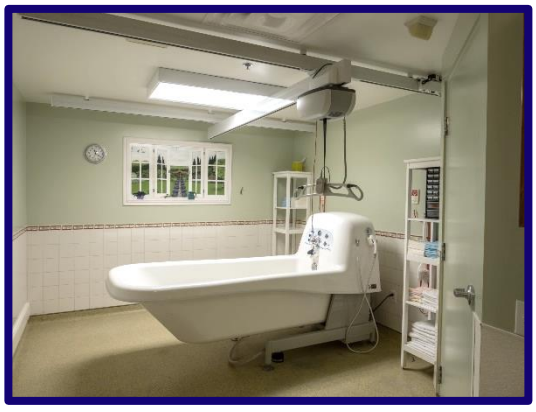


In addition, tasks that require repositioning a patient in bed, lifting limbs and ambulating using an appropriate sling are facilitated. H-track provides greater access to the patient for fall recovery.

This type of room coverage is preferred for the care of patients of size.

The length of an H-track and traverse rail can vary depending on room coverage needed and structural limitations etc.

Source: Savaria



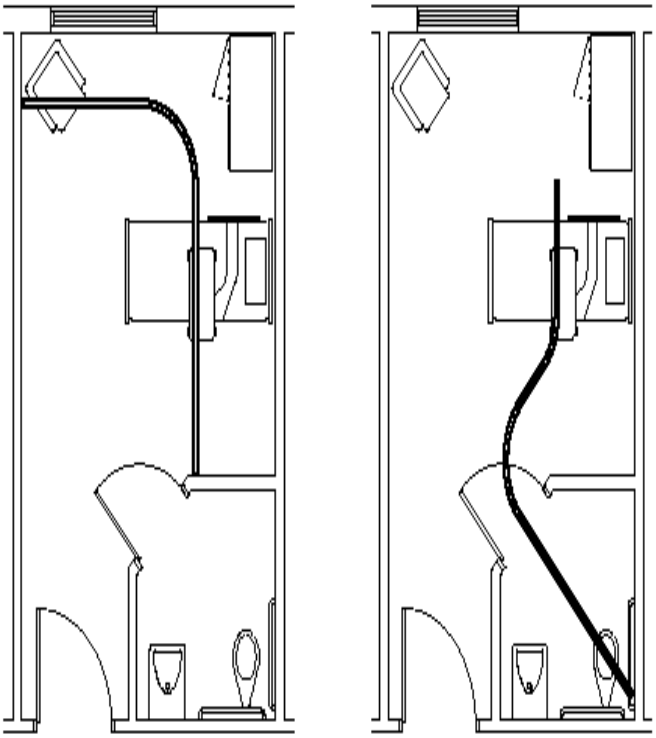
Source: Savaria

Overhead Lift Track Configurations

Angled overhead track:

This allows an overhead lift motor to navigate corners and bends.

Source: Savaria



Turntables and switch tracks:

Turntables provide a junction to allow the rail system to be run in several directions thus allowing the overhead lift to move in multiple directions.

Switch track also allows an overhead lift motor to be moved in 2-3 different directions

These systems are typically operated electrically to avoid user exertion.

Weight capacity of lift motors used on these tracks may be limited to 500-600 lbs.

Source: Savaria

Overhead Lift Track Configurations

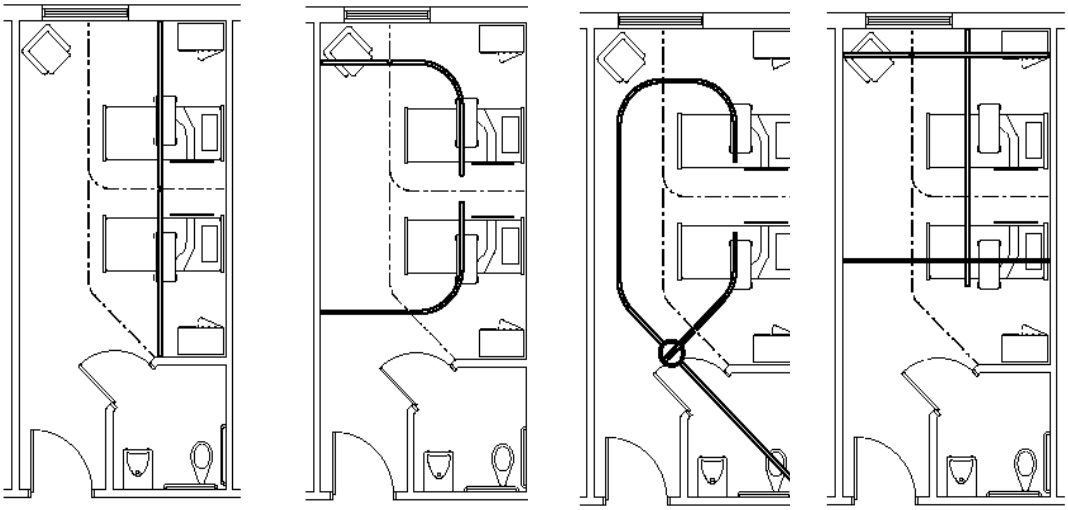
Connecting track between adjacent rooms e.g., bathrooms, or across 2-bed rooms:

To connect rooms, track can be either run through a cut out in the wall or door frame between rooms or if this is not feasible, a hook system connection can be used.

Having overhead lift access in a bathroom can reduce the number of transfers caregivers may have to complete and facilitate patient comfort and dignity by reducing the need to use a bedside commode. However, as previously discussed installing track into existing bathrooms can be costly due to fire prevention regulations. Ease of use and task time should be evaluated if a hook system connection is used between rooms.

When a larger space is to be tracked such as room covering system in a dual-bed patient room, then combination locks or connectors or gates can be used to prevent a motor from disconnecting and allow a motor to run smoothly when moving between 2 rails that are placed end-to-end.

Options are available to allow tracks to pass through privacy curtains.



Source: HumanFit

Source: ACC, 2012

Overhead Lift Track Configurations

Positioning lock:

This locks the lift motor in a specific position on the traverse rail which can be useful during patient treatment and for rehabilitation tasks where the motor needs to remain stationary.

Source: Guldmann

Other configurations

Overhead lifts mounted on boom systems

Some manufacturers offer overhead lift motors that can be mounted on boom systems. These may be an option for use in areas such as Operating Rooms or Imaging Suites. Like single track systems, lift operation is limited to the designated work area and must follow the prescribed direction of boom movement.

Overhead gantry or free-standing systems:

These systems are available as a 2-point or 3-point linear, or 4-point X-Y track. Some manufacturers offer gantry systems with a weight capacity of 1000 lbs.

Freestanding gantry systems can be a viable alternative to permanent ceiling track systems in areas where installation into the ceiling or walls is not always possible e.g., in the home environment.

2-point gantry systems can be adjustable in width and height so they can be 'collapsed' to move them from room to room if needed. However, they are not designed to be moved while a patient is in the lift.

Some gantry systems can be *pressure fitted* between the floor and ceiling to aid stability especially if floor surfaces are uneven.

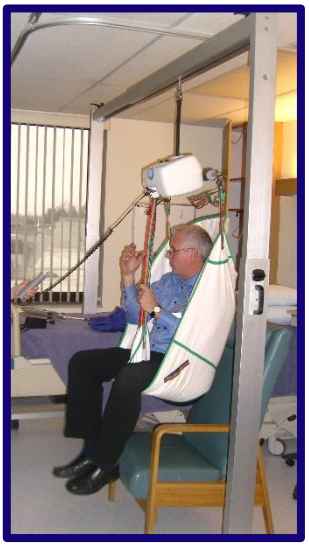
The *vertical lift height* available when using a gantry system is usually less than with ceiling mounted track, so it is important to ensure that adequate space, ceiling height, and other structural components and factors below the ceiling do not hinder use of a gantry.

Overhead Lift Track Configurations

4-point gantry systems often require more effort and time to set up but as with H-track ceiling mounted systems, they allow greater movement of a lift thus facilitating use for a broader range of SPHM tasks.

Lastly, gantry systems should not create a trip hazard for caregivers or facility members etc.

Source: ACC, 2012



Source: Alpha Modalities

***Table 5.5** Overhead Track Configurations.*

Aesthetics

The integration of an overhead lift with existing room décor is an important consideration in acute care, long-term care, and home care environments.

Some options that facilitate aesthetic goals include:

- Embedding or recessing ceiling track into the ceiling to minimize exposed tracks if structural elements above the ceiling allow (Matz, 2019).
- Creating custom cabinetry or partitions to hide the lift motor and hanger bar when not in use.
- Casework that serves multiple functions (e.g., storage that accommodates both a lift and slings and linens).
- A headwall system that conceals a traverse track when it is not in use.
- Painting support track in the ceiling or attached to walls to match the room décor.

If overhead lift motors and hanger bars are stored in cabinetry ensure that caregivers, environmental service, and maintenance personnel can easily access them, i.e., forward, and vertical reach distance to access the hanger bar and headset control should accommodate most users.

Overhead Lift Selection: Quantity, Location, Space Requirement, and Installation

Table 5.6 lists resources and tools that provide more information about determining the quantity of overhead lifts needed, lift configuration, design, and installation.

Quantity

Determining how many overhead lifts are needed in a care environment and how to prioritize installation, depends on many factors such as:

- Fiscal feasibility that considers cost of the lift systems and slings, installation, and maintenance.
- The physical structure and layout of the patient care area where a lift is needed, including the space requirements of rooms that need lift capacity to 1000 lbs., as well as the compatibility of an overhead lift with existing equipment (Refer to *'Disadvantages' on* ***page 5-14*****).**
- Work areas where caregiver injury and severity rates due to patient handling are high such as intensive care units, units that care for patients of size, and medical units.
- The SPHM tasks that need to be performed in the care area and frequency of occurrence e.g., repositioning in bed; transfers to a stretcher or chair; early ambulation etc.
- Patient characteristics such as:
    - The percentage of patients who require total or extensive assistance to mobilize daily and in a worst-case scenario. This number helps to determine how many rooms should be tracked on an in-patient unit if overhead lifts cannot be installed in all rooms. For example, if 50% of patients require total or extensive assistance on a unit with 30 private rooms unit, then at a minimum 15 rooms should be tracked.

      This number may decrease when double rooms are considered; however, these rooms often necessitate separate track and lift installations above each bed rather than utilizing a continuous track and sharing a single lift motor between two patients. Consider lift usage patterns and infection prevention and control requirements when determining track configuration in double rooms.

      If admissions of dependent patients fluctuate widely or will likely increase in the future, then tracking more rooms is advised.

      There is generally greater long-term cost efficiency when installing as many overhead lifts as feasible at one time. This approach can reduce expenses related to obtaining permits, architectural drawings, labor costs, potential increases in equipment and fixture pricing, as well as minimizing future disruptions and room closures within a unit.
    - Medical condition or diagnoses e.g., surgical (type), orthopedic, neurological etc.
    - The number, frequency, and length of stay of patients of size e.g., over 300 lbs. and over 500-600 lbs. This can help determine how many higher capacity lifts may be needed and accommodate the greatest range of patients.
- The number of beds on a patient care unit and number of single and double rooms.
- Patient census (daily average; peak load; range).
- Future changes to patient characteristics and/or census.

- Future changes to unit/dept. design.
- Staffing ratios, mix and variance.

It is important to note that there is some evidence that the greater the overhead lift coverage within a comprehensive SPHM program, the more likely staff will consistently use overhead lifts and MSDs are reduced (Powell-Cope et al., 2014).

Elements to consider when selecting rooms for overhead lifts in an acute care environment

1. Rooms with appropriate structural elements and room design to accommodate overhead lift systems.
2. Typical room assignment on an in-patient unit where non-mobile higher acuity patients would be placed i.e., where frequent repositioning and bed-to-chair transfers are performed. These may be rooms that are near the nurse's station.
3. Rooms that can accommodate largest track configuration. These may also be best for patients of size.
4. Rooms for patients immediately post-surgery where overhead lifts can be used to facilitate early mobility and rehabilitation.
5. Rooms used for patients who are a fall risk/monitored via camera may *not* be suitable, depending on camera set up.
6. If only some areas of a unit can be tracked, consider staffing patterns—such as nurses, aides, and therapy staff. If adjacent rooms are tracked, how does this affect caregiver assignments to high-acuity patients and exposure to WMSD risk factors? For instance, one aide may be assigned to multiple patients in rooms with lifts while another is given dependent patients in non-lift rooms for several consecutive shifts.
7. For lifts with wall-mounted charging stations, ensure there is enough wall space to install the handset charging station and wall mount hook for hanger bar storage (if chosen) in a corner of the room away from areas where routine tasks are performed or where patients and visitors could easily access them. For lifts with continuous charge, designate a location where they can be stored when not in use to meet similar requirements.
8. Consider any future changes to patient population or workflow that might impact room choice.

Overhead Lift Configuration, Design, and Installation

Refer to the following tools and resources for more information about overhead lift configuration, design, and installation.

- ***Tool 5a SPHM Technology Purchasing Checklist***
- **The Facility Guidelines Institutes Patient Handling and Movement Assessments (PHAMA) 2019**, provides useful recommendations for Overhead lift Coverage Recommendations by Clinical Unit/Area, design specifications and more. https://www.fgiguidelines.org/wp-content/uploads/2022/10/Patient-Handling-and-Mobility-Assessments.pdf

Overhead Lift Configuration, Design, and Installation
○ Appendix I: Overhead Lift Coverage Recommendations by Patient Care Area ○ Appendix K: Design/Layout Considerations for Overhead Lift Systems ○ Appendix L: Checklists for Installation and Maintenance of Ceiling-Mounted Patient Lifts ○ Appendix N: Infection Control Risk Assessment Matrix of Precautions for Construction and Renovation • **The Veterans Heath Administration** https://www.publichealth.va.gov/employeehealth/patient-handling/index.asp ○ Installation or Relocation Checklist for Ceiling Mounted Patient Lifts ○ VHA Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts ○ Patient Handling (Lifting) Equipment Coverage & Space Recommendations ○ VA Barrier Free Design Standard A Supplement to the Architectural Barriers Act Accessibility Standards (ABAAS) Jan 2017 rev 5/01/25. https://www.cfm.va.gov/til/etc/dsBarrFree-2025-05.pdf ○ Safe Patient Handling and Mobility Design Criteria August 2021. https://www.cfm.va.gov/til/etc/dcSPHM.pdf – Section 3.0 SPHM design illustrations for overhead lifts overhead lifts – Section 4.0 Design checklist for overhead lift application installation and documentation. – Section 5.0 Overhead Lift type utilization by room/department. – APPENDIX I: Room Diagrams – APPENDIX II: Case studies

Table 5.6 *Overhead Lift Configuration, Design, and Installation.*

Maintenance

Refer to ***Appendix B*** for information about inspection and maintenance of overhead lifts.

Standards and Regulations related to use of Overhead Lifts

Overhead lifts are considered medical devices in the U.S. and are regulated by the Food and Drug Administration (FDA) thus, they must meet the design and testing specifications detailed in ISO 10535: 2021 Assistive products — Hoists for the transfer of persons — Requirements and test methods. Other standards and codes that must be met include electrical and National Fire Protection Association requirements for healthcare facilities. *Refer to* ***Appendix E*** *for more information about Standards and Regulations related to use of powered SPHM technology.*

Portable Floor-Based Lifts

Mobile floor-based lifts, also known as full-body sling lifts, have been used to lift and transfer patients in healthcare since the late 1950s (Mechan & Wright, 2015).

Source: Baxter

Floor-based lifts are mostly used to lift and transfer dependent patients (i.e., non-weight bearing and needing extensive assistance) between 2 surfaces e.g., bed and wheelchair, commode, shower chair, in a seated position.

However, some electric/battery powered floor lifts have attachments that allow them to be used for patient ambulation with a walking sling, and some are also designed to lift patients in and out of vehicles.

Some floor lifts are designed specifically for use with bathtubs – *Refer to Selected Ergonomics Hygiene Equipment on* ***page 5-95.***

The dimensions and weight capacities of floor-based lifts differ by manufacturer *(see below).*

Table 5.1 summarizes the patient handling and mobility tasks that may be completed using a floor-based lift.

Floor-based lifts can be used in any healthcare setting such as hospitals, outpatient clinics, long term, and home care however, suitability will depend on the factors described in *Advantages* and *Disadvantages* below.

Figure 5.8 *Examples of a Floor-Based Lift used to:*

(1) Transfer a Patient from a Vehicle to Stretcher *(2) Ambulate a Patient*

Source: Baxter

General Description

Floor-based lifts consist of a 'C' or U-shaped support base with casters and a vertical fixed mast with a pivoting boom (lifting arm) attached. A hanger bar (also known as a spreader or carrier bar) is located at the end of the boom to which a patient sling is attached ***(Figure 5.9).***

Some lifts may have a rigid seat (sling) attached to a pivoting boom e.g., bathtub lifts ***(Refer to Slings on page 5–41).***

Like overhead or ceiling lifts, floor lifts have a variety of styles of hanger bars (***Refer to Hanger Bars on page 5-17)*** with connection points to accommodate either slings with plastic clips or with fabric loops.

The boom can be raised and lowered either manually e.g., via a hydraulic pump mechanism or using a powered mechanism e.g., a rechargeable electrical battery.

The legs of a floor lift can be widened to accommodate use with furniture such as chairs, and other transfer surfaces.

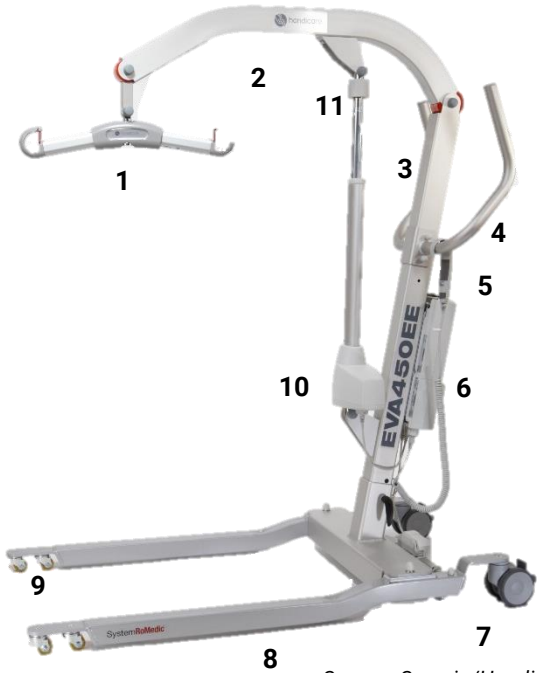
Powered floor-based lifts have a handset that is attached to the motor battery that is used to raise and lower the lift boom and, in some cases, to change the width of the lift legs.

Manual hydraulic lifts use a pump handle to raise and lower the boom and manual control to widen the lift legs.

Floor-based lifts require manual effort by a caregiver when transferring a patient between two surfaces (Refer to *Disadvantages* below). However, *motorized* floor lifts are available that reduce the physical effort needed to maneuver a lift when transferring a patient. Some floor lifts may have built-in scales to weigh patients.

1. **Hanger Bar**
2. **Lift Arm or Boom**
3. **Mast**
4. **Push Handles**
5. **Handset Control (Raises/lowers lift arm & controls leg width)**

   Note some models have a manual foot pedal that adjusts the width of the base legs
6. **Battery Pack (with emergency stop control and control box)**
7. **Locking Castors**
8. **Base Legs**
9. **Front Castors**
10. **Motor/Actuator**
11. **Lift Arm Emergency Lowering**



Source: Savaria/Handicare

Figure 5.9 *Example of a Powered Floor-Based Lift and Basic Components Parts.*
Note: Design and location of components vary by device manufacturer.

Advantages

The cost of purchasing a floor lift is lower than an overhead lift primarily because there are no installation costs.

They may be the preferred option when caregivers need to transfer patients on an infrequent basis, e.g., in a clinic setting.

Floor lifts are portable and can be used wherever overhead lifts are not available or cannot be installed, provided there is enough space to maneuver them *(see below). Compact and/or foldable* compact floor lifts with lower weight capacities are designed for easy transport and use in community-based care.

While they may not be as versatile as overhead lifts, powered floor lifts can be used for a variety of SPHM tasks.

Floor lifts (vs. overhead lifts) are a safer option for use when lifting and transferring patients with behavioral health issues as they can be secured away from the care area after use.

Disadvantages

Floor-based lifts are not as effective as overhead lifts in reducing the risk factors for WMSDs such as spinal compression and shearing forces. Floor lifts require greater application of force with a patient load especially when being pushed on uneven or carpeted surfaces, sloping floors, over thresholds, and maneuvered in a non-linear direction e.g., in small patient rooms and when transferring a patient of size. (Dutta et al., 2011; Lachance et al., 2016; Marras et al., 2009; Rice et al., 2009; Santaguida et al., 2005; Waters et al., 2012).

Interestingly, Dutta et al., (2011) found that the use of 2-caregivers to maneuver a loaded floor lift did not compensate for the poorer performance of floor lifts.

In laboratory-based studies at the James A. Haley Veterans' Hospital in Tampa, overhead-mounted lifts required 55 percent less effort to maneuver than portable floor lifts (VHA, 2016). *Refer to Advantages of Overhead Lifts.*

Floor-based lifts, unlike overhead lifts, also require sufficient clearance under beds and stretchers, around chairs, through doorways, and within patient rooms/care areas e.g., to access a toilet/bathroom and space to turn safely, to be functional ***(Figures 5.10 and 5.11).***

Figure 5.10 *Sufficient Clearance under a Bed.* *Source: Savaria/Handicare*

Figure 5.11 *Sufficient Clearance Around a Chair.* *Source: ARJO*

Some models of floor lift have *smaller wheels* or casters to improve clearance; however, this design can increase the force that caregivers must exert when moving a low-base lift with patient load ***(Figure 5.12).***

Beds used in behavioral health settings or care areas (e.g., emergency rooms), may have a solid base and be fixed to the floor which can prohibit use of floor lifts. Similarly, exam tables in clinic and imaging settings may have a solid base which hinders lift access.

Floor lifts also need sufficient vertical clearance to be operated ***(Figure 5.13***). Furniture such as beds and exam tables must be able to lower sufficiently and/or the lift boom must be able to rise high enough to lift a patient completely on and off a surface. Vertical clearance available typically diminishes when lifting patients of size.

Figure 5.12 *Low-Based Floor Lift with Sufficient Clearance Under a Chair.*

Source: Savaria/Handicare

Figure 5.13 *Sufficient Vertical/Lift Clearance from a Surface.*

Source: ARJO

The recommended clearance when using a floor lift for patient transfers (inpatient room) is 6’ 0” x 10’6” (VHA, 2021).

Large capacity floor lifts are available for lifting and transferring patients of size e.g., 600-1000 lbs. Due to their large footprint these lifts require greater room clearance for use and storage space. They can be more difficult to maneuver without motorized assistance. This is one of the key reasons why overhead lifts, when feasible, are recommended for care of patients of size.

Manual hydraulic lifts have been used in healthcare for several decades. However, because of the manual pumping mechanism they require greater force to operate safely than a powered lift.

As with all portable floor-based patient lifts and assistive devices, improper use, lack of maintenance, and/or insufficient caregiver training may increase the risk of device instability or tipping.

Importantly, mechanical and powered floor lifts are *not* designed to be used as transportation devices.

Lastly, floor-based lifts typically require a minimum of 2 people to operate them safely.

Quick Tip

The Facility Guidelines Institutes Patient Handling and Movement Assessments (PHAMA) 2019, Appendix D, provides useful recommendations for ‘Clearances for Safe Use of Patient Handling and Mobility Equipment’ including floor lifts.

https://www.fgiguidelines.org/wp-content/uploads/2022/10/Patient-Handling-and-Mobility-Assessments.pdf

Floor-Based Lift Features

Weight capacity

Floor lifts are available in a wide range of lift weight capacities up to 1000 lbs.

Charging

Powered floor-based lifts are powered by batteries that need regular charging either through direct connection to an electrical outlet or a detachable battery pack that can be removed for charging via a battery charger that is connected to an electrical outlet. This type of charging mechanism requires that a second battery pack be available for use while one battery is being charged.

It is important to note that some floor lifts with plug in to charge batteries will not charge if the emergency stop control is activated.

Hanger bars

Similar to overhead lifts, floor lift hanger bars are available in a variety of configurations *(Refer to Hanger Bars on **page 5-17**).*

Controls

Powered floor-based are operated via a battery powered handset.

Like overhead lifts, there are essential safety controls and features that must be included on floor-based lifts (*Refer to Overhead lift controls on **page 5-19**).*

Tool 5a, SPHM Technology Purchasing Checklist lists the safety features that are required by ISO 10535:2021 that should be considered when selecting and purchasing a floor-based lift.

Storage

To facilitate use by caregivers, floor lifts require an easily accessible storage area such as an alcove that is ideally near the care area where it will be used. Powered floor lifts also require storage to include a place for charging batteries via an electrical outlet.

Dimensions of floor-based lifts vary from approximately 24 to 40 inches wide and 54 to 72 inches long.

Quick Tip

SPHM Technology - Storage and Access Considerations

To facilitate caregiver use of SPHM technology, storage locations should be close to point of care and use. However, even if storage is nearby, consider other *barriers* to access to SPHM technology such as storage spaces that:

- **Are cluttered - other equipment must be moved to access SPHM devices/slings**
- **Require keycode access**
- **Have automatically closing doors**
- **Are not obvious to find**
- **Have power outlets that are too low or high to access and/or are used to charge other medical devices and not available for use**

Quantity

*Refer to **Appendix C** for more information about how to determine the number of floor-based lifts needed.*

Maintenance and Cleaning

*Refer to **Appendix B** for information about inspection and maintenance of floor-based lifts.*

*Refer to **Appendix D** for information about cleaning and disinfecting SPHM technology*.

Standards and Regulations Related to Use of Floor Lifts

Floor-based lifts are considered medical devices in the U.S. and are regulated by the Food and Drug Administration (FDA) thus, they must meet the design and testing specifications detailed in ISO 10535: 2021 and other electrical and National Fire Protection Association standards for healthcare facilities. *Refer to **Appendix E** for more information about Standards and Regulations related to use of powered SPHM technology.*

Portable Sit-to-Stand Lifts or Aids

Source: Etac/Molift

A sit-to-stand (or stand assist) lift or aid allows a patient to stand from a seated position, be transferred to another surface and return to a seated position e.g., to/from edge of a bed and a commode/toilet. Caregivers manually move a sit-to-stand (or stand assist) lift to transfer a patient between 2 surfaces.

These types of lifts and aids can also be used to assist with dressing, grooming, and performing peri-care, etc., when a patient needs to be supported in a standing position.

Sit-to-Stand Aids are either powered or non-powered. The functional differences between powered and non-powered sit-to-stand lifts and aids are described below.

Some models of powered sit-to-stand lifts have a removable foot plate to facilitate ambulation, and some are designed for ambulation only ***(Figure 5.15).***

Sit-to-stand lifts and aids can be used in any healthcare specialty areas and settings such as imaging, post operative recovery, outpatient clinics, long term, and home care. However, suitability will depend on the factors described in *Advantages* and *Disadvantages* below.

The dimensions and weight capacities of sit-to-stand lifts and aids differ by manufacturer *(see below).*

Table 5-1 summarizes the patient handling and mobility tasks that may be completed using a powered and non-powered sit-to stand lift.

General Description

Powered sit-to-stand lifts consist of a 'C' or 'U' shaped movable stand or base with casters, and a battery powered lifting arm that can be raised and lowered to assist a patient to/from seated to standing position. A waist belt style sling is placed around the patient and is attached to the end of the lift arm, to prevent the patient falling during a transfer. The patient stands on a foot plate and an adjustable knee pad with a security belt secures the patient's lower legs to the lift to offer stability and comfort when the patient is in a standing position ***(Figure 5.14)*.**

The base legs of the lift can be widened to accommodate use with furniture such as chairs, and other transfer surfaces. Some powered sit-to-stand lifts can include a scale for weighing patients.

Powered sit-to-stand lifts are used with patients who have partial weight bearing abilities and upper body strength, can grasp with at least one-hand, can follow simple instructions, and have no risk of combative behavior while in the device. Refer to ***Disadvantages*** for information regarding usage limitations.

1. **Lift Arm or Boom**
2. **Hooks for Sling**
3. **Handset Control (Raises/lowers lift arm & controls leg width)**
4. **Battery Pack (with emergency stop control, level of charge indicator, & emergency lower)**
5. **Locking Castors**
6. **Base Legs**
7. **Front Castors**
8. **Footplate (Removable on some brands/models for ambulation tasks)**
9. **Leg Support**

   Note some models have a manual foot pedal that adjusts the width of the base legs
10. **Manual Emergency Lower**

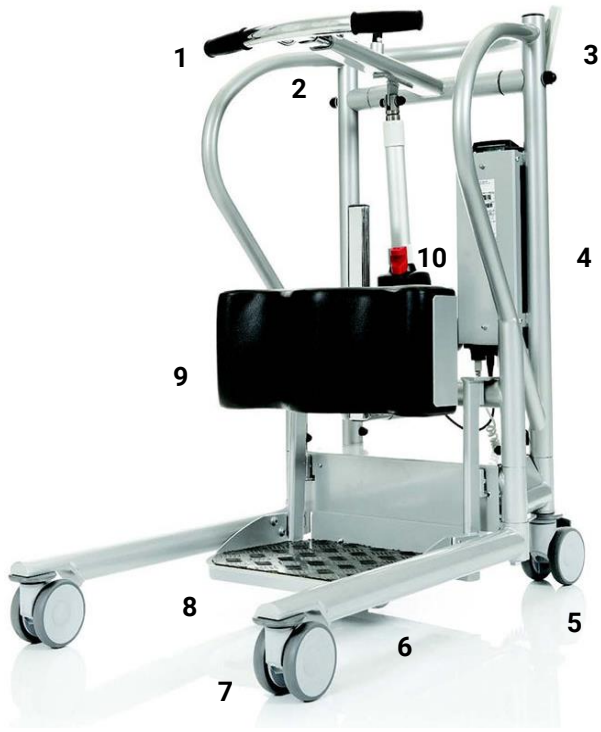


Figure 5.14 *Example of a Powered Sit-to-Stand Lift and Basic Components Parts. Note: Design and location of components vary by device manufacturer.*

Source: Savaria/Handicare

Non-powered sit-to-stand aids consist of a 'C' or 'U' shaped movable stand or base with wheels, a foot plate for a patient to stand on and handlebar support for the patient to hold on to. Some non-powered sit-to-stand aids have seats that can drop down for patients to lean against or sit on during transfers. Some non-powered sit-to-stand aids may have adjustable width legs.

In general, non-powered sit-to-stand aids are used with *higher functioning* patients e.g., the patient must be able to stand and sit unaided but may not be able to ambulate. They should be able to follow simple instructions and have no risk of combative behavior while in the device. Refer to ***Disadvantages*** for information regarding usage limitations.

Some non-powered sit-to-stand aids do not have a 'seat' feature, i.e., the patient remains in a standing position during a transfer. These aids are designed to allow a patient to stand on a turntable with knee support and pull themselves to a standing position. Some aids use a strap or belt placed around a patient and attached to the device to provide additional security. The caregiver manually rotates the aid to turn the patient towards another surface and/or can manually move the aid a short distance to complete a transfer between 2 surfaces. There are also powered standing aids that assist a patient to a standing position for ambulation.

Examples of several types of sit-to-stand lifts/aids are shown in ***Figure 5.15.*** *Refer to 'Slings' on* ***page 5-41*** *for information about slings that are used with sit-to-stand lifts and aids.*

Advantages

In general, sit-to-stand lifts and aids require less clearance for transfers than powered floor-based lifts, making them advantageous in small spaces like patient bathrooms. Recommended clearance for patient transfers (inpatient room) when using a powered Sit-to-Stand Lifts is 5' 0" x 10'6" (VA, 2021).

These devices can be used to reduce fall risk in patients who are not able to reliably use a walker e.g., in postpartum following an epidural during labor where a mother can stand but is too weak to ambulate following labor; a patient who is at risk of falling due to the potential effects of narcotic medications, postural hypotension from the prescription of a new medication after surgery when the patient first requires the bathroom (Monaghan, 2018).

There is some research to support that sit-to-stand lifts and aids can decrease the biomechanical load and injury risk to caregivers. Additionally, these lifts are associated with positive patient experience, such as increased patient satisfaction and dignity which may facilitate increased adherence and cooperation with caregivers during mobilization and rehabilitation (Goh et al., 2014; Riccoboni et al., 2021; Tang et al., 2020).

Sit-to-stand lifts may be effective in facilitating rehabilitation and active participation by a patient to achieve their mobility goals (Darragh et al., 2013; McIlvaine et al, 2011, Tang et al., 2017).

Powered sit-to-stand lifts have been shown to reduce a decline in mobility and functional outcomes in long term care settings and a decline in the incidence of pressure ulcers (Gucer, 2013).

Some newer designs of sit-to-stand devices facilitate greater active motion for lower limbs thus mimicking a more normal performance of movement patterns e.g. a flexible knee support that allows more forward knee movement and more bodyweight to be distributed through the feet, which can provide rehabilitation benefits (Fray et al., 2019).

One caregiver may operate a powered sit-to-stand lift in some circumstances e.g., if the patient is not of size and does not have medical devices attached to them such as an intravenous infusion system. Non-powered sit-to-stand aids are designed for use by one caregiver unless a second caregiver is needed to manage medical devices that are attached to the patient etc.

Powered Sit-to-Stand Lift.

Source: Savaria/Handicare

Powered Sit-to-Stand Lift.

Source: ARJO

Powered Sit-to-Stand Lift with Removable Foot Plate for Ambulation.

Source: Savaria/Handicare

Non-Powered Sit-to-Stand Aid.

Source: ARJO

Powered Sit-to-Stand Aid with Removable Foot Plate for Ambulation.

Source: TR Equipment

Non-Powered Sit-to-Stand Aid.

Source: Savaria/Handicare

Figure 5.15 *Examples of Powered and Non-Powered Sit-to-Stand Lifts and Aids.*

Disadvantages

Like floor lifts, powered and non-powered sit-to stand lifts and aids require sufficient clearance under beds, stretchers and exam tables, around chairs, and through doorways to be functional.

Furniture such as beds and exam tables must be able *to lower* sufficiently to allow a patient to easily place their feet on the device footplate (or floor if ambulating) easily before standing and to be able to sit with buttocks supported on a surface when returning to a seated position after a transfer.

These devices can be more challenging to move on carpeted, uneven or sloping floors, over thresholds, and when moving patients of size etc., thus, increasing the force exerted by caregivers.

Patients who are very tall or short in stature may not 'fit' in a sit-to-stand lift or aid safely and comfortably.

As with the floor-based lifts, care must be taken to ensure stability of the lift during use. Unlike most floor-based lifts, the brakes on sit-to-stand lifts and aids *must* be locked for safety when a patient is moving to/from a seated to standing position.

Sit-to-stand lifts and aids *may not* be suitable for use with:

a. Orthopedic patients following knee, hip, or shoulder surgery. A rehabilitation professional should determine if it is appropriate to use.

b. Patients who cannot tolerate or for clinical reasons should not have a belt around their torso e.g., recent spinal/abdominal incisions/stomas etc.

c. Patients who have shoulder injuries and shoulder pain may not be able to tolerate a sit-to stand lift sling that supports the patient around their upper torso and under their axilla.

   For 'b' and 'c' above, the patient's medical provider should determine if use of a sit-to-stand lift or aid is appropriate.

Sit-to-Stand Lift and Aid Features

Weight capacity

The weight capacity of many powered and non-powered sit-to-stand lifts and aids is typically 400-440 lbs., however there are some powered models with a higher capacity to 800 lbs. for mobilization of patients of size. The weight capacity of standing turning aids typically ranges from 375-440 lbs.

Charging

Powered sit-to-stands lifts are powered by batteries that need regular charging either through direct connection to an electrical outlet or a detachable battery pack that can be removed for charging via a battery charger that is connected to an electrical outlet. This type of charging mechanism requires that a second battery pack be available for use while one battery is being charged.

It is important to note that some sit-to-stands lifts with plug in to charge batteries will not charge if the emergency stop control is activated.

Controls

Powered sit-to-stands lifts are operated via a battery powered handset.

Like overhead and floor-based lifts, there are essential safety controls and features that must be included on sit-to-stand lifts (*Refer to Overhead lift controls on* ***page 5-19).*** ***Tool 5a*** ***SPHM Technology Purchasing Checklist*** lists the safety features that are required by ISO 10535:2021 that should be considered when selecting and purchasing sit-to-stand lifts and aids.

Storage

To facilitate use by caregivers, sit-to-stand lifts and aids require an easily accessible storage area that is ideally near the area they will be used. Powered sit-to stand lifts also require storage to include a place for charging batteries via a plugged-in to an electric outlet.

Dimensions of sit-to-stand lifts vary depending on weight capacity and range from approximately 23 to 30 inches wide and 36 to 50 inches long.

Quantity

Refer to ***Appendix C*** *for more information about how to determine the number of sit-to-stand lifts needed.*

Maintenance and Cleaning

Refer to ***Appendix B*** *for information about inspection and maintenance of sit-to-stand lifts and aids.*

Refer to ***Appendix D*** *for information about cleaning and disinfecting SPHM technology.*

Standards and Regulations Related to use of Sit-to-Stand Lifts and Aids

Sit-to-stand lifts and aids are considered medical devices in the U.S., and as such are regulated by the Food and Drug Administration (FDA) thus, they must meet the design and testing specifications detailed in ISO 10535: 2021 and if electrically powered, other electrical and National Fire Protection Association standards for healthcare facilities. *Refer to* ***Appendix E*** *for more information about Standards and Regulations related to use of powered SPHM technology.*

Slings for Patient Lifts

Slings can be defined as accessory devices that are used with SPHM technology such as overhead lifts, mobile floor-based lifts and sit-to-stand lifts and aids, to support a patient's body or body part during transfer, lifting, repositioning, ambulating, or holding tasks. The design of the sling determines the position of the patient or patient's body part when attached to a lift or transfer device e.g., a seated, recumbent, supine, or upright position.

Over the past decade, the design of patient lift technology, including slings, has evolved and expanded. There are numerous styles of patient slings that are designed to suit a patient's body type and abilities, meet clinical care needs, and facilitate a wide variety of patient care SPHM tasks.

Sling design, sizing and weight capacities, and cleaning requirements vary between manufacturers. *Refer to **page 5-67** for more information.*

The broad choice of slings and lack of design and sizing standardization between manufacturers increases the risk of caregivers unintentionally misusing lifts and slings, potentially causing patient harm (ISO 10535:2021).

To ensure safe use of this SPHM technology, it is essential that a *systems approach* be used when purchasing, using, maintaining, and managing sling supplies to facilitate the success of a SPHM program.

This includes when feasible, *standardizing* sling style and size range by manufacturer, and the brand and model of patient lifts—including hanger bar configurations and attachment points, within a facility or organization to minimize user errors and reduce patient harm from unintentional misuse.

***Tool 5a* SPHM technology purchasing checklist** can be used together with the information provided in this Section to guide the selection of slings. ***Tool 5b* Sling safety checklist and *Tool 5c* Sling & hanger bar compatibility picture guide** may be used to educate caregivers about safe use of slings.

When choosing slings and managing supply, it is *essential* to collaborate with the facility's linen service, materials management/supply chain teams, infection prevention and control, wound and ostomy departments, and EVS/Housekeeping, to ensure they support desired SPHM procedures for safe and efficient use of SPHM technology including slings. These include protocols for leaving slings under a patient, ensuring adequate sling supply and cleaning procedures for SPHM technology etc.

Description

Slings are manufactured from flexible materials such as fabric, which adapts to the shape of the body, or from rigid materials such as plastic or stainless steel.

Slings made of flexible materials connect to the hanger bar on an overhead or floor lift, or to the lifting arms of powered sit-to-stand lifts, or to the frame of stand assist aids ***(Refer to Figures 5.1 to 5.3, 5.5 and 5.7-5.15)***

Slings made of rigid materials may have straps to attach them to a lift hanger bar or are permanently integrated into the design of the lift ***(Table 5.8 - II Rigid Slings).***

Figure 5.16 shows the basic components of a non-rigid seated and a repositioning or supine sling.

Slings may be laundered between uses with different patients; may be disposable (non-washable) and designed for use with only one patient; or may be designed to wipe clean between use with different patients (AASPHM, 2016; ACC6075, 2012; Matz et al., 2019).

The number and type of attachment points such as loops that can be used to connect a sling to a mechanical lift or stand assist device vary depending on the design and function of the sling. For example, seated slings typically have 4 or 6 attachment points; supine or repositioning slings may have eight to twelve; and limb slings may only have 2 attachments points.

There is also variation in the method used to attach a sling to a mechanical lift or sit-to-stand device. A sling can have loop, and/or clip or key style attachment points ***(Figure 5.17).***

Loop attachments can be made of fabric, plastic or synthetic materials, or metal. Loop attachments can vary in dimension and design. Clip or key attachments are typically made of plastic and can vary in design e.g., size and shape of the keyhole (AASPHM, 2016; ISO, 2021).

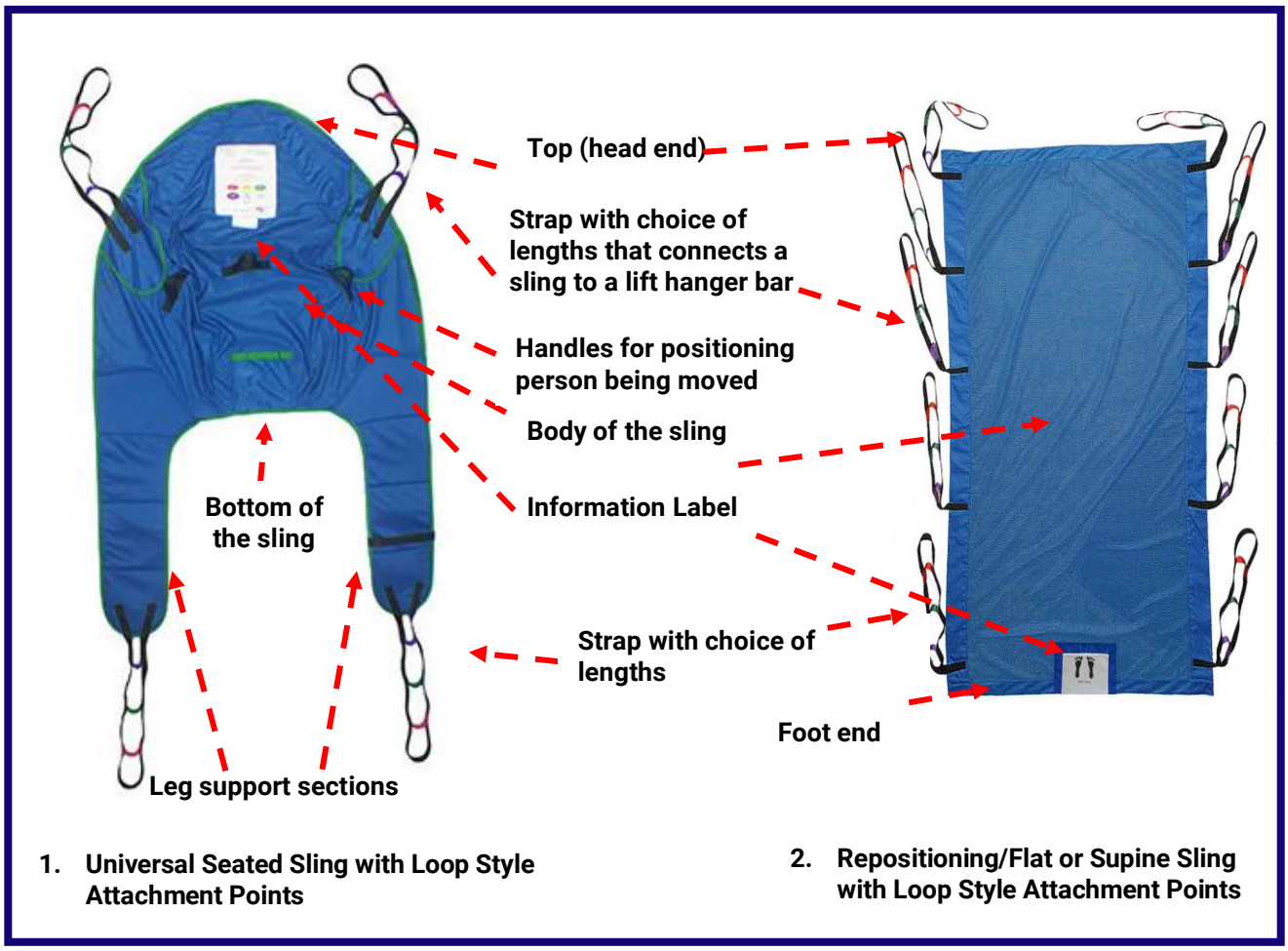


Figure 5.16 *Basic Components of a (1) Non-Rigid Seated Sling and (2) a Supine or Repositioning Sling.*

Source: Alpha Modalities

Loop-style attachments allow you to adjust sling strap length and vary the position of the patient. For example, a patient who is positioned in the style of seated sling shown in ***Figure 5.16***, may be positioned in an upright posture using shorter loops or in a reclined posture using longer loops at the head end of the sling depending on clinical and functional needs during a transfer.

Source: Baxter

Source: HumanFit

Loop Attachments

Source: ARJO

Source: HumanFit

Key/Clip Attachments

Figure 5.17 *Examples of Slings with Loop Style and Key/Clip Style Attachment Points.*

Hanger bars are designed for use with loop or with clip attachments. A sling with a clip attachment should only be used on a hanger bar that is designed for a clip attachment. A sling with a loop attachment should only be used on a hanger bar designed for a loop system. ***Refer to Hanger Bar Configuration on page 5-17.***

Clip and loop slings should *never* be used interchangeably as there is a high risk that the sling will detach from the hanger bar and cause patient injury or death (FDA, 2018; AASPHM, 2016). Refer to ***Table 5.7*** *and* ***Appendix F*** for more information about sling and hanger bar compatibility.

Slings are an integral component of mechanical lift and sit-to-stand or stand assist systems and should be designed and manufactured to at a minimum meet the requirements of the International Organization for Standardization (ISO) *10535:2021 Assistive products - Hoists for the transfer of persons-Requirements and test methods* ***(Refer to Appendix A).***

Sling and Hanger Bar Compatibility
As mentioned above there are a variety of sling designs with different methods of attachment to a hanger bar and a variety of configurations and sizes of hanger bar. So, it is imperative that the sling to be used is compatible with the hanger bar on the lift device to facilitate safe use. Slings and lifts provided by the same manufacturers are usually compatible. However, according to ISO 10535:2021, a manufacturer of lifts and/or slings should provide information that states which design of lift hanger bar and attachment style (e.g., loop or clip) is suitable for use with a specific style of sling i.e., a compatibility statement. Slings may be purchased from different manufacturers for various reasons e.g., the style of sling needed is not available from the lift manufacturer or the sling from a different manufacturer is better for patient care. If the lift and sling are from *different* manufacturers, the sling manufacturer should provide a compatibility statement. Ultimately, each healthcare organization has the final responsibility to ensure any slings purchased from a lift manufacturer, and/or from a third-party sling manufacturer are compatible with the hanger bar(s) in their system(s) or facility (Enos, 2019; Enos, 2022; ISO, 2021). Therefore, before using slings and lifts from different manufacturers, a compatibility risk assessment should be conducted, and the results documented in an appropriate place for future use within the facility's SPHM program. It is suggested that a copy of this is also placed in the patient's care plan, especially if lift devices and slings are not standardized e.g., by manufacturer and style, within a facility. As previously discussed, when possible, *standardization* of lifts, hanger bars, and slings is recommended within a setting to reduce the risk of healthcare worker error and simplify training. A setting using lifts with hanger bars accommodating loop slings should avoid, when possible, the use of lifts with hanger bars accommodating clip slings (AASPHM, 2016). If special needs arise requiring a mix of hanger bars and sling types, the facility must take precautions to prevent healthcare worker error, such as labeling of hanger bars to indicate use with the appropriate sling and provide additional training for staff in appropriate use of hanger bars and slings (AASPHM, 2016; Nagavarapu et al., 2017). ***Appendix F*** *provides more information about sling and hanger bar compatibility and adverse events associated with hanger bars and slings.* ***Tools 5 b & c*** *provide additional guidance.*

Table 5.7 *Sling and Hanger Bar Compatibility.*

Sling Types & Styles

Slings can be divided into types based on their function or the type of SPHM task they are designed for.

Basic categories of sling are as follows:

I. Non-rigid or flexible slings
1. Seated
2. Supine
3. Limb slings and turning bands
4. Walking/ambulating harnesses/gait trainers
5. Sit-to-stand belts or slings
6. Specialty slings

II.. Rigid slings

Table 5-8 presented below outlines general sling categories, identifies the applicable SPHM tasks, and specifies the patient populations for which each sling type is suitable. It does not describe the full range of sling options available. *Always* consult a sling manufacturer's instructions for specific information about the proper use of their slings.

I. Non-Rigid or Flexible Slings

1. Seated Slings – Non-Rigid

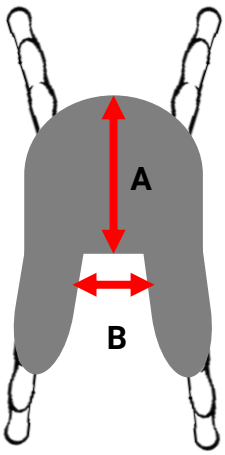
Seated slings are used to lift and transfer patients who require full body support (i.e. non-weight bearing) in a seated or semi-reclined position, e.g. bed to/from commode or toilet, wheelchair, chair, stretcher or exam table, when attached to an overhead lift or to a portable floor-based lift.

Seated slings differ in style and design by manufacturer.

Some manufacturers offer many different styles of seated slings; each suited to a specific SPHM task and/or patient need.

However, seated slings can be categorized into 3 basic types:

- Universal or general-purpose seated sling
- Hammock sling
- Toileting/hygiene sling



Seated slings may vary in the amount of trunk and head support offered ***(A)*** i.e.,

- High back (with head support)
- Medium back (without head support but supporting the complete torso) and
- Low back supporting the pelvis and waist

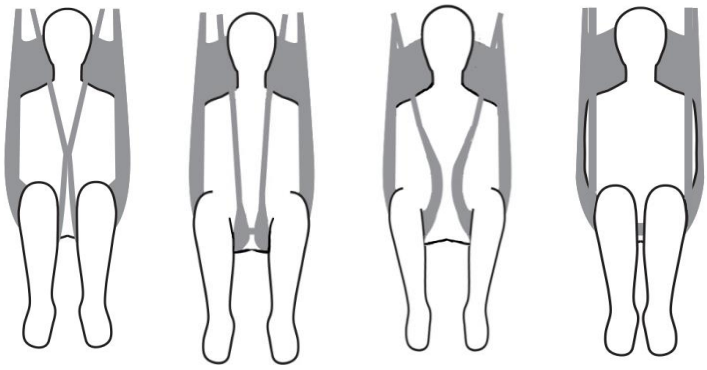
I. Non-Rigid or Flexible Slings

They may or may not have:

- An opening to allow for toileting
- Divided leg support pieces which can vary in length and width i.e., narrow, standard, wide split leg support opening ***(B)***
- Padded or quilted leg support pieces that can reduce the incidence of leg straps bunching under legs, creating discomfort and a risk to skin integrity
- Removable plastic supports or 'stays' located in the body and or head of the sling to provide additional support

Slings with divided leg support: The method of connecting leg supports to a lift hanger bar varies and is dependent on the design of the leg strap. Common configurations are:

1. Crossed - where leg supports come up between the patient's thighs and the leg strap on one support is passed through the loop of the strap on the other support to secure the legs supports in place in a cross over style
2. Security strap - where leg supports come up between the patient's thighs and one leg support is passed through a strap located on the other leg support to secure both legs supports together and allow a more open leg/hip position
3. Open position - where leg supports come up between the patient's thighs and are attached directly to the sling bar without being crossed or using a security strap
4. Closed or cradle position: One leg support is positioned under both thighs followed by the other leg support and attached to the hanger bar



1 2 3 4

Each of the above configurations have advantages and disadvantages depending on a patient's body habitus, presence of lower limb amputation, and level of trunk control.

The choice of leg support configuration used should be in accordance with the sling manufacturer's instructions.

I. Non-Rigid or Flexible Slings

1. Seated Slings – Non-Rigid

Style of Sling and Description	General Guide for Suitable Use

Universal or general-purpose seated slings

Sometimes referred to as a *'Quick Fit'* sling.

This is a U-shaped sling that provides full back support but may or may not provide head support.

The sling is divided into two leg support sections at the mid to lower pelvic area. The leg supports can be placed between the legs to support each leg separately or positioned to support the legs together *(Refer to 'slings with divided leg support' above).*

Function

Universal slings are the most commonly used slings for general transfers of patients in a seated, or reclined to/from bed, commode or toilet, wheelchair, chair, stretcher or exam table, or off the floor (with head support) following a fall *(if uninjured).*

Example of a low back universal seated sling

Source: Guldmann

Example of a high back universal seated sling

Source: Etac/Molift

Advantages

- Offers a larger support area for patient comfort compared to a toileting sling
- Easier to put on and remove when the patient is sitting or lying and allows some access for washing and toileting
- When properly positioned, the leg supports reduce the risk of the patient slipping or falling out of the sling

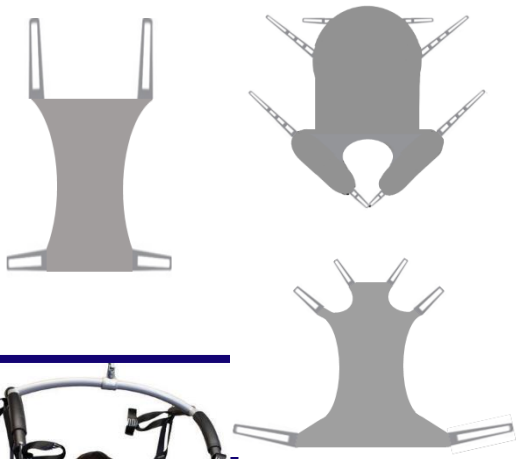
May be appropriate for patients who:

- Cannot assist or provide active participation
- Can tolerate sitting position
- Have adequate hip and knee flexion
- Require head support (high back) e.g., patients with spasticity or extensor spasm
- Require lateral trunk support (high back)
- Can tolerate leg supports

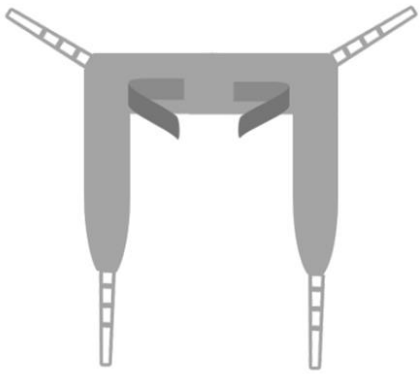
Disadvantages

- May be challenging to use for toileting and bathing if clothes are to be removed and replaced
- The leg bands or straps can be uncomfortable for the patient if they are not positioned correctly, or if the patient is left sitting in the sling with the leg bands in place ***(Refer to Table 5.9)***

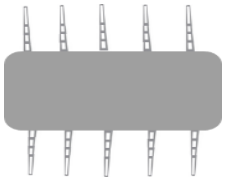
Style of Sling and Description	General Guide for Suitable Use
 *Example of a high back universal seated sling with key/clip attachments* *Source: ARJO*  *Example of a high back universal seated sling in net fabric for bathing with loop attachments* *Source: Etac/Molift*	***May not be appropriate for patients with:*** • "Hip precautions" (especially internal or external rotation) • Pelvic fractures • Spinal injuries • Extreme fixed kyphosis • Shoulder/thoracic injury or surgery • Single or bilateral above knee amputation • External fixation or support devices such as HALO or TLSO braces • Wounds or painful body areas, tubing, and stomas, which may be compressed by sling application and patient positioning • Contractures, spasms or risk of unexpected stiffness and movement in the sling during the transfer
Hammock slings Also called full body slings or split leg slings depending on the sling design. Typically, a rectangular shape sling that provides full back and pelvic support but may or may not provide head support or an opening for toileting. Some designs of Hammock slings provide split leg support which require the use of multiple specifically designed leg loops. These leg supports can be applied in an open or closed position depending on the amount of leg support required. Some designs have additional straps attached to the body of the sling for added support. ***Function*** Hammock slings can be used for transfers of patients in a seated, reclined position to/from	**Advantages** • Provides a high level of support for the torso, hips and sacrum and thighs • Each leg may be supported independently and in a neutral position (depending on the style of Hammock sling) ***May be appropriate for patients who:*** • Cannot assist or provide active participation • Have limited upper body function and tone • Can tolerate sitting position • Have adequate hip and knee flexion • Require head support (high back) • May be suitable for a unilateral or double above knee amputee

Style of Sling and Description	General Guide for Suitable Use
bed, wheelchair, chair, stretcher or exam table, commode, or toilet (if opening for toileting present), and off the floor (with head support) following a fall.   *Example of a full body sling or comfort sling with no opening for toileting.* *Source: Alpha Modalities*  *Example of a hammock sling suitable for a bilateral above knee amputee* *Source: ARJO*	Support needs may vary depending on length of stump and level of support provided when using the sling in a closed leg position • Experience pain while in a sling and for patients of size. This sling distributes weight over a larger area, providing more comfort *Additionally:* • It may be more suitable to leave under a patient after being lifted to a chair if the sling has no opening for toileting ***(Refer to Table 5.9)*** • Depending on the Hammock sling style, it may accommodate patients with hip precautions by adjusting the leg straps to keep hips neutral (not rotated) **<u>Disadvantages</u>** • Some styles can only be applied and removed with patient in a lying positioning to ensure fabric is under the patient's buttocks • Has limited access for hygiene tasks ***May not be appropriate for patients:*** • Who need lateral trunk support (a universal sling may provide more lateral support) e.g., patients who may have seizures or involuntary spasms • Have spinal injuries • Have extreme fixed kyphosis • Who want or need to have the sling removed when seated in a chair (this is usually not possible) • Wounds or painful body areas, tubing, and stomas, which may be compressed by sling application and patient positioning

Style of Sling and Description	General Guide for Suitable Use

Toileting or hygiene slings
 	
This U-shaped sling is designed to leave the entire buttocks area *uncovered* to facilitate toileting and washing, and to provide access to remove/lower the patient's clothing while they are being supported by the sling and lift.
 	
This type of sling provides support around the midback and the lower torso under the arms. It splits into two wide straps at waist level which provide support to the legs under the mid-thigh area.
 	
Some hygiene slings have a belt that is secured around the patient's waist for added security, and some may have the option of higher back and head support
 	
Function
 	
Toileting slings are used for transfers of patients in a seated position, to/from bed, commode or toilet, wheelchair, or chair.
 	
 
	Advantages
	
	• Easy personal access for e.g., dressing, personal hygiene etc.
	• Easy application due to the smaller amount of fabric than other types of slings
	• Some patients with access to lifts in the home setting may be able to put this sling on independently
	
	May be appropriate for patients who:
	
	• Have good trunk control
	• Have head and neck control and do not require head support
	• Have good muscular endurance i.e., trunk and hip control required to tolerate and maintain a safe upright posture in sling
	• Can demonstrate some level of hip extension/gluteal strength
	• Can re-position their arms independently
	• Are cooperative and predictable
	
	Disadvantages
	
	• Limited to use for:
	  ○ Patients who meet the physical and cognitive criteria above
	  ○ Toileting/hygiene tasks only
	
	May not be appropriate for patients who:
	
	• Have weak or flaccid core strength/lacks trunk control as there is a risk of slipping through the sling e.g., patients who may have seizures or involuntary spasms
	• Require head and neck support

Style of Sling and Description	General Guide for Suitable Use
 *Example of a toileting sling* *Source: Baxter*  *Example of a toileting sling* *Source: Etac/Molift*	• Have cognitive impairment e.g., there is a risk of slipping through the sling if the patient is uncooperative and raises their arms over their head • Have unilateral above-knee amputation, or bilateral lower limb amputations • May not be suitable for patients with hip precautions • Cannot be used to lift a patient from the floor • Have wounds or painful body areas, tubing, and stomas, which may be compressed by sling application and patient positioning
2. Supine Slings – Non-Rigid	
Supine or repositioning slings are typically rectangular in shape with several attachments points and are designed to cover the bed surface and in most cases support the full body. Designs vary in width, length, number, and length of loop attachments. Some styles of supine slings require a flat sheet to be placed between the patient and the sling for patient comfort e.g., mesh fabric supine slings. ***Function*** Supine or repositioning slings are used to reposition (boost and turn) and transfer patients who are lying in a supine position and cannot move themselves. Repositioning may occur when moving a patient from side to side or rolling to a side lying position for pressure relief, skin care and/or bathing, moving or boosting toward the head of the bed and moving from surface to surface (such as bed to/from stretcher) as a lateral	**<u>Advantages</u>** • If left under the patient, supine slings may facilitate the frequency of repositioning and reduce the friction and shearing forces typically generated during when a patient is manually boosted in bed ***(Refer to Table 5.9)*** • If in situ can assist a patient to a sitting position in bed to place portable x-ray plates or pillows • Can be used to place patients to and from supine to prone position when used with an overhead lift and as appropriate with some styles of powered floor-based lifts ***May be appropriate for patients who:*** • Must remain flat • Can tolerate supine position

Style of Sling and Description	General Guide for Suitable Use
transfer. These slings are typically designed for use with overhead lifts especially when used for lateral supine transfers. If a powered floor-based lift and supine sling is to be used to reposition and/or transfer a patient, ensure that the lift and sling manufacturer(s) approve this use and complete a thorough risk assessment to ensure the task can be performed safely. These slings can also be used with overhead lifts and some larger capacity mobile floor-based lifts to rescue a patient from the floor after fall. The sling can be used to support a patient on a rigid back board during fall recovery if a potential spinal injury has occurred ***(Refer to Fall Recovery on page 5-81).*** Depending on the strap configuration of the sling and the style of lift hanger bar, some supine slings allow movement and transfer of patients in a *semi-reclined* position e.g., for boosting in bed and for transfer to a reclined chair with foot support such as, a cardiac chair.   *Example of mesh repositioning/supine sling.* *Source: Etac/Molift*   *Example of a repositioning sling* *Source: Alpha Modalities*	• Cannot tolerate sitting position or has restricted hip and knee flexion • Have hip precautions when used with a wedge system or similar, to abduct hips and legs, and with pelvic fractures if tolerated • Have external fixation or support devices such as HALO or TLSO braces or traction if the device does not damage the sling during use **<u>Disadvantages</u>** • The patient may feel claustrophobic or dislike being 'wrapped' or 'cocooned' in the sling when lifted in a supine position *However,* if the sling and hanger bar allow movement in a semi-reclined position, patients may feel less claustrophobic because this position offers a wider field of view ***May not be appropriate for patients with:*** • Spinal trauma where the spine must remain in alignment • Respiratory compromise and cannot tolerate laying in a supine position • Should *not* be used for transferring a patient to an *upright* chair, wheelchair etc., as there is a risk of the patient sliding out of the chair due to the amount of sling fabric under the patient

Style of Sling and Description	General Guide for Suitable Use

3. Limb Slings and Turning Bands

Function

These slings may consist of one or multiple straps or bands of fabric or wipeable material designed to lift and support a body part(s) e.g., supporting limbs during dressing changes and foot care, and turning a patient to view their back or bottom and to provide care.

These slings may vary in shape and dimension e.g., rectangular, or triangular and may be padded for extra support and comfort.

Example of a limb sling

Source: Baxter

Example of a limb sling

Source: Alpha Modalities

Example of a turning band

Source: Alpha Modalities

Advantages

- Enhances accessibility to different areas of a patient's body for performing a range of care tasks
- May reduce the need for caregivers to support a limb or the number of caregivers required hold a patient in a side lying positioning
- Limb slings may be used for range of motion exercises when attached to a ceiling or floor lift
- A limb sling(s) can be used with an overhead lift to support a patient's leg(s) as they move in and out of bed.

May be appropriate for patients who:

- Require limb holding or positioning for wound care; venous wrapping; hygiene tasks, etc.

Disadvantages

- Placing and removing a *turning* bands(s) under a patient, especially a patient of size - may add to time to complete a care task

May not be appropriate for patients who:

- Cannot tolerate lifting of a limb
- Cannot tolerate being turned to a side lying position
- Have impaired skin integrity and/or neurovascular deficits to the limb requiring lifting (additional precautions should be taken)
- Lacks range of motion in the joints or other restrictions of the lifted limb (i.e., lack of ankle, knee, hip flexion)

Style of Sling and Description	General Guide for Suitable Use
 *Example of a rehabilitation support sling* *Source: Guldmann*  *Example of a turning bands* *Source: Baxter*	• Have wounds that the sling would occlude when in use Additionally: • Turning bands may not be appropriate to use with unconscious clients who have no active trunk control or with spinal or hip precautions • Turning bands or limb slings *should not* be used for lifting a patient off a surface • Limb slings should not be placed under joints • Pillows, small soft towels can be used as padding as needed

4. Walking/Ambulating Harnesses/Gait Training Slings

Function These slings assist patients with partial to full weight bearing capabilities from a sitting to standing position and movement in a standing position e.g., pivot transfers, ambulation, and toileting. The design of these slings varies. These slings may provide upper body or lower torso/hip support with or without head support and may or may not have crotch or leg supports. Some are built to support a pannus for larger patients. Leg straps (if present) are not designed to support the client's weight or maintain the client in a standing position. They can assist to prevent the chest harness from rising on the patient's body and assist to control the patient's movement if they lose balance when ambulating (fall prevention). Gait training slings may also have leg support straps that allow adjustment of the amount of	**<u>Advantages</u>** • Can promote safe and early ambulation and assist a patient to meet rehabilitation goals ***May be appropriate for patients who:*** • Have upper extremity coordination of at least one limb • Have upper body strength/trunk control • Can transition from sit-to-stand with no or minimal assistance • Have at least partial weight-bearing capability • Are cooperative and can follow simple activity commands (a risk assessment should occur to determine if use is appropriate with a patient who may become aggressive/combative is safe) • Have the endurance required of the task • Can engage in rehabilitation e.g., Sensori-motor training

Style of Sling and Description	General Guide for Suitable Use
weight a patient is to apply through their legs when ambulating. These slings are compatible with overhead lifts and some floor-based lifts. A suitable floor lift is one that is equipped with a lift boom that offers sufficient vertical clearance for patients to stand under the hanger bar and with drop-down horizontal arms to offer support during ambulation.   *Example of an ambulation harness/sling* *Source: Savaria/Handicare*	**Disadvantages** ***May not be appropriate for patients:*** • Who do not meet the criteria listed above • Have groin injuries • Have rib injury • Where the sling occludes wounds on the torso etc.  *Example of an ambulation harness/ sling* *Source: Baxter*  *Example of a gait training harness/sling* *Source: Guldmann*
5. Sit-to-Stand Slings	
These slings can consist of a single band that is secured around a patient's waist. They may or may not be used with a buttock support or leg extension strap that goes around the upper thigh to further secure the patient. The height of torso support offered and the girth dimension for security straps can vary. Standing slings usually connect at two points on a sit-to-stand lift or non-powered device via loops, clips, or ropes attachments.	**Advantages** • Can facilitate rehabilitation goals related to standing and walking activities and activities of daily living such as toileting • Can facilitate assessment and peri and/or wound care of the back and buttocks of a patient when in a device • Can facilitate removal and replacement of clothes

Style of Sling and Description	General Guide for Suitable Use
Some manufacturers offer special support straps to secure uncontrolled limbs. Some slings have a non-slip material on the inside of the sling to prevent movement of the belt up the patient's torso. Padding may be provided on the top edge of the sling to provide comfort to the patient under the arms. ***Function*** These slings are used with powered and non-powered mobile sit-to-stand or non-powered stand assist devices to complete tasks such as transfers to/from bed, commode or toilet, wheelchair, or chair, and in some environments to/from a height adjustable stretcher or exam table.	***May be appropriate for patients who:*** • Have upper extremity coordination of at least one limb including being able to hold at least one handle or frame of a non-powered stand assist device • Upper body strength/trunk control and head control • Has at least partial weight-bearing capability • Is cooperative and can follow simple activity commands • Can actively straighten his or her hips when raising to a standing position **<u>Disadvantages</u>** ***May not be appropriate for patients:*** • Who do not meet the criteria listed above • Have spinal injuries or surgery • With hip or knee precautions • With shoulder pain or instability • If the sling occludes wounds, drains or a stoma, etc., on the torso • Orthostatic hypotension

Example of a sling for a powered sit-to-stand lift

Source: ARJO

Example of a sling for a powered sit-to-stand lift

Source: Guldmann

Example of a wipeable sling for a powered sit-to-stand lift

Source: Alpha Modalities

Example of a sling for a non-powered sit-to-stand aid

Source: Guldmann

Style of Sling and Description	General Guide for Suitable Use
Specialty Slings	
These include but are not limited to slings that are specifically designed for use with amputees, lifting and support of a pannus, and for use in the Morgue. There are also combination slings that have been developed for multiple purposes, for example: • An air-assisted lateral transfer device that can also be used to lift a patient in a spine or seated position with an overhead or floor-based lift. • Supine slings that have friction reducing properties so they can be used with an overhead lift or for manual repositioning in bed and lateral transfers. It is important to ensure that combination slings meet ISO 10535: 2021 design and compatibility standards, and that purchasers conduct a thorough risk assessment to ensure safe use with the lift systems that will be used. ***Refer to Appendix F for more information.***  *Example of a combination sling & air assist device for repositioning and transfers* *Source: HoverTech*	Refer to the manufacturer's instructions for appropriate use of specialty slings.  *Example of a pannus sling.* *Note – some pannus slings can be used without an overhead lift system* *Source: Alpha Modalities*  *Example of sling straps that can be used in a mortuary* *Source: Guldman*

Style of Sling and Description	General Guide for Suitable Use
II. Rigid Body Slings	
These slings are manufactured from rigid materials such as plastic (which may or may not be padded) or from flexible materials encased by a frame. Depending on the design of the attachment system or coupling, they may be used with some models of overhead lift systems or power floor-based lifts.	
Rigid Seated Slings Slings where the patient is sitting on a platform which is suspended to an overhead lift by means of a frame. A rigid body support for seated transfers may also have non-rigid body support components such as fabric bands or straps that support a patient's legs.	***Advantages and Disadvantages*** *- Refer to Toileting slings above.* *Example of a rigid style seated sling with leg supports* *Source: The Library of Congress, 2011* 
Rigid Supine Slings Some rigid supine slings are designed to lift a patient from the floor or perform a transfer from surface to surface when the patient's back or spine must remain immobile. They can be attached to overhead or powered floor-based lifts with a 4-point hanger bar *(See figure on right).* Others are designed using a rigid framework attached to a special hanger bar or support frame to support a body e.g., for use in morgues and funeral homes or for use with bathing lifts.	

Style of Sling and Description	General Guide for Suitable Use
 *Example of a rigid supine sling or stretcher used with a mobile bath lift* *Source: TR Equipment*	 *Example of a rigid supine scoop sling.* *Source: ACC, 2012. Etac/Molift*

Table 5.8 *General Sling Categories, Associated Tasks, and Applicable Patient Populations***.**

Source: ACC, 2012; Alexander, 2008; Ballarat Health Services, 2013; Baptiste et al., 2008; DLF, 2014; Enos, 2019; ISO 2021; Murry & Monaghan, 2012; Smith et al., 2023; VHA, 2016.

Non-Rigid Sling Fabric or Material

Non-rigid slings are made from different fabrics. The fabric type, mix, thickness, weave, stretch (tight or loose), and placement of support bands and binding strips affect sling function, patient comfort, skin impact, and laundering needs.

Sling materials can be divided into 3 broad categories:

1. Reusable washable slings:

These are made of fabric and should be laundered when soiled and before use with another patient. Reusable slings may be made of solid or mesh synthetic materials such as polyester and nylon and may include padding.

The most common categories of sling fabric are:

- *Plain polyester*

  Plain polyester knitted fabrics are common and are hard wearing with some element of 2- way stretch. They can usually tolerate laundering well and may be easier to slide into/out of position under the patient.

- *Polyester mesh*

  Polyester mesh dries quickly, making it ideal for baths and showers. It should only be left under a patient briefly due to its design and composition.

- *Nylon rip-stop fabric, also known as parachute fabric/silk or "slipfit"*

  Slipfit fabrics are thin, non-breathable, parachute silk like materials that reduce friction for easy insertion and removal.

  However, their tight weave lacks stretch and ventilation, thus they may not be suitable to leave under a patient for a prolonged length of time.

- *'Spacer' fabrics*.

  Spacer fabrics are three-dimensional knitted textiles made of two separate layers, joined or kept apart by spacer yarns. They consist of an initial layer for moisture release, a middle layer for air flow, and an outer layer for heat dissipation. The ventilating properties of spacer fabric help to remove moisture away from the skin, and its soft, cushioning characteristics reduce force, allowing 4-way stretch whilst remaining relatively light. These properties allow the fabric to mold to the patient's body and together with the pressure re-distribution properties, breathability and wicking properties, make it be more suitable to leave under a patient (based on risk assessment). (Webb et al., 2018).

  Webb et al., demonstrated that if a sling needs to be left in situ, then the spacer fabric is more likely to reduce the risk of pressure ulcer development (Webb et al., 2018).

2. Reusable wipeable slings

These slings should not be laundered between use with patients. Instead, they should be wiped down with sanitizer/disinfectant that is approved by the facility and sling manufacturer, before use with each patient.

Wipeable slings usually have a coating that keeps them from being breathable, which usually means that they are not a good choice to stay under a patient or in direct contact with the patient's skin (VHA, 2016).

3. Disposable slings

Disposable or single 'patient' use slings are designed to be used by *only one patient* and disposed of when soiled, damaged, or no longer needed by the patient. Disposable slings are designed not to be laundered and reused. Disposable sling fabrics vary from nonwoven fabrics to many textures of cotton, polyester, and/or polypropylene, among others, each of which may have their own effect on breathability and environmental footprint. These slings can be useful for patient specific solutions or when spread of infection or cross-contamination between patients is a concern.

Leaving a Sling under a Patient

There is international agreement that SPHM devices should be used when repositioning and transferring patients to reduce friction and shear caused when manually lifting and moving patients (Brienza et al., 2015; NAIPA, EPUAP, PPPIA, 2025).

The 2025 International Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline states that 'manual handling equipment (*SPHM technology*) should not be left under the individual after use, unless the equipment is specifically designed for this purpose' (NAIPA, EPUAP, PPPIA, 2025).

The following is also stated in the guideline 'Principles of safe manual handling should be used to ensure the safety of the individual, their informal carers, and the collaborative care team. Selection of manual handling techniques should consider preventing skin exposure to pressure and shear forces. Specialized equipment (including but not limited to mechanical lifting devices, transfer sheets, lateral air transfer devices, turn systems/devices, low friction fabrics, turn-assist devices and turn-assist features on beds and manual handling techniques (e.g., ergonomic techniques, two- to four-person lifts, etc.) that reduce the risk of friction and shear should be available and implemented' (NAIPA, EPUAP, PPPIA, 2025).

Regardless of whether SPHM technology is intended to remain under a patient, clinicians should assess each patient's clinical situation and consider if features of the technology such as a sling, could contribute to pressure injury development.

Leaving a sling such as a supine sling under a patient in bed may facilitate more frequent repositioning of the patient when used with an overhead lift thus reducing the risk of pressure injury to the patient and injury to caregivers from manual lifting.

Conversely if a bed-sling must be removed and reapplied each time a patient is to be repositioned, the extra workload and time hinders caregiver use of overhead lifts. The frequent placement and removal of a sling create a risk of injury for caregivers. (Nagavarapu et al., 2017; VHA, 2015). Pulling and tugging a sling to remove and replace it may also increase risk of damage to the patient's skin.

Based on over 10 years of experience at one large hospital, breathable repositioning slings are left under patients in rooms with overhead lifts without increased skin damage or pressure injury. These slings are specifically designed to be left in situ.

Studies by Edupuganti & Price (2013), Nelson et al., (2014) and Clark et al. (2015) support these findings. These studies conducted with various in-bed slings and bed surfaces did not yield significant increases in pressure or temperature compared to baseline measurements without a sling. Furthermore, Clark et al., reported that leaving the specific style of repositioning sling used in their study under a patient had no detrimental effect on the pressure-redistributing performance of the bed mattress (Clark et al., 2015).

A few studies have examined the impact of leaving seated slings under a patient in a chair and have concluded that this depends on the design of the sling including the fabric type and how long the sling is to be left in-situ (Crane et al., 2015; Van Dyck, 2016; Webb et al., 2018).

Leaving a Sling under a Patient
Overall, there is little evidence to support that leaving slings under patient increases the risk of pressure injury, but further research is needed. The SPHM manager/coordinator in collaboration with healthcare providers and wound care nursing staff should carefully evaluate both the risks and the benefits for individual patients when considering the practice of leaving a sling beneath patients to meet repositioning requirements. When determining whether a sling can be left under a patient consider the following: • Is the patients' skin compromised or is there a specific skin sensitivity? • What fabric is the sling made of and how breathable is it? • Does the sling present rough or raised uneven edges which can cause pressure points if left under patient? • If a sheet must be left on top of a supine sling for comfort and/or an incontinence pad - will this impede breathability of the sling and/or the function of the bed support surface? • Can a repositioning sling be secured in some way so that creases are minimized e.g., elastic straps to secure the sling to the mattress, tucking straps under the mattress etc? • If a sling manufacturer claims their sling (or any other SPHM technology) can remain under a patient, can they provide independent third-party pressure mapping and breathability test results to verify the claim?

Table 5.9 *Leaving a Sling under a Patient.*

Sling Laundry & Cleaning

Reusable fabric slings

Laundry requirements for reusable slings can vary depending on the fabric composition of a sling. A sling manufacturer and/or supplier should provide laundering instructions which should include a) types of washer and dryer systems that should be used, b) washing and drying instructions, and c) clarification on use of chlorine and/or oxygen-based bleach systems. Unfortunately, commercial laundries may not be able to launder slings per the manufacturer's instructions due to cost and laundry equipment available. Laundries may use high heat wash and/or drying and/or bleach, which often damages slings.

Additionally, laundering instructions should be followed to meet the following Environmental Infection Control in Health-Care Facilities guidelines published by the Centers for Disease Control (CDC) which may differ from a manufacturer's laundering requirements for their slings.

The lifespan of a reusable sling is mostly related to how a sling is laundered e.g., washing, and drying method and temperature used; the detergent/disinfectant used; and the frequency of laundering. Misuse of a sling or damage that occurs as result of contact with medical devices such as external fixation braces etc., is also a factor that influences how long a sling will be safe to use.

Manufacturers have varying 'lifespan' for their slings, however, if a sling is maintained well many manufacturers say that a typical reusable sling has a 3 - year lifespan. A manufacturer may void a sling's warrantee if their laundering or cleaning instructions are not complied with due to safety and liability concerns.

Wipeable slings

Wipeable slings should be wiped down/disinfected with a sanitizer that is approved by the facility and sling manufacturer before use between different patients. The sling manufacturer should provide information about the types of sanitizer or disinfectant that can be used to wipe down or clean a sling. Ensure that all components of the sling can be cleaned effectively (Refer to *Sling Accessories* below). Frequent use of bleach-based cleaning agents may damage wipeable slings. Tolerance to liquids if soaked during cleaning should also be determined. Sling manufacturers should also meet FDA published guidelines for reprocessing non-critical medical devices (FDA, 2015).

Single patient use or one-time use slings

This type of sling should never be laundered and reused**.** Sling labels should include identification that indicates that they must not be laundered and include a symbol that indicates if the sling has been laundered and thus should not be reused.

Sling accessories

Some slings have accessories that should be reviewed to ensure they can be cleaned to meet infection prevention and control needs, e.g. seat belts on toileting slings with Velcro® fasteners or buckles, ropes attachments on some sit-to-stand slings, or synthetic sheep skin on legs of ambulating slings.

*Refer to **Appendix D** for information about cleaning and disinfecting SPHM technology.*

Flammability

Sling manufacturers must include information about flammability in instructions for use (ISO 10535: 2021) e.g., if they have added flame retardant chemicals to the sling material. Refer to any local or state fire code related to flammability of fabrics and equipment used, such as in an operating room environment.

Sling Management

A well-designed sling management system is an essential component that facilitates safe use of patient lift technology by caregivers.

The SPHM manager/coordinator and committee should collaborate with key stakeholders to develop, implement, and sustain an effective sling management process.

Choosing Slings

Overall guidance for choosing SPHM technology is discussed in ***Section 7.***

Considerations when determining sling quantity and type

The quantity and types of slings needed to facilitate appropriate use of overhead and floor-based lifts and sit-to-stand lifts and aids, is based on many factors such as:

- Use requirements including the type and frequency of SPHM tasks to be performed in all areas where patient lifts are used, and the mobility related characteristics of the immediate and future patient population, etc. The quantity of each type of lift device and how slings will be used should be considered. For example, if repositioning slings are left under patients in rooms with overhead lifts on inpatient care units, there needs to be sufficient par stock of slings to allow for frequent changes due to soiling etc.
- The range of sling sizes and weight capacity needed. Remember sling sizes vary by manufacturer. Per ISO 10535:2021, sling manufacturers should provide key dimensions for each of the sling types they offer. ***Refer to Table 5.10***.
- If sling types and sizing will be standardized or if slings will be supplied by more than one manufacturer and will vary in design, use, and style of attachment points e.g., loop and key/clip. Consider the risk of user error and training requirements and processes needed to ensure caregivers will choose and use a sling correctly etc.
- Sling materials that comply with facility infection prevention and control protocols i.e., washable, wipeable, and/or disposable/single-patient use slings. Consider if your laundry provider can comply with the manufacturer's washing and drying requirements for washable slings and if facility cleaning methods meet the manufacturer's requirements for wipeable slings.
- The *service life* (i.e., the length of time during which a sling can be used once opened) and the *shelf life* (i.e., the length of time that a sling can remain *unopened* before it should no longer be used). These factors will vary by manufacturer and sling type i.e., washable, single patient use, or wipeable.
- Initial purchasing costs and ongoing costs to maintain sling supply including estimated sling loss. Sling loss estimates should consider if the process for cleaning a sling after use is not followed e.g., a washable sling is put in the trash, theft, damage, and end of service life replacement.
- For washable slings –
    - The costs of laundering e.g., by weight (lbs.) or by quantity of slings and
    - Delivery and return time to/from laundry for washable slings during normal workdays, holidays, weekends etc.
- Time to deliver slings from a facility's sling storage area(s) to units/departments and required par stock to meet usage needs for twenty-four hours a day, seven days a week etc.
- Storage availability for ongoing stocking of slings in a patient care area.
- Disposal process and cost and environmental impact especially if using disposable slings.

The factors above should be considered when calculating the overall cost of purchasing slings and maintaining and managing sling supply.

Tool 5a lists considerations when choosing a sling vendor.

Sling management processes to be developed

Consider the following:

- Washable slings –
    - How slings will be collected from point of use e.g., caregivers place soiled/used slings in a linen bin located in the patient room with other laundry.

      Disposing of used/soiled slings in a separate laundry bin and/or location away from point of use increases caregivers' workload and may discourage lift use. It also adds time and effort for EVS or housekeeping staff when preparing patient rooms and/or treatment areas where slings are needed. Consider how temporary caregivers and other staff will be trained in the use of, access, and disposal of slings. A user-friendly process will help mitigate sling loss.
    - When and how a damaged washable sling should be removed from service.
- Disposable slings - When and how should they be discarded.
- Wipeable slings - When and how should they be cleaned and removed from service if damaged.
- How caregivers obtain slings if none are available on their unit/department.
- The process to replace or repair (as feasible per the sling supplier) damaged slings.
- Who will develop and distribute instructions and job aids for sling use, ordering, cleaning, and disposal protocols that are relevant for all stakeholder groups.
- An inventory system that tracks the purchase, service life, and use of slings to help forecast when slings should be replaced based on their usage and condition and to mitigate sling loss.

  For each sling purchased, the inventory may document a) date of purchase, b) date of first use, and for reusable slings c) date of periodic sling inspection, by “competent person” assigned by the facility or organization. (Enos, 2018; ISO 10535:2021). Recording sling damage and the process to dispose of or replace damaged slings is recommended. Refer to ‘*Periodic Sling Inspection*’ below.

  Radio Frequency Identification (RFID) tracking systems can be used to track slings within a facility. RFID tagging is available for washable slings.

Monitoring sling recalls or upgrades is also part of an effective sling management system. Regularly check the FDA's Medical Device Recall Database and their dedicated recalls page for updates on specific products. Look for press releases, product updates, and other information about recalls directly on the *manufacturer's* website. Enroll in the free Recalls.gov service to receive electronic notifications about recalls from the FDA and other agencies. *Refer to* ***Appendix E*** *for more information on SPHM technology related regulations and recalls.*

Storage

Sufficient styles (seated, repositioning, etc.), sizes, and quantities of slings should be readily available near the point of use to facilitate use of lift equipment by caregivers.

Shelves or bins used to store slings should be labeled so that caregivers can quickly grab the correct style and size of sling. Storing slings in a manner so that caregivers can view sling labels to verify style and size easily can facilitate quick access e.g., slings are folded so that the label and any other size indicator such as trim color, is salient.

Storage locations should be within easy horizonal and vertical reach of most users.

Washable slings are often stored with clean linens and disposable and wipeable slings with other clean and sterile supplies. Collaborate with unit/department staff and the department who will maintain the sling supply to determine the optimal place for storage etc.

Slings that are used infrequently, e.g., for a specific task or patient population, could be stored in a central location if caregivers can order them easily for timely delivery to the care area when needed. For example, to reduce storage needs on patient care units, pannus slings and XXL seated slings that are used on a monthly basis or less by a few patient care locations could be stored centrally in one or two locations if slings can be accessed easily when needed etc.

Periodic sling inspection

A sling inspection process is important to reduce the risk of structural failure of a sling when in use and potential for patient harm.

A visual inspection of a sling should be conducted by the caregiver *prior to each use (Refer to **Tool 5b**).* However, slings should also be inspected by a *competent* person when they are placed into first use, and on a periodic basis.

Manufacturers of reusable slings (washable/wipeable) should indicate how often their slings should be inspected, however, ISO 10535:2021 recommends periodic sling inspection at least every *6 months*. More frequent inspection may be needed if slings are used or cleaned more frequently than normal.

Slings that are found to be defective or damaged by users or the person(s) who conducts periodic sling inspections, must be removed from service immediately.

Periodic sling inspection should include assessment of:

- **Fabric or structural materials** for rips, tears, holes, or fraying and signs of chemical or heat damage such as discoloration, brittleness, stiffness, thinning.
- **Stitching and bindings** at seams and load-bearing areas for loose, broken, or frayed threads, particularly at stress points where straps connect to the body of the sling.
- **Straps, loops and clips or fasteners** for signs of wear or damage.
- **Label legibility** to ensure the manufacturer's label is intact and all information is readable *(Refer to **Appendix G** for more information about sling labels).*

Refer to Tool 5d Sling Inspection Checklist for more information.

All sling management activities should be documented including periodic inspection activities for legal and safety purposes.

ISO 10535:2021 recommends that inspection documentation includes the inspection date, identification details and serial number of the sling, the sling's condition, if the sling was removed from service, the date of the next inspection and the inspector's name and signature.

A competent person is defined in this context, as an individual with the relevant technical knowledge and practical experience with SPHM technology to enable her/him to detect defects and/or weaknesses and to assess their importance in relation to the safety and continued use of the slings being examined (AASPHM, 2016).

Tool 5a provides more considerations to assist in developing an effective sling management system.

Sling Sizing

Manufacturers provide slings in various styles and sizes, such as seated slings ranging from extra extra-small to extra extra-large.

Sling sizes are not consistent across manufacturers (Smith et al., 2023; ISO 10535:2021). For example, a medium size universal seated sling from one manufacturer will have a different recommended weight range and dimensions than a medium size universal seated sling from another manufacturer.

Several manufacturers use a color-coding system to identify the size range of a sling e.g., a sling with yellow edging is a medium, however there is no standardization of color coding between manufacturers (ISO 10535:2021).

The shape of a sling and number of attachments within a style of sling e.g., hammock style slings, also varies between manufacturers.

Additionally, sling designs can alter over time, so a new sling from a manufacturer may differ in size or attachment strap length from one that was previously purchased from the same manufacturer (NHS, 2015).

A sling may need to be changed if a patient gains or loses weight and/or as a medical condition or clinical needs changes (Gibson, 2015).

The factors listed above can contribute to user error when choosing a sling, especially if there is a wide variety of sling styles available in a facility and/or a variety of slings of the same style from different manufacturers.

Therefore, it is essential when choosing a sling for an individual patient to ensure the correct ‘fit.’

Caregivers should be knowledgeable about the weight capacity of the specific sling being used; however, it is equally important to recognize that weight capacity alone does not determine appropriate sling fit, as factors such as the patient’s body shape and weight distribution play a significant role (Alexander, 2008; Smith et al., 2023). Therefore, caregivers must also know how to correctly fit a sling to meet an individual patient’s SPHM needs.

Manufacturers should provide instructions on how to choose the correct fit of sling for a patient. Some provide only weight range as a sizing guide while others will also provide dimensions of a sling and how to measure the patient correctly to ensure an appropriate fit. Body measurements required will depend on the style of sling.

ISO standard 10535:2021 recommends that in addition to the maximum weight capacity, manufacturers of slings provide the following dimensions for each type of sling offered.

Sling Type	Body Dimensions
Non-Rigid Slings	
Seated Slings	• Weight range of the sling • Level of trunk and head support – high, medium, low support ***(Table 5.8)*** • Slings with split leg support opening, the type of opening support – narrow, standard, wide ***(Table 5.8)*** • Hip breadth • Sitting height • Shoulder breadth • Body length • Chest circumference • Thigh circumference
Supine/Flat Repositioning Slings	• Shoulder breadth (deltoid) and if other part of body is broader • Hip breadth in supine position • Body length
Limb slings, turning bands & other slings that support part of a body	• Essential body dimensions will depend on the intended use of the sling • Maximum weight capacity of the sling in relation to the lifted body part
Ambulation/walking/ gait training slings	• Sitting height • Chest circumference • Waist circumference • Thigh circumference for legs straps if present
Sit-to-stand slings	• Sitting height • Body length • Chest circumference • Waist circumference
Rigid Slings	
Seated rigid slings	• Level of trunk and head support – high, medium, low support • Hip breadth • Sitting height • Chest circumference

Sling Type	Body Dimensions
	• Waist circumference
Rigid slings for supine transfers.	• Shoulder breadth (deltoid) and if other part of body is broader • Hip breadth in supine position • Body length

Table 5.10 *Essential Body Dimensions for Sling Sizing.*

Source: ISO 10535:2021

Additional information about definitions of body dimensions and guidelines for color coding for size of non-rigid slings can be found in ISO 10535:2021.

Other information that should be provided either on the sling label or in the manufacturer's instructions are reviewed in ***Appendix G.***

Other factors that influence the choice and fit of a sling include a patient's physical, cognitive, and clinical needs as described in ***Table 5.8*** and the design of the sling and lift hanger bar. For example:

- **The shape and size of a sling**. Generally, a sling with more material e.g., a universal sling provides greater comfort and support than a sling with less material such as a hygiene or toileting sling.
- **The number and position** of attachment points such as loops or clips on a sling.
- **The adjustability** of the attachments on sling e.g., a loop style attachment that allows a choice of lengths to be used. For example, when using shorter shoulder loops on a universal seated sling and longer leg loops the patient's body will be in a more upright seated position (if the sling is sized correctly and fits well).
- **The shape** of the hanger bar to be used and number of attachments points. For example, a 2-point hanger bar used with a seated or repositioning style of sling can place patients in a more 'closed or bent forward posture' which may not be comfortable for larger patients or those with joint pain and certain orthopedic conditions.
- **The width** of the hanger bar, for example a wider hanger bar may help reduce discomfort and pressure on the shoulders and legs when using a seated style sling.

Additionally, sling fit should be checked when performing patient handling tasks, including when a sling is first placed on the patient, during attachment of the sling to the lift hanger bar or attachment points, and when raising the lift motor to apply tension to the sling before lifting the patient of a surface.

Therefore, it is important that selection of a sling for a patient is determined by assessment of the patient and their mobility needs on admission, when a patient's clinical condition or needs change, and every time a SPHM handling and mobility task is performed ***(Refer to Administrative Controls).*** *Risk Assessment for Safe Use of Slings is discussed in* ***Tool 5b.***

Friction Reducing Devices (FRDs)

General Description

Friction reducing devices (FRDs) are used to transfer a patient in a supine position from one surface to another e.g., to/from bed and stretcher. Some FRDs can also be used to reposition a patient on a flat surface such as boosting and turning a patient up in bed, and/or repositioning a patient in a chair, and placing a patient to and from a supine and prone position. Some types of FRDs can be used to assist insertion and removal of a lift sling under a non-mobile patient and assist a patient to the edge of the bed prior to a standing transfer.

FRDs lower the coefficient of friction (frictional resistance) between two surfaces, such as a patient and a drawsheet or bed sheet, making movements such as bed-to-stretcher transfers or repositioning in bed easier (Baptiste, 2018).

The goal is to decrease the physical effort (pulling force) required by caregivers to move a patient and to reduce the friction and shearing forces on a patient's skin when they are being repositioned or transferred.

Friction reducing devices can be placed into 4 general categories:

1. Air-assisted transfer devices
2. Friction-reducing slide sheets/tubes
3. Transfer and roller type boards
4. Bed overlay systems for repositioning

Table 5.1 summarizes the patient handling and mobility tasks that can be performed using Friction Reducing Devices.

In the acute care setting, repositioning a patient in bed is one of the most frequently performed tasks and is known to be a leading cause of low back injuries in caregivers (Callison and Nussbaum, 2012; Kotowski et al., 2013; McCoskey, 2007; Poole Wilson et al., 2015; Pompeii, 2009; Wiggermann et al., 2021).

For over 100 years, cotton sheets or draw sheets have been commonly used to boost patients in bed or on a treatment surface and are still widely used in healthcare settings. However, evidence supports that the forces required to boost a patient in bed using a cotton sheet or drawsheet *far exceed* the safe force limits for the spine (Bartnik and Rice, 2013; Larson et al., 2018; Wiggermann et al., 2021). Thus, using a sheet/drawsheet to boost a patient on a surface or to transfer a patient between 2 surfaces in a supine position is unlikely to prevent caregiver injuries related to patient handling.

Friction reducing devices can be used in various repositioning and transfer scenarios to reduce the physical demands placed on caregivers. They have been found to produce less internal spinal loads as compared to traditional cotton sheets (Amini Pay et al., 2021; Bartnik and Rice 2013; Elnitsky et al., 2014; Larson et al., 2018; Koppelaar et al., 2012; Lloyd & Baptiste, 2006; Theou et al., 2011; Weiner et al., 2017; Wiggermann et al., 2021).

However, the ability of an FRD to reduce spinal load (forces) during repositioning and lateral transfer tasks varies by device. Unlike mechanical lifts such as an overhead or floor-based lift, FRDs do not fully support the weight of the patient, so when using an FRD, caregivers still must exert some force to pull horizontally when transferring or repositioning the patient on a surface.

The friction between the FRD and the surface significantly affects how much force a caregiver needs to move the patient.

Factors that influence the amount of resistance between 2 surfaces and thus how much physical effort a caregiver must exert to break the starting friction to initiate movement include the:

- Patient weight and size. Physical stress is greater when moving heavier patients (Wiggermann et al., 2021; Muona et al., 2022).
- Composition of the support surface e.g., smooth and firm vs. soft

Air-assisted transfer devices appear to be the most effective type of FRD to reduce spinal loads in caregivers especially as patient weight increases (Wiggermann et al., 2021).

The number of caregivers required to complete transfers tasks and repositioning using a FRD will depend on a patient's weight and body habitus, the width of both the initial and the receiving surfaces during lateral supine transfers, and other factors such as the presence of lines and monitoring equipment, and if support of the patient's airway, head and/or lower limbs is required.

1. Air Assist Transfer Devices

Air assist transfer devices consist of a motorized blower, hose, and a mat or pad with tiny pinholes on the bottom and handles along each edge. The mat is positioned beneath the patient, ensuring appropriate support for both the head and legs. The blower is attached to the mat via a hose. Once started, the blower uses an electrical motor to force air into the mat to inflate it. After the mat is inflated, the blower continues to push air into the mat and through the tiny holes on the base of the mat creating a cushion of air that reduces friction so the mat can easily slide along a surface or between 2 surfaces. These devices remain inflated when completing a repositioning or transfer task and must be deflated once the task is completed.

The blower motor, hose and mat can be stored in a cart for easy access and transportation.

Air Assist transfer devices need to be connected to an electrical outlet for use. However, some can be operated by a portable re-chargeable battery which is a useful option if there is no readily available electrical power source.

A minimum of 2 caregivers is normally required to use an air assist device for lateral supine transfers.

Air assist devices mats can be:

- Reusable and wiped clean between patient use or
- Disposable (single patient use) and used for only one patient. However, a single disposable device can typically be used repeatedly to move the same patient multiple times if it remains clean.

Air Assist transfer devices can be used in a wide variety of healthcare settings although they are more commonly used in hospital settings in perioperative and imaging departments and patient care units.

Some examples of use in these areas include:

- **Imaging and perioperative settings**

  A *deflated* air assist transfer device can be left under a patient when they are transported to/from patient care units and other treatment areas such as imaging and perioperative departments, where it can be inflated to facilitate safe transfers.

  Air assist transfer devices are typically radio-translucent so can be used in a variety of imaging settings including Magnetic Resonance Imaging (MRI). For MRI-use, a long hose (e.g., 25 feet) enables caregivers to use the mat in MRI areas by keeping the blower (air supply motor) out of an MRI room. Check with the device manufacturer to ensure an air assist mat and hose are compatible with MRI.

  Mats are offered in different widths and lengths and shapes depending on function e.g., a half-air assist mat may be used in the operating room for gynecological and urology surgeries where a full-length air assist mat could interfere with surgical access when using specialty tables.

- **Patient care units**

  In-bed repositioning. Air assist devices are designed to remain under a patient during procedures or imaging. Depending on the manufacturer's recommendations and approval by a facility's wound and ostomy department, an air assist mat may be left under a patient for longer periods to facilitate repositioning (i.e., boosting, turning and proning) in bed. This is especially useful when caring for dependent patients of size in a room with no overhead lift system. Two small studies indicate that leaving a single-patient-use air assist mat or a reusable mat does not increase risk of pressure injuries (Deter et al., 2013; Lloyd, 2010).

  Bed-side imaging. An air assist device can be inflated to facilitate easier placement and removal of an x-ray plate under a patient. The device is deflated while an x-ray is taken.

  Fall recovery. An air assist mat can be placed under a patient who has fallen in a confined or awkward space. While deflated, the mat's handles can be used to slide the patient to an area suitable for using a mechanical lift or air assist lifting device to raise the patient off the floor ***(Refer to page 5-81).*** *A patient must be assessed for injuries before determining if this is the safest way to move them and when determining the safest method to lift them from the floor using SPHM technology.*

Source: ARJO

Source: Hovertech

Figure 5.18 *Examples of an Air Assist Transfer Device - Full Length Mat.*

General safety considerations

An air assist mat must be *wide enough* to support the patient's torso and hips and *long enough* to support their head, torso, and legs. A patient's legs will need to be manually supported during a transfer or repositioning task if not supported by the mat e.g., when using a half-mat.

A patient must be centered on an air assist mat prior to inflation to prevent the risk of tipping to one side. It is also imperative that caregivers are trained to move an air assist transfer device slowly to reduce the risk of the patient being moved too quickly or too far.

When transferring a patient between 2-surfaces, surfaces should be at the same height, and the brakes ***must*** be applied on both transfer surfaces.

Caregivers should not attempt to use a mat that is not fully inflated to transfer a patient.

Figure 5.19 *Example of an Air Assist Transfer Device – Half Length Mat.*

Source: Hovertech

These devices are not typically used for patients with undiagnosed or unstable (none-cleared) spinal injuries unless they are used with a rigid back board placed on top of an air assist mat to support the patient.

Obtain approval from the device manufacturer and patient's medical team if an air assist transfer device is to be used with patients who have Ventricular Assistive devices (VADs) or similar medical devices that may be impacted by exposure to static. In environments with lower humidity static may occur during a transfer when using an air assist device.

It is essential to inform the patient prior to transfer that the device will produce noise during both mat inflation and movement. For individuals with dementia or other neurocognitive disorders, assess whether the abrupt sound from the blower may cause distress or act as a potential trigger for aggressive behavior.

Refer to the manufacturer's instructions for additional instructions about safe use.

Weight capacity and size

The weight capacity of air assist transfer devices ranges from 600-1200 lbs. They are available in different widths and lengths.

Storage

The blower and mats can be stored on a purpose-built cart. If blowers are not stored on a cart there is a risk of damage when they are placed on the floor under a height adjustable surface e.g., a bed, and caregivers inadvertently lower the bed onto the blower. Some blowers are equipped with hooks to secure them to a transfer surface.

Battery operated air pumps will require electrical outlets for re-charging in storage areas.

Blowers should be located in or close to areas of use e.g., in a surgical suite, or accessible for use between 1 or more adjacent imaging rooms.

Cleaning

Reusable mats – wipe down between patient use. Some reusable mats may be laundered by following the manufacturer's specific washing instructions.

The blower and hose should be cleaned (wiped down) between use with individual patients.

Some manufacturers offer disposable covers for reusable air assist devices and disposable 'sleeves' for the motor hose to facilitate cleaning.

Disposable mats – some manufacturers offer a fee for service to clean and reprocess mats.

*Refer to **Appendix D** for information about cleaning and disinfecting SPHM technology.*

Maintenance

Blowers and battery systems should be inspected as part of a facility's routine inspection process for electrical medical devices.

Quantity

A workflow assessment is recommended to identify the locations, methods, and frequency of air assist device usage.

The type of mat to be used i.e., reusable, disposable or both, is also a factor that will determine quantity needed.

Like patient lift slings, a process for mat management should be developed that considers the supply process for staff to access mats, disposal process for single use mats and damaged reusable mats, infection prevention and control measures, and reporting of non-working blowers and carts.

As with other SPHM technology, users should inspect air assist mats and blowers for damage etc. before use.

There should be enough blowers so that staff can access them quickly and easily. If blowers are not easily located, staff are more likely to transfer or reposition a patient manually using a deflated mat. Although a deflated mat has some friction reducing properties, they are not typically designed to mitigate risk of caregiver injury when used in this way.

Refer to ***Appendix C*** for more information about how many air assist mats and blowers are recommended.

Standards

Air-assisted transfer devices are classified by the FDA as Class II medical devices. *Refer to **Appendix E** for more information about Standards and Regulations related to use of powered SPHM technology.*

2. Friction-Reducing Slide Sheets/Tubes

These are low-friction sheets that readily slide across other materials or each other in a horizontal direction while decreasing frictional resistance when manually repositioning or transferring a patient ***(Figures 5.20 & 5.21)***.

These devices can be made of lightweight material such as nylon fabric that is coated with silicon to reduce friction or a flexible plastic material.

They are available as a single sheet or a tube of material. Tube slides have 2 sheets sliding against each other, so they have greater friction reducing ability than a single slide sheet. Slide sheets may also be filled with a thin layer of silicone gel that may improve patient comfort when being used for repositioning and lateral transfer tasks.

Some slide sheets only move in one direction and are designed to reduce patient slippage down in the bed and/or in a chair/wheelchair.

Slide sheets can be helpful when inserting and removing lift slings with dependent patients and promoting patient mobility such as moving a patient's leg (s) in and out of bed ***(Figure 5.22)*** or pivoting a patient in a seated position to the edge of the bed. They can also be used as rehabilitation aids when teaching patients how to mobilize in bed and to the edge of the bed.

Larger slide sheets may be tucked under a patient who has fallen in a confined or awkward space and used to carefully slide the patient to a place where a mechanical lift or air assist lifting device can be used to raise them from the floor. *A patient must be assessed for injuries before determining if this is the safest way to move them and when determining the safest method to lift them from the floor using SPHM technology.*

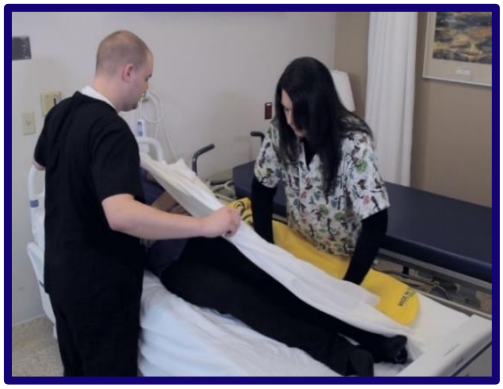
Some slide sheets are designed to be placed under a drawsheet or folded bed sheet, which is then used to move the patient. Slide sheets are then removed after a task is *completed* ***(Refer to General Safety Considerations below)***.

Source: Guldmann

Source: Alpha Modalities

Figure 5.20 *Examples of Boosting a Patient with a Friction Reducing Slide Sheet.*

Source: ARJO



Source: Wright Products

Figure 5.21 *Above & Right - Examples of Lateral Supine Transfers with a Friction Reducing Slide Sheet.*

Source: Wright Products

However, there are some slide sheets that are designed to remain under a patient in bed (also known as 'in-bed' slide systems). This type of in-bed slide sheet may be beneficial when the tasks of inserting and removing slide sheets have a detrimental impact on the patient or put the caregivers at risk of injury. They are indicated when a patient is in pain and spends considerable time in bed and when they are moved frequently (Smith et al., 2023).

Sturman-Floyd found 'no increase in the incidence of new pressure injuries during a six-months monitoring trial of 110 clients who each used an 'in-bed' satin-finished woven textile slide system on top of tissue viability mattress. The incidence of pressure ulcers of all grades was reduced in clients with existing pressure injuries; and the number of carers required for patient handling procedures, even for bariatric clients, was significantly reduced.' There were also significant projected savings related to patient care and pressure injury management costs (Sturman-Floyd, 2011).

Figure 5.22 *Example of Using a Friction Reducing Slide Sheet to Facilitate Moving a Patient's Legs.*

Source: HumanFit/Wright Products

Some 'in-bed' slide systems do not reduce friction as effectively as removable slide sheets or air assist devices and may not sufficiently lower caregiver injury risk with larger patients (Wiggermann, 2021).

When choosing slide sheets consider evaluating and comparing their friction-reducing properties through mock-ups when repositioning and transferring individuals of varying weights on and between common support surfaces in your facility, such as bed mattresses with sheets or stretchers.

Ensure that wound and ostomy staff approve of use 'in-bed' slide systems before purchase. ***Refer to Table 5.9 for more information.***

General safety considerations

Except for in-bed slide sheets and one-way slide sheets that are designed to stay in a chair under a patient, all other slide sheets should be removed from under the patient after completing a repositioning or transfer task. This practice minimizes the risk of the patient sliding off the support surface.

A slide sheet should be of adequate length and width to fully support the patient's shoulders, trunk, and buttocks during a patient handling task. Using a slide sheet that supports the entire length of the patient's body for lateral supine transfers reduces the need for caregivers to support the patient's legs and head during a transfer unless specific clinical reasons require otherwise.

When transferring a patient with a slider sheet between two surfaces, any gap larger than 1-2 inches should be bridged with a full-length slider board (per manufacturer instructions), both surfaces should be set at the same height, and the brakes ***must*** be applied on both transfer surfaces.

It is important that caregivers are trained to use slide sheets correctly and practices are monitored so that the devices are not use to 'lift' patients. Caregivers should follow ergonomic work practices when placing or removing slide sheets to reduce awkward movements and strain.

Refer to the manufacturer's instructions for additional instructions about safe use.

Weight capacity & size

Weight capacity is variable. Some manufacturers indicate that their slide sheets do not have a specified weight limit; however, as patients' weight increases, more caregivers may be needed to use a slide sheet safely.

Slider sheets come in several sizes and lengths. Short slider sheets can be more practical for repositioning tasks and for pivoting a patient who is in a seated position to the edge of a bed. Longer slide sheets are suited to transferring supine patients from one surface to another, such as from bed to stretcher.

Slide sheets that do not require a top sheet for use need to be large enough to fit the patient and allow caregivers material to grasp the sheet using a power grip (whole hand grip) and not a pinch grip without uncomfortable contact with the patient.

Storage

Slides sheets are typically foldable for storage. Some are provided in wall mount dispensers that can be placed in patient rooms or treatment areas for easy access.

Larger silicon filled slide sheets have optional grommets placed at one end so they can be hung on hooks in the work areas they will be used in ***(Figure 5.23).***

Figure 5.23 *Example of Friction Reducing Slide Sheet with Grommets for Hook Storage.*

Source: Wright Products

Cleaning

Slide sheets may be disposable, wipeable, or washable.
Refer to ***Appendix D*** *for information about cleaning and disinfecting SPHM technology.*

Quantity

When determining quantity, the type of slide sheet to be used must be considered i.e., reusable, disposable, or both.

As with patient lift slings, a process for management of slide sheets should be developed that considers the supply process for staff to access slide sheets, disposal process for single use sheets and damaged reusable sheets, and infection prevention and control measures.

Caregivers should inspect slide sheets for damage before use.

Refer to ***Appendix C*** for more information about how many slide sheets are recommended.

Standards

Slide sheets are classified by the FDA as Class I medical devices as they present minimal potential for harm. *Refer to* ***Appendix E*** *for more information.*

3. Transfer Boards

Slider boards

These boards are made of lightweight plastic (polyethene). They may be flexible or rigid in design.

Slider boards are used with friction-reducing slide sheets/tubes or drawsheets to perform lateral supine transfers between 2 adjacent horizontal surfaces.

Roller boards are another style of transfer board that uses a system of rollers encased in vinyl covering.

General safety considerations

Flexible slider boards and roller boards are not designed to replace rigid back or trauma boards for spinal immobilization.

Ensure the patient's skin/part of their body cannot become caught between a slider or roller board and the transfer surface when applying and removing a board and during a transfer.

Most slider and roller boards are not designed to be left under a patient and should be removed immediately after a transfer. However, some slider boards may be radiolucent and are designed to stay under a patient during imaging procedures. Some have anti-static surface coatings to protect patients from sticking to the surface while reducing static build-up.

Review whether a slider or roller board is appropriate for use with a patient who has impaired skin integrity.

Slider and roller boards should be of adequate length and width to fully support the patient's body to reduce the need for caregivers to support the patient's legs and head during transfer unless specific clinical reasons require otherwise.

When transferring a patient between 2 surfaces, the surface must be at the same height, and the brakes ***must*** be applied on both transfer surfaces. *Refer to the manufacturer's instructions for additional instructions about safe use***.**

Short transfer boards

These boards, constructed from either wood or plastic, are designed to assist patients who are unable to stand or bear weight in transferring between two surfaces such as a bed and a wheelchair in a seated position, either independently or with caregiver support.

Short transfer boards may be straight ***(Figure 5.24)*** or curved. Curved transfer boards make it possible to transfer around fixed armrests. Some offer a gliding attachment that facilitates lateral sliding movement of the patient across the board ***(Figure 5.25).***

To use a shorter transfer board a patient must be able to hold themselves upright in a seated position, be able to transfer their weight naturally, and have cognitive ability to understand the task and follow commands.

Short transfer boards are typically used by physical therapists as part of a rehabilitation process for specific patients.

When being used during rehabilitation, a therapist may use a transfer belt that is secured around the patient's waist to guide the patient across the surface. However, therapists and other caregivers may still apply horizontal forces in awkward postures when assisting with these transfers. Fingers may be trapped under board edges.

These boards can also be used together with an overhead lift and walking sling to support the patient's trunk as part of the rehabilitation process when transferring from surface to surface.

Figure 5.24 *Example of Straight Short Transfer Board.*

Source: Stock Image

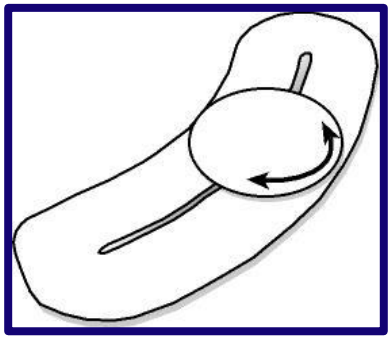


Figure 5.25 *Example of Curved Short Transfer Board.*

Source: OSHA, 2009

General safety considerations

The surfaces between the transfer board must be the same height and stable e.g., brakes are applied on a wheelchair or any surface with wheels. Adequate space should be provided at the intersection of surfaces to position the chair at a 60° angle. The board must be smooth and that any grips on the underside are intact (Smith et al., 2023). *Refer to the manufacturer's instructions for additional instructions about safe use.*

Slider, Roller & Transfer Boards

Storage

Easily accessible and close to point of use.

Weight capacity

Weight capacity is variable by manufacturer but typically range from 300-500 lbs.

Cleaning

Slider, roller and transfer boards are cleaned (wiped down) between patient use, however, some slider and roller boards have disposable covers to facilitate cleaning. *Refer to **Appendix D** for information about cleaning and disinfecting SPHM technology.*

Quantity

*Refer to **Appendix C** for more information about how many slider boards are recommended.*

4. Bed Overlay Systems for Repositioning

These systems can be placed on top of existing beds and in some cases the bed mattress. A powered motor is attached to a specialized sheet system and used to move the patient up in bed. Some models incorporate a patient tilt or offloading feature for continuous lateral rotation ***(Figure 5.26).***

Other SPHM technology is needed to complete tasks such as lateral supine and seated transfers between the bed and another surface.

Weigh capacity varies but is typically 480-500 lbs.

Figure 5.26 *Example of a Bed Overlay System with Powered Function to Boost a Patient and Tilt and Hold a Patient in an Offloaded Position for Pressure Relief.*

Source: Seneca Devices

Fall Recovery

Safe rescue of a patient following a fall can be achieved using several different types of SPHM technology such as an overhead lift with a flat repositioning sheet or a universal seated sling with head and shoulder support. Powered floor-based lifts can also be used if the lift boom lowers close enough to the floor ***(Figure 5.27)*.**

Ceiling and floor lifts should *not* be used to lift patients from the floor if they have suspected spinal injury or fractures or are unconscious with a non-rigid sling. However, use of an overhead lift (or in some cases a larger capacity floor lift) with a rigid spine board that is placed in a full-length repositioning/supine sling; or with a rigid supine sling, may be used to lift a patient if a spinal injury is suspected **(*Refer to Table 5.8*).**

Source: Baxter

Source: Alpha Modalities

***Figure 5.27** Example of Fall Recovery with (1) a Powered Floor-Based Lift with a High Back Universal Seated Sling and (2) an Overhead Lift with Full Body Repositioning/Supine Sling.*

However, there are other SPHM devices that are specifically designed to safely raise a patient from the floor following a fall. These include:

1. Air assisted full length lifting devices
2. Electric inflatable lifting cushions
3. Mobile electric chair and platform lifts

The choice of SPHM technology to lift a patient after a fall will depend on the patient's ability to be able to stand with minimal assistance from caregivers, and the extent of any injuries that occurred because of the fall.

The number of caregivers required to complete a fall recovery task when using these devices is usually significantly less than manually lifting a patient from the floor and is dependent on the patient's injury status, clinical needs, and size.

In outpatient, long term care and community settings, emergency services are typically called for assistance with fall recovery when patient or resident injury is suspected. However, Emergency Medical Services are often requested to assist residents who have fallen and are unable to get up, even when no injuries have occurred (Quatman et al., 2018). This practice is increasing and, in some cases, prevents EMS workers from being able to respond to emergencies (Washington Post, 2024). Some EMS agencies

have started to charge for lift assists with no injury at nursing and medical facilities (Oregon Live, 2021). The use of the mechanical fall recovery devices described below could help long term care facilities better manage client falls without injury and reduce help needed from EMS (Houghton et al., 2024).

Fall Recovery for Patients who Cannot Stand with Minimal Assistance

1. Air Assisted Full Length Lifting Devices

This device consists of a large inflatable mat with several chambers that are filled with air sequentially from the bottom chamber to top chamber using a motorized blower with a hose to lift the patient in supine position to a safe height for transfer ***(Figure 5.28).***

The deflated mat is placed under the patient on the floor, and the mat is inflated. Once the mat is fully inflated the patient can then be transferred in a supine position to another surface such as a stretcher or bed using an air assist transfer device or transfer board ***(Refer to Friction Reducing Devices on page 5-70)***.

The mat has handles around the edge of the top chamber and a reduced friction bottom surface. Once inflated this device can be carefully pulled a short distance and moved to an area where the patient can be transferred to another surface such as the bed in a patient's room.

If a patient falls into a confined space, a mat may be placed under the patient on the floor and the handles on the mat used to slide the mat to a location where the mat can be inflated and the patient transferred to a bed or stretcher **(*Also refer to page 5-72).***

This device can be partially inflated (2-3 chambers) to help a patient who has fallen but uninjured be lifted off the floor in a supine position and then moved into a seated position on the device. The patient's mobility status can then be assessed to determine if they can stand and mobilize with or without minimal assistance from caregivers. This technique is especially useful when assisting an uninjured patient of size after a fall but who cannot pull themselves to a kneeling and then standing position.
If air assisted full length lifting devices *and* air assisted lateral transfer devices are provided from one manufacturer, then the same blower may be used for both devices.

Source: ARJO

Source: Hovertech

Figure 5.28 *Examples of Fall Recovery with an Air Assist Lift Device.*

As with the air assist lateral transfer device, some brands of these mats can be operated with a battery powered motor or blower, so they can be used in settings where electrical power supply is not available such as an outside bay in an emergency department or a parking structure.

These devices may also be used together with an air assist transfer device to *extract a patient from a vehicle* provided that the vehicle seat with patient is at the same height as the air assist lifting device i.e. transfer surfaces are even or the vehicle seat is slightly higher than the surface of the air assist device.

Some manufacturers offer air assisted full length lifting devices that are designed *for emergency patient evacuations* downstairs ***(Figure 5.29)*.**

Figure 5.29 *Example of an Air Assist Lift Device that can also be used for Emergency Evacuation.*

Source: Hovertech

General safety considerations

Air assisted full length lifting devices *do not* have brakes so caution must be taken when transferring a patient from the device to another surface.

Assess the lift device's maximum inflated height to confirm that other transfer surfaces, such as stretchers, can be adjusted to match.

Although some manufacturers claim that these devices are firm enough to perform CPR, it is recommended that resuscitation protocols and use of air assisted full length lifting devices are reviewed by your trauma or medical team especially as they relate to caregiver safety when performing CPR and effectiveness of compressions.

Refer to the manufacturer's instructions for additional instructions about safe use.

Weight

The weight capacity of air assisted full length lifting devices ranges from 1000-1200 lbs. They are available in differ widths. A patient must be able to fit on the device.

Storage

The blower and mat can be stored on a purpose-built cart. Battery operated air pumps will require electrical outlets for re-charging in storage areas.

Cleaning

Air Assist full length lifting devices are reusable and wiped clean between patient use. The blower and hose should be wiped cleaned between use with individual patients.

Some manufacturers offer disposable covers for reusable air assist devices and disposable 'sleeves' for the motor hose to facilitate cleaning.
*Refer to **Appendix D** for information about cleaning and disinfecting SPHM technology.*

Maintenance

Blowers and battery systems should be inspected as part of a facility's routine inspection process for electrical medical devices.

Quantity

Typically, these devices are not used on a frequent basis so can be stored in a central location that is easily accessible to users such as rapid response teams. Therefore, 1-2 devices may be sufficient per facility especially if there are many overhead lifts and/or floor lifts in patient care areas.

A process should be developed and communicated to staff to ensure they know when, and how to obtain and use a fall recovery device, and who will provide assistance when using the device etc.

As with other SPHM technology users should inspect an air assist full length lifting device and blower for damage before use. A process to report and address damaged or non-working components should be implemented.

Refer to ***Appendix C*** for more information about how many air assisted full length lifting devices are recommended.

Standards

Air-assisted full length lifting devices are classified by the FDA as Class II medical devices. *Refer to* ***Appendix E*** *for more information about Standards and Regulations related to use of powered SPHM technology.*

The following equipment requires the patient to be capable of completing a weight bearing transfer from the equipment once they have been raised from the floor in a supported seating position. The patient must also have reasonable sitting balance, core strength, and be able to understand and follow simple commands.

2. Electric Inflatable Lifting Cushions

Inflatable lifting cushions may be battery operated or connected directly to an electrical outlet for operation. They are constructed in sections, and a motor is used to inflate the cushion section by section and raise the patient from the floor until they are in a seated position and able to transfer to another surface ***(Figure 5.30).***

Inflatable cushions are available without or with an inflatable backrest. The backrest provides more support for the patient during the task and allows the caregiver to provide more support to the patient from behind when raising them from the floor.

Weight capacity

They are available in variable sizes and capacities from 485-980 lbs.

Figure 5.30 *Example of a Powered Inflatable Lift Cushion.*

Source: ACC, 2012

Storage

The blower and cushion can be stored on a mobile cart for convenience. Battery operated air pumps will require electrical outlets for re-charging in storage areas.

Cleaning

Electric inflatable lifting cushions are reusable and the cushions together with the battery case should be wiped clean between use. *Refer to* ***Appendix D*** *for information about cleaning and disinfecting SPHM technology.*

Maintenance

They should be inspected as part of a facility's routine inspection process for electrical medical devices.

Quantity

Refer to *air assist full length lifting devices.*

Standards

These devices are classified by the FDA as Class II medical devices. *Refer to* ***Appendix E*** *for more information about Standards and Regulations related to use of powered SPHM technology.*

3. Mobile Electric Chair and Platform Lifts

These types of lifts are battery powered and use a powered handset control to raise a patient from the floor on a seat or platform in a seated position from which they can transfer to another surface ***(Figure 5.31).*** Some styles of electric chair lift can raise a patient from a supine position on the floor into a semi-seated and then upright seated position for transfer.

Once raised from the floor into a seated position, an SPHM mobility assessment should be conducted to determine if the patient can stand and mobilize without assistance, or if a SPHM device such as a non-powered sit-to-stand aid is needed to complete the transfer.

Some chair lifts can be disassembled and carried in bags to easy transportation. These types of lifts are typically used in long-term care and community-based settings.

Weight capacity

Variable - 300-440 lbs.

Cleaning

These devices should be cleaned (wiped down) between patient use. *Refer to **Appendix D** for information about cleaning and disinfecting SPHM technology.*

Maintenance

They should be inspected as part of a facility's routine inspection process for electrical medical devices.

Quantity

Refer to *air assist full length lifting devices.*

Standards

These devices are classified by the FDA as Class II medical devices. *Refer to **Appendix E** for more information about Standards and Regulations related to use of powered SPHM technology.*

***Figure 5.31** Example of a Powered Fall Recovery Platform Lift.*

Source: IndeeLift

Miscellaneous Assistive Devices

Gait Belts

A gait belt is an assistive device that is placed around a patient's waist and used by a caregiver to provide a secure grip when assisting a weight bearing patient to mobilize with supervision during standing transfer and ambulation and gait training tasks. They may also be used to guide a patient when completing a seated transfer between 2 surfaces on a short transfer board.

Gait belts are straight straps made of fabric e.g., cotton webbing or nylon, or vinyl, that are about 2" wide with an adjustable plastic or metal buckle ***(Figure 5.32).*** Vinyl belts can be cleaned and disinfected between use with different patients.

As discussed in ***Section 1***, gait belts ***do not*** reduce the risk of caregiver injury when mobilizing patients.

Gait belts are appropriate for steadying and guiding patients as they walk and help with minor body position adjustments to improve balance, *provided* the patient has adequate strength and function in their legs to support themselves, is cooperative and can follow simple activity related commands.

Gait belts are ***not*** designed to lift a patient in any manner. Additionally, research supports that spinal loads of caregivers who tried to manually assist a patient to the ground during a fall with or without use of a gait belt exceed safe limits (Arnold, 2025).

In addition to the risk of caregiver injury when used as a lifting aid, this author has observed serious soft tissue injury to patients when gait belts have been applied and used incorrectly.

One study indicates that gait belts may reduce the risk of patient falls that result in injury (Venema et al., 2019), however, the potential mitigation of patient injury risk comes at the expense of caregiver safety (Arnold, 2025).

Figure 5.32 *Example of a Gait Belt.*

Source: Stock Image

Transfer Belts

Like gait belts, transfer belts are designed to assist with ambulation and gait training tasks. However, they are usually wider and padded for patient comfort and have handles to facilitate neutral hand, wrist and arm postures of the caregiver ***(Figure 5.33).*** Handles may be positioned vertically, horizontally, diagonally, or in any combination of the three.

Transfer belts come in a variety of sizes and shapes, and they fasten with a quick release buckle or clip.

Some transfer belts can be laundered or wiped clean between use.

There is some evidence that transfer belts may be better at reducing spinal loads of the caregiver than gait belts (Tang et al., 2018).

Figure 5.33 *Example of a Transfer Belt with Handles.*

Source: Stock Image

If *gait and/or transfer belts* are to be used by caregivers in an SPHM program, then policy and procedures should be implemented that promote safe and appropriate use of gait/transfer belts. Policy should include:

- When it is appropriate to use gait/transfer belts with minimal risk of injury to caregivers and patients.
- The consistent use of validated patient mobility screen ***(Refer to page 5-98)*** that allows caregivers to determine the appropriate SPHM technology to mobilize a patient and when a gait belt may be used safely.
- Training on how to use gait belts safely, when they are appropriate to use, and when to use more supportive SPHM technology to promote patient mobility.
- A focus on use of more appropriate SPHM technology to support patient mobility needs and prevent caregiver harm as described in this Section. This includes the use of overhead or floor-based lifts with walking slings and non-powered sit-to-stand devices that are easily accessible at point of care.
- Positive reinforcement of safe behaviors such as consistent use of mobility assessment screening tools and mechanical lifts and mobility technology, to promote a culture of employee and patient safety (Arnold, 2025).

*Refer to **Appendix D** for information about cleaning and disinfecting SPHM technology.*

Beds, Stretchers, Exam Tables, Transport Assistive Devices and Stretcher Chairs

Refer to ***Table 5-11*** for more information about compatibility of SPHM technology described in this Section and beds, stretchers, exam tables, transport assistive devices, and stretcher chairs**.**

The following information *is not* all inclusive. Please also refer to the manufacturer's instructions for the technology detailed below including safety protocols related to ligature and entrapment risks if applicable, and instructions for cleaning and maintenance.

Electric Profiling Beds

These beds are classified as patient handling technology due to their design features, which assist in patient repositioning and mobility and may influence the use of SPHM technology.

The design of the mattress used on an electric profiling bed can also influence the choice of SPHM technology that can be used to mobilize an individual patient. For example, a mattress that has a cover with high co-efficient of friction properties i.e., a strong resistance to sliding or movement, and a soft filling, such as an Air Fluidized Therapy Bed or sand bed, may *reduce* the effectiveness of friction reducing devices.

Electric Profiling Beds offer features that improve patient comfort and clinical outcomes, and when used properly, they also help caregivers reduce awkward postures such as bending and reaching and exertion during patient repositioning and other care tasks ***(Figures 5.34 & 35)*.**

Features of these beds can include:

- Height adjustability
- Elevation of the backrest to various angles to allow a patient to sit unsupported in an upright position as needed
- Auto contour features that allow a knee support platform to be raised as the back rest is raised. This feature reduces the likelihood of the patient sliding down in bed reducing shear and friction on their skin
- Trendelenburg and reverse Trendelenburg
- Extension to accommodate a tall person
- Retractable footboard
- Higher weight capacities and width to accommodate a patient of size
- Lateral tilt function/continuous lateral rotational therapy. Note this feature does not negate the need to use SPHM technology to turn a dependent patient to perform peri or wound care etc
- Bed-to-seat and/or bed-to-standing and egress features that promote early progressive mobility
- Percussion/vibration
- Weight scales
- Smart cardiopulmonary resuscitation function
- Fall prevention features
- Lockout features to prevent accidental operation by the patient
- Motorized drive with powered steering

There is an increasing availability of beds that use computer driven smart features that can include automated bed positioning, vital sign monitoring, data collection and storage and patient-provider communication tools.

Motorized electric profiling beds reduce the physical effort required to move them, making them especially useful when pushed for long distances, moved on uneven walkways, or on inclines. Studies show that use of beds and stretchers with a power drive significantly reduces spinal loading and thus risk of WMSDs (Kotowski et al., 2022; Wiggermann, 2017).

If a powered bed's battery is depleted during patient transport, its heavier construction necessitates greater manual effort to maneuver compared to a non-motorized bed. This increases the risk of WMSDs to caregivers and other employees such as transport staff. To minimize this risk motorized beds should remain connected to an electrical outlet when not being used for transportation purposes and a system should be in place to inspect and replace batteries periodically per manufacturer's instructions.

A mechanical bed pusher can be used to assist with mobility of the beds non-motorized electric beds especially for transport of patients over longer distances, inclines etc. ***Refer to page 5-91.***

It is important that caregivers are trained in the use of bed controls to minimize their exposure to risk factors for WMSDS and facilitate patient care. This includes the appropriate use of power drive functions

on motorized beds and stretchers and of steering and neutral controls on non-motorized transport equipment to reduce forces exerted.

Figure 5.34 *Example of a Motorized Electric Profiling Bed.*

Source: ARJO

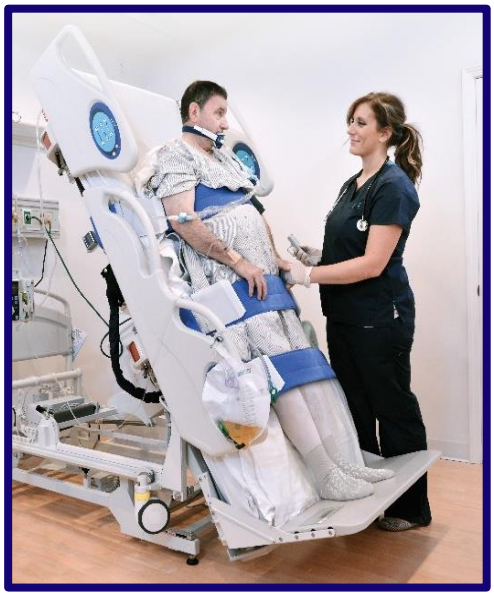


Figure 5.35 *Example of a Motorized Electric Profiling Bed with Bed Chair and Tilting Features.*

Source: ARJO

Stretchers/Gurneys

Stretchers or gurneys should also be evaluated to determine if their design impacts the use of SPHM technology.

Motorized stretchers reduce caregiver pushing force when moving the bed. *Refer to Electric Profiling Beds and battery depletion during transportation.*

Additional design features that can reduce the use of forceful exertion when using a stretcher include:

- A wheel system that helps steer and maneuver non-motorized stretchers

- Electric or hydraulic raising and lowering mechanism
- Electric mechanism which facilitates lifting of the head of a stretcher.

  This author has frequently evaluated the force necessary for one caregiver to *manually* elevate the head section of a non-powered stretcher containing a patient, using either one hand or both hands. Force exerted increased as a patient's torso mass increased.

  The forces measured consistently *exceeded the recommended biomechanical safety thresholds for most caregivers* thus significantly increasing the risk of WMSDS involving the neck, upper back, and shoulders. Evaluations were conducted in response to reports of WMSDs by nurses related to manually raising the head of non-powered stretchers with patient load in perioperative post-anesthesia departments at 2 large hospitals.

Height-Adjustable Powered Exam Tables

Access to height adjustable exam tables is essential to facilitate safe use of floor-based lifts and sit-to-stand devices.

Title 36 CFR Part 1195 Standards for Accessible Medical Diagnostic Equipment of the Americans with Disability Act requires that transfer surfaces such as examination tables must have transfer surfaces that are adjustable in height, offering a low transfer position of 17 inches and a high position of 25 inches, and with at least four intermediate settings. Additionally, each transfer surface shall provide two unobstructed sides for patient transfer e.g., for wheelchair and patient lift access.

These standards are mandatory for state and local government-owned or operated healthcare facilities. However, for other healthcare facilities, they are considered as the industry's best practices and should guide planning for use of SPHM technology in settings where exam tables are used such as clinics. For more information go to https://www.ecfr.gov/current/title-36/chapter-XI/part-1195/appendix-Appendix%20to%20Part%201195.

Refer to ***Appendix E for*** information about ADA accessibility requirements and use of SPHM technology in clinic settings.

Overall access to height adjustable exam and treatment surfaces e.g., in imaging departments, rehabilitation gyms, clinics etc., is important to facilitate proper patient care and to eliminate the occurrence of manual patient transfers and need for caregivers such as therapists to provide treatments while using awkward postures. When wheelchair bound patients cannot be easily transferred to an exam surface they may need to be treated in their wheelchair. In some cases, patients must be rescheduled to return to a facility on a stretcher by EMS transport so that they can be transferred to and from an exam table to receive examination or treatment, thus delaying care and increasing costs etc.

Transport Assistive Devices

Powered Devices for Non-Motorized Beds and Wheelchairs

Weston et al. found that manual wheelchair pushing posed biomechanical risk to the lumbar spine (in compression and A/P shear) and to the shoulders which worsened as patient weight increased (Weston, et al., 2017).

Battery powered transport assist devices attach to non-powered beds or wheelchairs and allow caregivers and other staff to transport patients more easily thus reducing the risk of injury. They are especially helpful for safe transportation of non-powered beds and wheelchairs over long distances, on inclines, and varying floor surfaces.

These devices attach to the head or foot of a non-powered bed or back of a wheelchair and are then steered in the desired direction by the operator ***(Figures 5.36 and 5.37).***

These devices increase the overall length of the bed or wheelchair that they are attached to, and they may need additional clearance to turn and maneuver the attached equipment.

Weight capacity is variable.

Considerations when choosing a powered device for non-motorized beds and wheelchairs include:

- Compatible coupling mechanism between the assistive device and beds and/or wheelchairs.
- Additional storge required with a power source for charging a device.
- Sufficient space to accommodate use of the device along the intended path of use e.g., along hallways with space for other foot traffic and equipment, around corners, through doorways, in patient rooms, treatment and diagnostic spaces, and elevators etc.
- Features that may be needed for wheelchair transports e.g., IV pole arm mount and oxygen cylinder holder.
- Determining where devices should be kept for easy access when needed.

Alternatively, motorized wheelchairs are available to transport patients of size in a health care setting.

Quantity

To determine quantity of devices needed, evaluate the number of beds or wheelchairs that require powered transport assist devices, the anticipated frequency of use, and the travel routes within the facility to determine the appropriate quantity and optimal storage locations for convenient access by users.

Figure 5.36 *Example of a Battery Powered Transport Assist for Non-Motorized Beds.*

Source: ACC, 2012

Figure 5.37 *Example of a Battery Powered Transport Assist for Wheelchairs.*

Source: HumanFit

Stretcher Chairs

Portable stretcher chairs allow for easy patient transfers by converting between a chair and a stretcher and usually have four wheels to facilitate patient transportation ***(Figure 5.38)***.

These devices can be used for patient transportation in places of difficult access for stretchers and beds and as treatment surfaces ambulatory care settings.

Caregivers can use a lateral transfer device to move patients in the supine position between bed or stretcher and stretcher chair when in a flat position. If available, overhead and floor-based lifts may be used to transfer a patient.

Some stretcher chairs models are also designed to assist with standing for early patient mobilization.

Weight capacity, surface dimensions, and range of height adjustment vary.

Evaluate the forces needed to adjust and move non-powered stretcher chairs before purchase to minimize caregiver injury risk.

Figure 5.39 illustrates examples of portable chairs that do not convert to a stretcher but do have various motorized adjustments to support optimal patient positioning.

Figure 5.38 *Example of a Portable Stretcher Chair.*

Source: ARJO/Seating Matters

Figure 5.39 *Example of a Portable Multi- Positional Chair that has Motorized Options to Support Optimal Patient Positioning.*

Source: Seating Matters

Compatibility of SPHM Technology and Electric Profiling Beds, Stretchers, Exam Tables and Stretcher Chairs

The following are usability and safety factors to consider *(not all inclusive)* when evaluating the compatibility of SPHM technology with electric profiling beds, stretchers, exam tables, and stretcher chairs. Refer to ***Tool 5a*** for more information.

Overhead lifts

- Is there enough space above and around a bed or other surface to raise or lower the hanger bar and move the patient while keeping the lift strap in a vertical position i.e., without pulling the hanger bar at an angle?

  Consider access to the patient with bed attachments that may be used such as 4-post frame trapeze systems, and orthopedic traction systems.

Overhead lifts, mobile floor-based lifts, and sit-to-stand devices

- Can the device surface be lowered enough to ensure the patient clears the surface when using any sling type and in varied body postures e.g., upright, reclined, or supine positions?

  Evaluate the effect of the bed overlay or mattress on vertical clearance and any adjustments that may be feasible e.g., deflation mode on an air mattress.
- Are shorter patients able to place feet onto the floor when getting out of bed, stretchers or off an exam table etc?
- Does the bed overlay or mattress to be used impact bed height in the lowest position?
- Can a sit-to-stand lift or aid be used safely if a patient cannot place their feet on the device floor plate?
- Can floor-based lifts and sit-to-stand devices fit under a bed or stretcher at its lowest setting? Consider the location of steering wheels and motors that may be mounted under the center of bed or stretcher frame that may prevent access to the patient.
- Do side rails when lowered hinder access to the patient when using floor-based lifts and/or prevent a bed being lowered to a minimum height?
- Can floor-based lifts and sit-to-stand devices fit under or around exam tables?
- If a bed or stretcher chair converts to a seat or to a standing position can SPHM technology be positioned for safe use? For example, can a sit-to-stand device be used safely when mobilizing a patient from a bed that is converted to a seated position.
- Can side rails (beds, stretchers, and chairs) be lowered sufficiently to:
  - So that transfer surfaces are even when using friction reducing devices to perform lateral transfers?
  - Allow overhead lifts to clear the rails when transferring a patient who is in a seated or supine position?

Compatibility of SPHM Technology and Electric Profiling Beds, Stretchers, Exam Tables and Stretcher Chairs
• When lowered, do side rails create a gap between another transfer surface, and a slider board would be needed as a bridge if performing a lateral transfer using a friction reducing sheet? • When rails are lowered can a patient comfortable sit at the edge of the surface without contact from their thighs with the rails which may hinder ease of mobility? User trials of all SPHM technology discussed here are recommended to ensure that they can be safely used with the support surface being evaluated and employee training requirements can be determined.

Table 5.11 *Compatibility of SPHM Technology and Beds, Stretchers, Exam Tables and Stretcher Chairs.*

Selected Ergonomics Hygiene Equipment

Bathing a patient in bed typically requires caregivers to spend most of the task in forward bent, twisted, and prolonged static postures (Knibbe & Knibbe, 2016). As discussed in ***Section 1***, awkward postures and static loading of the spine increase the risk of WMSDs.

A variety of bathing/showering/toileting devices are available that minimize these risk factors when performing patient hygiene tasks and enhance patient dignity, comfort and facilitate self-care. These devices are discussed below.

As with other wheeled lift equipment, mobile hygiene equipment should be easy to push and maneuver when loaded and must fit into the space intended for use. Floor surfaces should be non-carpeted and even, and thresholds should be flush to reduce physical exertion needed when moving hygiene equipment.

Electric powered shower trolleys and chairs will need a *storage area* that is easily accessible by caregivers with electrical outlet for charging per manufacturer's instructions.

Cleaning and maintenance should be in accordance with manufacturer's instructions. Routine castor/wheel maintenance is recommended.

Space requirements for use of Shower chairs and trolleys are provided in the resources listed in ***Table 5.6.***

Refer to ***Appendix C*** *for more information about how much ergonomics hygiene equipment is recommended.*

Shower Trolley

Shower trolleys are designed with a full-body basin to support a patient in a supine position ***(Figure 5.40).*** To facilitate neutral working posture for caregivers, trolleys should have power height adjustment, and/or rail designs that allow staff to work close to the patient. Some models have power tilt adjustment and power head elevation.

Show trolleys can be used for other patient care tasks such as burn care, wound debridement, and decontamination. In some cases, a trolley has sufficient height adjustment to meet ADA requirements as a portable changing table.

Weight capacity is 300-1000 lbs. with varying dimensions.

As with beds, stretchers and other treatment surfaces, ensure that

- Overhead and floor-based lifts can be used with a trolley to safely perform patient transfers to and from a bed to the trolley e.g., sufficient vertical or lift clearance and clearance under a trolley for floor-based lifts.
- Some trolleys support the use of non-powered, non-rigid friction reducing devices for patient transfers. Ensure that the transfer surfaces can be adjusted to the same height as a trolley with a minimal gap to avoid needing a bridging device.
- Range of height adjustment accommodates use safe of SPHM technology used for patient transfers and allows caregivers to work using neutral postures.
- Forces required to push and maneuver a trolley when loaded are acceptable (see above).
- Sufficient clearance in the workspace that the trolley is to be used so that caregivers can use neutral postures when performing hygiene tasks.

Figure 5.40 *Example of a Powered Adjustable Shower Trolley.*

Source: TR Equipment

Shower Chairs

Ergonomic shower chairs allow patients to shower while seated, enabling caregivers to maintain neutral postures using power-assisted height and seat tilt adjustments ***(Figure 5.41).*** Patient safety and comfort features should include padded features that facilitate postural support and maintain skin integrity, and adjustable armrests, a security belt and locking castors.

Range of height adjustment accommodates use safe of SPHM technology used for patient transfers and allows caregivers to work using neutral postures.

Weight capacity is typically 300-440 lbs. with varying dimensions. However, there are some larger shower/commode chairs with capacity to 700 lbs.

Figure 5.41 *Examples of a Portable Multi-Positional Ergonomic Shower Chair.*

Source: TR Equipment

Assistive Toilet Seats

Toilet assist devices have powered standing/lowering features that can assist a caregiver in transferring a patient on/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. (VA, 2021).

Some toilet lifts can be moved from room-to-room and bedside to bathroom for use over the toilet or as a powered bedside commode. A GFCI outlet near the toilet and/or a battery charger are needed.

Weight capacity 300-750 lbs. with varying dimensions.

Figure 5.42 *Example of a Height Adjustable Bath Lift.*

Source: TR Equipment

Bathtub Lifts

Some floor lifts are designed specifically for use with bathtubs. These lifts may be fixed in place with a swivel seat that moves over a bathtub or mobile. ISO 10535:2021 addresses the specific design and testing requirements for these lifts ***(Figure 5.42).***

Ensure mobile bath lifts are compatible with bathtubs to be used and allow safe use of SPHM technology for patient transfers.

As with all portable floor-based patient lifts and assistive devices, improper use, lack of maintenance, and/or insufficient caregiver training may increase the risk of device instability or tipping.

Administrative Controls

The following information outlines an SPHM mobility assessment protocol that can be used to create an individualized SPHM care plan and choose technology that addresses patient mobility requirements, while maintaining safety for patients and caregivers during handling and mobility procedures.

Topics discussed:

- How to determine a patient's SPHM needs
- SPHM mobility assessment and decision-making tools
- Why is standardized SPHM mobility assessment protocol needed?
- Common SPHM mobility assessment and screening tools
- When is a SPHM mobility assessment conducted?
- Who should conduct a SPHM mobility assessment?
- Documenting and communicating a patients' SPHM needs
- Developing an SPHM mobility assessment protocol

The following tools provide information about work practice controls that support the SPHM mobility assessment protocol:

- ***Tool 5e*** offers guidance on performing a point-of-care pre-mobility safety check prior to initiating any patient handling or mobility activity**.**
- ***Tool 5f*** describes ergonomic best practices that can reduce caregiver exposure to risk factors for WMSDs when performing patient handling and mobility tasks and enhance safety for patients.

The SPHM mobility assessment protocol described is *not* all inclusive. Please refer to additional resources and references provided in this section and in ***Section 10***.

How to Determine a Patient's SPHM Needs

A structured and systematic approach is needed to identify risks, establish goals, and determine the necessary resources and controls to effectively mitigate risk for both caregivers and patients during high-risk patient handling and mobility activities.

This is achieved through a standardized SPHM mobility assessment protocol that considers the activities summarized in ***Figure 5.43*****.**

The assessment process seeks to balance risks associated with patient handling and mobility tasks and the needs of the patient and the resources available.

Evidence supports that SPHM mobility assessment protocols or decision-making tools are an essential component of a successful multifaceted SPHM program (ANA, 2021; Matz, et al., 2019; Thomas and Thomas, 2014; VHA, 2016). Thomas and Thomas (2014) indicated that in SPHM programs without a mobility assessment protocol, caregivers are less likely to use SPHM technology due to the absence of mobility principles to guide them (Thomas and Thomas, 2014).

A standardized SPHM mobility assessment protocol serves as a critical component within a comprehensive and holistic approach to patient care that considers each patient's physical, emotional, intellectual, and social needs alongside medical treatment and rehabilitation or mobility objectives to ensure that all aspects of care are integrated and mutually supportive.

Active engagement and collaboration with patients and their families regarding the use of SPHM technology and associated work practices is essential for meeting these diverse needs. At the same time, the protocol should facilitate the safety of both caregivers and patients during SPHM activities, balancing the wellbeing and autonomy of the patient with the practical requirements of safe handling and mobilization (Matz et al., 2019; Smith et al., 2023).

The ANA Safe Patient Handling and Mobility: Interprofessional National Standards Across the Continuum Standard 6 states that "The employer and healthcare workers partner to adapt the plan of care to meet the safe patient handling and mobility (SPHM) needs of individual healthcare consumers and specify appropriate SPHM technology and methods" (ANA, 2021).

The following information detailing an SPHM mobility assessment protocol contains the elements outlined in Standard 6 of the ANA SPHM standards.

SPHM Mobility Assessment and Decision-Making Tools

SPHM ergonomic algorithms and guidelines

Evidence-based SPHM ergonomic algorithms and guidelines have been developed that define the SPHM technology recommended to safely mobilize a patient when performing high-risk patient handling and mobility tasks based on the cognitive and physical characteristics and clinical needs of each patient (Matz et al., 2019).

The Veterans Health Administration (VHA) created these decision-making guidelines in 2001 following comprehensive research and testing among diverse patient populations. These guidelines have subsequently been revised to reflect more recent advances in Safe Patient Handling and Mobility (SPHM).

For each task to be performed the caregiver follows a systematic process and answers a series of questions to determine if the patient is cooperative and capable of physically assisting such as, determining their weight bearing capacity for tasks that require a transfer between bed and chair or chair to exam table; or their ability to reposition themselves independently in bed or on a support surface.

The algorithms also incorporate guidance for patients of size and ergonomic work practices for each task to be performed.

These resources are targeted for use by persons directly involved with patient handling, movement, and mobility, such as registered nurses, licensed practical nurses, nursing assistants, physical and occupational therapists, radiology technicians, and patient care technicians (VA, 2016).

Besides the VA algorithms, the National Association of Orthopaedic Nurses (NAON) and the Association of periOperative Registered Nurses (AORN) have developed SPHM ergonomic algorithms that address high-risk patient handling tasks within their respective specialties.

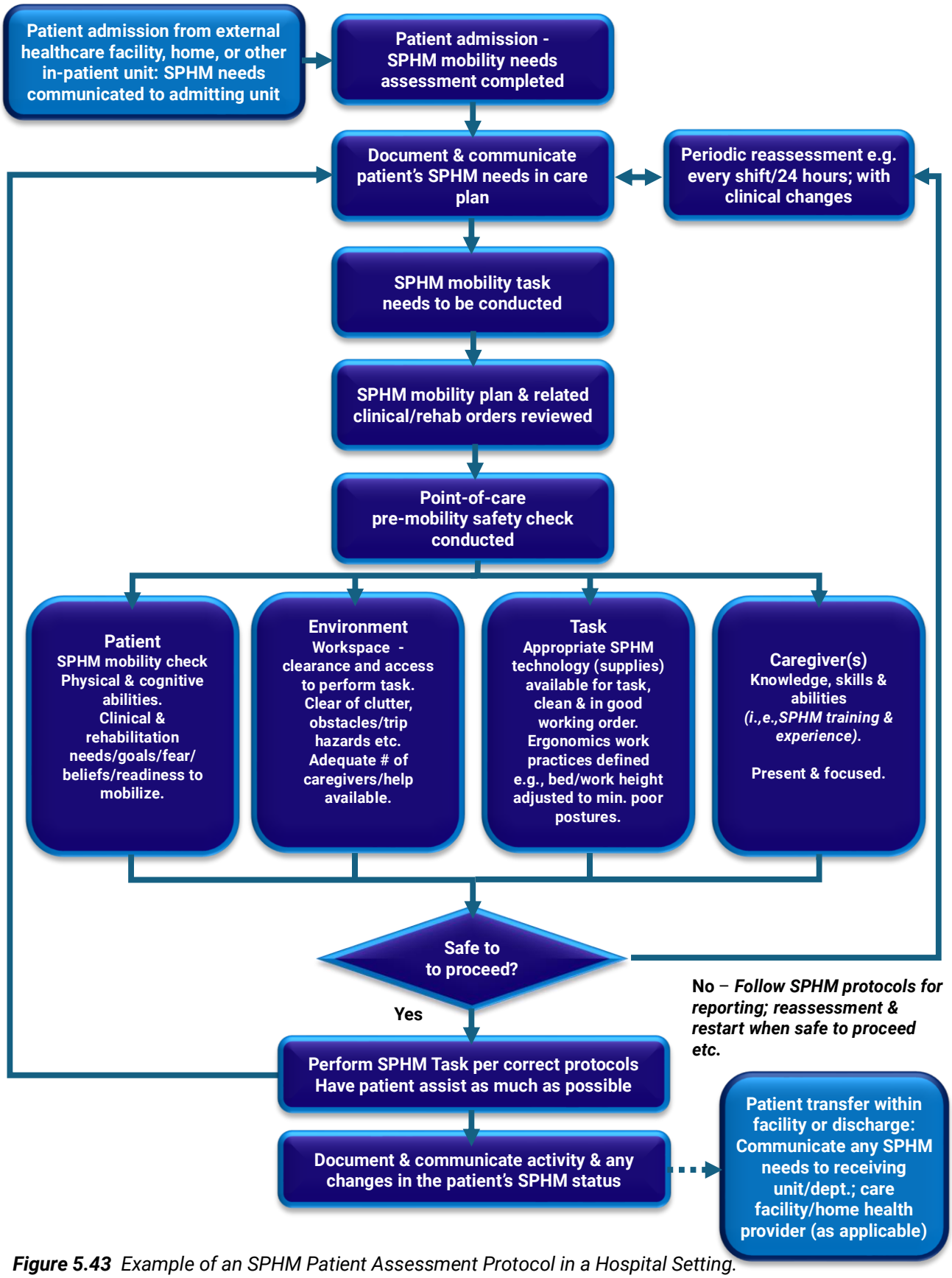


Figure 5.43 *Example of an SPHM Patient Assessment Protocol in a Hospital Setting.*

These ergonomic algorithms provide guidance for caregivers to determine the most appropriate SPHM equipment and technique for a specific patient handling task that will reduce the risk of caregiver and patient injury. They provide a basis for effective knowledge transfer and consistent decision making for patient handling techniques and equipment needs (Matz, 2019).

*Refer to **Table 5.13** for the list of the VA SPHM algorithms for high-risk tasks and links to resources.*

These algorithms can be adapted to reflect the choice of SPHM technology available for specific patient handling tasks at your facility. They can also be used to inform SPHM training content.

SPHM mobility assessment tools

However, the algorithms and associated guidelines do not provide guidance on how to determine an individual patient's mobility level on admission, when reevaluation of a patient's mobility is needed due to changes in clinical status and treatment, or in *real-time* prior to performing a handling and mobility task to ensure a mobilization task can be completed safely (Boynton et al., 2014).

A standardized SPHM mobility assessment tool that is designed to identify an individual patient's ability to mobilize prior to performing a patient handling and mobility task is also an essential element of a SPHM mobility assessment protocol (Matz et al., 2019).

The use of a SPHM mobility assessment tool allows caregivers to evaluate an individual patient's physical, cognitive, clinical, and rehabilitative needs that impact mobility and other patient handling and care needs (ANA, 2021).

SPHM mobility assessment tools allow a caregiver to evaluate a patient's cognitive and physical abilities as the patient completes a variety of physical tasks that progress sequentially from supine to sitting to standing to ambulation. During each task the patient's strength, coordination, balance, tolerance, and ability to follow directions are assessed. The assessment is stopped if the patient appears unsafe or cannot meet requirements for the next level of physical activity and a standardized mobility score or level is then assigned to the mobility level that the patient is able to achieve.

This score indicates the amount of assistance required for a mobility related task and helps determine the selection of appropriate SPHM technology to ensure safe mobilization.

For example, a patient who cannot assist or offer very limited assistance to mobilize would be defined as dependent or have a mobility level score of 1 (on some mobility tools). SPHM technology such as powered overhead or floor-based lifts, and friction reducing devices would be used to perform SPHM tasks together with a plan to use technology to facilitate improved mobility status as feasible. A patient who can stand and ambulate safely without supervision may be categorized as independent or have mobility level score of 4 (dependent on the assessment tool used).

Table 5.12 provides examples of cognitive and physical functional abilities that are typically evaluated using a SPHM mobility assessment tool.

Figure 5.44 provides examples of SPHM technology that can be used to assist and progress a patient's mobility based on their physical abilities.

The outcome of the assessment, which indicates the patient's dependency level or score together with other mobility related needs, is included in the patient's care plan and communicated to caregivers (ANA, 2021).

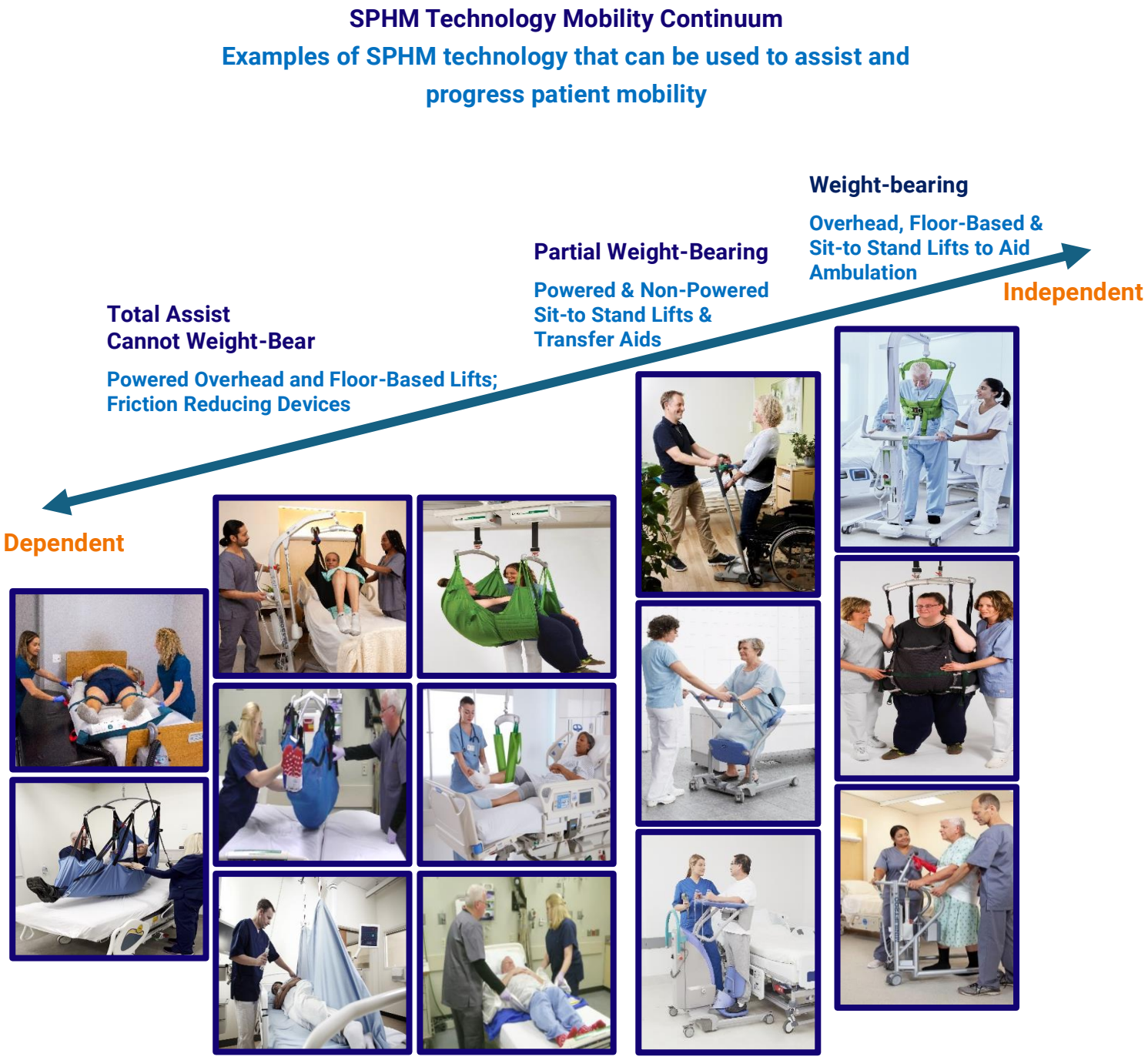


Figure 5.44 *SPHM Technology Mobility Continuum.*

For more information about the SPHM technology pictured here, patient mobility applications, and vendor sources, please refer to ***Section 5 Engineering Controls.***

Common Elements of SPHM Mobility Assessment Tools

SPHM mobility assessment tools vary in how a patient's ability to mobilize is assessed. The activities listed below are commonly used to determine a patient's ability to mobilize and guide the choice of appropriate SPHM technology.

Refer to resources listed in ***Table 5.13*** for more detailed information.

The patient can:

- Participate in the mobility assessment - understands direction, cooperates, and follow simple commands
- Perform the following physical functional tasks with no/minimal physical assistance. *(Minimal assistance can include use of verbal and light-touch cues. During standing and ambulation tasks assistive aides such as a cane, or walker may be used as appropriate).*

Assess patient in-bed

- Boost up in bed
- Roll onto at least one side and maintain side lying position

Assess patient at edge of bed or treatment surface, chair etc

- Move from lying to sitting on the edge of the bed (or exam table/stretcher). *Can use side rails to assist*
- Maintain an upright sitting position on the side of a bed (or sitting forward on a chair/other seated surface)
- Bring one arm across midline to reach to shake hands with the caregiver – repeat with the other arm. *Note this step may be performed before a patient moves to the edge of the bed e.g., in the BMAT 2.0*

Standing readiness

- Straighten one leg/extend knee and point and flex foot dorsiflexion/plantar flexion at least 3 times and repeat with the other leg
- With feet on floor, shift weight forward *(with care*) and lift buttocks off surface and stand

Standing balance: Static

- Stand unassisted with balance

Standing balance: Dynamic

- Step or march in place using small steps
- Step from one foot to another forward and back and side to side

Ambulation

- Walk independently or with supervision, e.g., if high fall-risk

Source: Boynton et al, 2020; Enos, 2020; Melillo et al., 2022; Smith et al, 2023; VHA, 2016.

Table 5.12 *Common Elements of SPHM Mobility Assessment Tool.*

Why is a Standardized SPHM Mobility Assessment Protocol Needed?

Conducting a SPHM mobility assessment takes the guesswork and uncertainty out of determining how a patient should be mobilized safely thus reducing the risk of patient and caregiver harm during high-risk patient handling and mobility activities (Boynton et al., 2014).

It helps caregivers to choose the most appropriate SPHM technology and practices based on a patient's *real-time* mobility status and needs, and to determine if a patient's SPHM mobilization plan has changed.

Implementing a standardized assessment tool and process can help to drive consistent use of SPHM technology and ergonomic practices within a facility or across an organization.

Conducting a SPHM mobility assessment or screening prior to performing a patient handling and mobility task is essential.

A patient's physical or cognitive abilities can change frequently e.g., within a shift and from shift to shift, which affects their capacity to mobilize**.** This is particularly applicable in an acute care environment.

For example,

- A patient who uses a powered or non-powered sit-to-stand lift or aid to be transferred from bed to the toilet or commode during the day may need a higher level of assistance during the night, such as use of an overhead or floor-based lift and especially if they are at a higher risk for falls.
- A patient who can transfer from bed to chair with a walker and caregiver supervision may not be able to return to bed the same way after sitting in the chair for a period of time due to fatigue and pain.

Changes in mobility status may be due to an increased level of fatigue and/or pain, side effects of medication, and changes in medical status that may have altered their balance, ability to bear weight and/or ability to follow instructions.

Therefore, reliance on a patient's mobility level or score from a previous assessment —such as those made by a physical therapist or a patient's nurse on the prior shift or earlier within a shift, *may not* consistently reflect the patient's current ability to mobilize.

A patient's (and or their family member's) perception about their ability to mobilize e.g., ability to support their weight during a standing transfer from chair to bed, is not always reliable especially when the factors previously noted are present.

Assessment of a patient's mobility *prior* to any activity is also critical to prevent patient injury from falls and staff injury from manually supporting a patient during a controlled descent when trying to prevent a fall. The use of SPHM technology to mobilize patients has been shown to reduce the risk for patient falls and facilitate safe early mobility ***(Refer to Table 5.15).***

Gabel et al., 2023, demonstrated that when staff used a validated SPHM mobility assessment tool prior to mobilizing patients as part of an early mobility program, patient falls were reduced (Gabele et al., 2023).

Standardized mobility assessment protocols can facilitate communication and collaboration between nursing, medical and rehabilitation staff, and enable nurse-led routine patent mobilization thus reducing reliance on rehabilitation staff as the primary enabler of patient mobilization.

In recent years, nursing has increasingly viewed patient mobility as the responsibility of rehabilitation professionals (Pavon et al., 2024; Wyatt & Arnold, 2020).

Delaying patient mobility until rehabilitation staff have conducted a thorough assessment after a patient's admission or restricting mobility activities to those performed solely by therapists to improve standing, transferring, and ambulation, may hinder patient recovery by delaying and limiting necessary mobility-related interventions.

Having nurses assess patients' mobility needs upon admission and during their stay, facilitates timely and appropriate referrals to rehabilitation for complex patients and reducing referrals for routine mobility tasks that nursing staff can perform (Jones et al., 2020; Boynton 2024). For example, nursing staff can implement mobility orders such as assisting patients to mobilize three times daily according to their SPHM mobility level or score, utilizing the appropriate SPHM technology.

As Jones, et al., noted, physical (PT) and occupational therapists (OT) are skilled professionals, however, it is important to consider efficiency of resources in today's changing health care economy (Jones et al., 2020).

Standardized SPHM mobility assessment protocols can assist nurses to successfully lead patient mobility efforts as part of a multidisciplinary focus on early progressive mobility that is integrated in daily clinical routines (Jones et al., 2020; Wyatt et la., 2020).

It is important to note that not every patient has or develops a new functional deficit during hospitalization that requires physical or occupational therapy intervention. Additionally, not all patients will see a PT during their stay or will only see rehabilitation on day of discharge (Boynton, 2024).

Nurses are responsible for assessing patients' mobility requirements and implementing a mobility plan as part of standard care during recovery.

The critical role of SPHM in Early Mobility programs is discussed in ***Table 5.15.***

Common SPHM mobility assessment and screening tools

The more commonly used and validated SPHM mobility assessment and screening tools to evaluate a patient's real-time mobility status and SPHM needs are listed in ***Table 5.13*** and include:

- The Bedside Mobility Tool (BMAT) 2.0

Quick Tip

There are numerous tools to assess a patient's ability to mobilize such as, The Timed Up and Go Test, Functional independence Measure or FIM, Dionne's Egress Test, Hendrick II and Morse Fall Scales, and the John Hopkins Activity Measure for Post-Acute Care *(AM-PAC®) 6-Clicks score*.

However, these tools do not consider the use of SPHM technology to safely move and mobilize a patient such as guidance for caregivers when selecting the right technology to safely stand and ambulate the patient as a part of toileting, strengthening, and ambulation activities.

In its 'Fall Prevention in Hospitals Training Program', the Agency for Healthcare Research and Quality (AHRQ) emphasizes that safe patient handling is a critical component of universal fall precautions and is especially important for patients who require assistance with transfers. If staff members lack training in safe patient handling, a patient could fall, or staff could be injured because appropriate assistive equipment was not used (AHRQ, 2024).

Incorporating fall risk assessment into SPHM patient mobility assessment protocols and the evaluation of individual patients' SPHM needs can be an effective approach to facilitating safe early mobilization. However, fall risk assessments are not an adequate substitute for a dedicated SPHM mobility assessment tool.

- The Veterans Administration (VA) Mobility Screening and Solutions Tool (VA MSST)
- The John Hopkins Safe Patient Handling Mobility (JH-SPHM) Guide (with AM-PAC® 6-Clicks tool)

When choosing an SPHM mobility assessment tool, review the related literature ***(Refer to Table 5.13)*** to evaluate the differences between the tools listed above such as how a patient's mobility status is determined and SPHM technology recommended. This will assist you to determine if one of the tools is suitable for use as part of your SPHM mobility assessment protocols and if additional cognitive and physical evaluation activities should be incorporated. For example, in an intensive care setting the M.O.V.E. (Myocardial Stability, Oxygenation Adequate, Vasopressor Minimal, Engages to Voice) screening protocol could be performed before conducting an SPHM mobility assessment to determine an ICU patients' readiness for early mobility. *Also refer to developing an SPHM mobility assessment protocol on* ***page 5.116***.

Additionally, it may also be necessary to use other risk assessment tools in conjunction with an SPHM mobility screening tool such as fall, violence and/or pressure injury risk assessments tools depending on the patient's clinical needs and safety related needs of caregivers. Information from these assessments can be incorporated into the patient risk profile and considered when developing the safe patient handling and mobility plan.

It should be noted that SPHM mobility assessment tools and SPHM ergonomic algorithms should guide decision making when determining the safest way to mobilize a patient but *not* replace professional judgment needed to ensure the safety of both patients and caregivers.

SPHM Mobility Assessment and Decision-Making Tools

SPHM Clinical Algorithms and Guidelines

- **The Veterans Health Administration (VHA) SPHM algorithms 2014:**
  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

Algorithms can be accessed via an IOS or Android app https://mobile.va.gov/app/safe-patient-handling# or from https://www.scribd.com/document/477540667/VHA-Safe-Patient-Handling-algorithms

SPHM Mobility Assessment and Decision-Making Tools

Information about use of the algorithms can be found in:

- Safe Patient Handling and Mobility Guidebook. VHA Center for Engineering & Occupational Safety and Health (CEOSH) St. Louis, Missouri. January 2016. https://www.stryker.com/content/dam/stryker/education-and-training/focusrn/resources/caregiver-safety/implementation-tools/VA%20SPHM_PDF.pdf
- Bariatric Safe Patient Handling and Mobility Guidebook: A Resource Guide for Care of Persons of Size. Center for Engineering & Occupational Safety and Health (CEOSH). Veterans Affairs. 2015 Rev. 2025. https://www.asphp.org/wp-content/uploads/2011/05/Baraiatrice-SPHM-guidebook-care-of-Person-of-Size.pdf

- **The National Association of Orthopaedic Nurses (NAON) algorithms** specific to the lifting and mobilization of Orthopedic patients https://www.orthonurse.org/Portals/0/Docs/Publications/Position%20Statements/NAON%20Safe%20Patient%20Handling%20and%20Mobility%20Algorithms%20for%20the%20Adult%20Orthopaedic%20Patient.pdf?ver=rueoatTtX342xARJCn9kJw%3d%3d

- **The Association of periOperative Registered Nurses (AORN) ergonomic tools and/or algorithms specific to the high-risk patient handling tasks in the Perioperative environment.** These tools also contain ergonomic guidelines for pushing and pulling wheeled equipment and for tasks requiring static holding such as holding a limb for pre-surgical preparation. Subscription required /free to AORN members https://www.aorn.org/article/2024-updates-to-aorn-guideline-for-safe-patient-handling-and-movement

  SPHM algorithm pocket reference(2019). https://www.aorn.org/docs/default-source/aorn/toolkits/safe-patient-handling/safe-patient-handling-pocket-reference-guide.pdf?sfvrsn=36a9944f_0

SPHM Mobility Assessment Tools

- **The Bedside Mobility Assessment Tool (BMAT)** is a validated assessment tool and has become widely used in the US hospitals over the past decade. The BMAT is a nurse-driven bedside assessment that evaluates the patient's current mobility level by asking the patient to complete four sequential functional tasks. If a task cannot be completed, the patient is assigned a mobility level. Each level from 1(dependent) to 4 (independent) suggests SPHM technology required for safe lifting, transferring, and mobilizing patients (Turner et al, 2020).
  Boynton, T., Kumpar, D., & VanGilder, C. (2020). The bedside mobility assessment tool 2.0. Am Nurse J, 15, 18-22. https://www.myamericannurse.com/the-bedside-mobility-assessment-tool-2-0/

  The bedside mobility assessment tool 2.0. Fig-A-210673-EN-r2_BMAT-2.0-Stair-Step-Chart_Presentation https://www.myamericannurse.com/wp-content/uploads/2020/07/Fig-A-210673-EN-r2_BMAT-2.0-Stair-Step-Chart_Presentation-LR2-Copy-1-2.pdf

SPHM Mobility Assessment and Decision-Making Tools

Hillrom | Bedside Mobility Assessment Tool 2.0 | Instruction Video. https://www.youtube.com/watch?v=HyFnWmCsJ24

The BMAT tool is copyrighted. For further information on the BMAT, its fee-free licensing agreement, or training in its use, visit www.hillrom.com

- **The Veterans Administration (VA) Mobility Screening and Solutions Tool (VA MSST)** is a validated screening and decision support tool for caregivers in VA acute and community-based facilities to evaluate a patient or resident SPHM mobility needs.
  The VA MSST uses a pictorial decision flowchart to assist caregivers to evaluate a patient's ability to mobilize through a series of functional tasks to determine a patient's mobility level and like the BMAT, then matches the patient's mobility status with the best device available. The tool is for use by multiple disciplines, providing evidence-based practice clinical decision support related to the use of SPHM equipment, and which is appropriate across multiple health care settings. (Melillo et al., 2022).

  Melillo, C., Rugs, D., Toyinbo, P., Barrett, B., Chavez, M., Cowan, L., ... & Sullivan, S. C. (2022). Reliability and validity of the Veterans Administration Mobility Screening and Solutions Tool. BMC Health Services Research, 22(1), 1323. https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-022-08745-1

- **The John Hopkins Safe Patient Handling Mobility(JH-SPHM) Guide "**provides recommendations for the appropriate choice of safe patient handling equipment to meet the daily mobility goal (JH-HLM) while considering patients functional capacity as measured by AM-PAC® Inpatient Basic Mobility 6-Clicks scores". Source: Physical Medicine and Rehabilitation. Activity and Mobility Promotion (JH-AMP). Common Mobility Language Guide and Toolkit. The John Hopkins Activity and Mobility Promotion Toolkit is copyrighted but can be accessed from: https://www.hopkinsmedicine.org/physical-medicine-rehabilitation/education-training/amp/toolkit

  McLaughlin, K. H., Friedman, M., Hoyer, E. H., Kudchadkar, S., Flanagan, E., Klein, L., ... & Young, D. (2023). The Johns Hopkins Activity and Mobility Promotion Program: a framework to increase activity and mobility among hospitalized patients. Journal of nursing care quality, 38(2), 164-170. https://journals.lww.com/jncqjournal/fulltext/2023/04000/The_Johns_Hopkins_Activity_and_Mobility_Promotion.12.aspx?context=FeaturedArticles&collectionId=5

  Kumble, S., McLaughlin, K. H., Funk, K., Dekany, S., Ludwig, D., Farley, H., ... & JH-AMP Group. (2024). Development of a New Tool to Combine the Promotion of Patient Mobility with Safe Patient Handling Equipment: The Johns Hopkins Safe Patient Handling Mobility (JH-SPHM) Guide. Workplace Health & Safety, 72(11), 503-513.

  Lininger, M. R., Warren, M., Knecht, J., Verheijde, J., Tyler, B., & Tompkins, J. (2021). Clinical instruments for bedside functional assessment: Convergent validity among the AM-PAC '6-Clicks' and BMAT. *Journal of Clinical Nursing*, *30*(13-14), 2048-2056.

Table 5.13 *SPHM Mobility Assessment and Decision-Making Tools.*

When is a SPHM Mobility Assessment Conducted?

An SPHM mobility assessment should be completed, documented, and communicated to caregivers:

- When a patient is admitted to a health care facility
- When transferred from one patient care unit to another
- Once during a shift[1]
- When there is a change in the patient's clinical condition and/or treatment(s)
- When the patient's mobility level or score has changed, e.g., the point-of-care SPHM mobility assessment or screening indicates that the patient's assigned mobility status and SPHM needs have changed
- When there has been an incident or injury involving a patient[2]
- Before every patient handling and/or mobility task (i.e., at point of care) to ensure that mobility status has not changed. *Refer to 'Why is a Standardized SPHM Mobility Assessment Protocol Needed? on* ***page 5.104.***

1. The frequency of reassessment is typically determined by the multidisciplinary team who develop the SPHM mobility protocols ***(Refer to page 5.116)*** and varies according to the care setting. In care settings such as residential care or assisted living facilities, where the clinical status of residents or clients tends to remain stable, reassessment may be scheduled less frequently, for example monthly, Clients with dementia for example, in residential memory care settings will need more frequent assessment of cognitive and physical abilities.

   However, even when a resident's or client's clinical status may be relatively constant, it is still recommended that caregivers conduct a quick mobility screening prior to completing a handling or mobility task to ensure caregiver and client safety.

2. Healthcare organizations should monitor patient injuries associated with patient handling and mobility (ANA, 2021).

As the general population in the US is growing and aging with increasing comorbidities, more health services are transitioning to outpatient and home care environments to relieve some of the burden of overcrowding in hospitals (AHA, 2024; Jones & Dolsten, 2024). Long-term care facilities are providing services to residents with more complex health needs due to this trend.

This indicates an increasing need for the use of SPHM technology and assessment protocols to ensure the safety of clients and caregivers in non-hospital settings.

For example, in an out-patient setting a patient who arrives in wheelchair and can stand a pivot transfer with supervision to a procedure/exam table may not be able to mobilize in the same way following treatment or a procedure due to fatigue and/or effects of treatment etc.

Consequently, caregivers in these settings should perform a mobility assessment or screening prior to assisting patients who may be unable to mobilize independently to reduce the risk of patient falls and caregiver injury.

A SPHM mobility assessment or screening protocol should be part of a multi-faceted SPHM program that is tailored to meet the needs of each outpatient setting or facility and includes the use of SPHM technology and protocols to address patient mobility needs.

Who Should Conduct an SPHM Mobility Assessment?

All caregivers who are responsible for handling and mobilizing patients should receive training and be capable of assessing a patient's mobility status within the scope of their professional license or registration.

In Standard 6 of the ANA SPHM standards, the following is stated: "The organization will support the delegation or assignment of SPHM tasks and activities in a manner consistent with its state's practice act or other legislation governing licensure" and that the "healthcare worker will ensure that delegation or assignment of SPHM tasks is completed in a manner consistent with state professional practice acts or other applicable laws or regulations" (ANA, 2021).

The initial SPHM mobility assessment together with development of the SPHM mobility plan for individual patients, is usually completed by a Registered Nurse (RN) such as the admitting nurse, in the acute care setting. Reassessment of the patients' mobility needs and updating the patient's care plan is completed by a patient's nurse. SPHM mobility assessment and care planning can be integrated with other nursing activities such as fall risk and skin assessment.

Input from a variety of health care provider disciplines is often required when planning SPHM mobility needs in patient populations with special or more complex SPHM needs such as patients of size.

In non-hospital settings assessment and reassessment may be completed by a Registered Nurse, Physical or Occupational Therapist, depending on the care setting and their licensing regulations.

As previously discussed in several health care settings, a patient's ability to mobilize may change frequently and/or a caregiver may not have access to reliable information about a patient's ability to mobilize. Therefore, it is essential that all caregivers, including Unlicensed Assistive Personnel (UAP) such as certified and non-certified nursing aides, medical assistants, and imaging technologists who are responsible for patient handling tasks, always conduct a SPHM mobility screening or check prior to performing patient handling and mobility tasks. This enables the caregiver to confirm if they can safely perform the mobilization activity as directed in the patient's SPHM mobility care plan.

There should be a standardized decision-making protocol for a UAP to follow if they determine that a patient cannot mobilize safely as stated in their SPHM mobility care plan. For example, if a patient's mobility status has changed, request the patient's nurse reassess the patient's mobility level and determine SPHM technology needs before completing the mobility task.

If it is not possible for the RN (or other knowledgeable licensed caregiver such as a nurse who is a unit based-SPHM champion) to reassess the patient immediately, caregivers should use the safest and more conservative method to mobilize the patient. For example, transferring a patient with an overhead or powered floor lift instead of the normally used powered sit-to-stand device, if they are appropriately trained to use the SPHM technology needed.

The patient's nurse should be notified immediately about any changes in mobility status to ensure that a re-evaluation can take place, be documented in the patient's care plan and communicated to other caregivers.

Caregivers should have the assurance that they may voice concerns and receive support from management and colleagues when choosing not to perform patient handling and mobility tasks they consider potentially unsafe for either the patient or themselves.

Defining SPHM Mobility Assessment and Screening

Patient assessment is a core part of the RN's professional scope of practice that requires clinical reasoning, nursing judgement, and critical decision-making (Ernstmeyer & Christman, 2024). For this reason, RNs cannot delegate tasks involving assessment activities to UAP and must follow rules allowed for delegation to UAP under an RN's state licensing board scope of practice. Likewise, UAP under the supervision of a registered nurse or a licensed practical/vocational nurse, are responsible for accepting the delegation, seeking clarification of, and affirming expectations, performing the task correctly and timely communicating results to the nurse.

Within the framework of SPHM mobility assessment protocols described in this section, screenings refer to the process by which non-licensed caregivers identify changes in a patient's mobility status prior to initiating any patient handling tasks as outlined in the patient's SPHM care plan. UAP may use the same SPHM mobility assessment tool that nurses use to assess a patient's mobility level. However, for UAPs the tool is just a screening or check and cannot be used to reassign a patients' mobility level or score and change their SPHM care plan.

Should there be any changes or concerns regarding the patient's ability to mobilize, established procedures must guide caregivers on appropriate actions. For example, if the caregiver is a UAP seeking a reassessment by a qualified nurse (Boynton, 2024).

For both screening and assessment, regulatory bodies, liability, and scope of practice must be considered when deciding who is qualified and allowed to perform a test.

Ultimately allowing UAP to perform a SPHM mobility screening is a facility decision based on state-level licensing and scope of practice laws.

For more information:

American Nurses Association. (2012). ANA's principles for delegation by registered nurses to unlicensed assistive personnel. *Silver Spring, MD: Author*. https://www.nursingworld.org/globalassets/docs/ana/ethics/principlesofdelegation.pdf

Barrow JM, Sharma S. Five Rights of Nursing Delegation. [Updated 2023 Jul 24]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK519519/

Ernstmeyer, K., & Christman, E. (Eds.). (2024). Nursing management and professional concepts (2nd ed., Chapter 3, Delegation and Supervision). Chippewa Valley Technical College. https://www.ncbi.nlm.nih.gov/books/NBK610432/

The National Council of State Boards of Nursing (NCSBN) National Guidelines for Nursing Delegation 4/29/2019 https://www.ncsbn.org/public-files/NGND-PosPaper_06.pdf

Documenting and Communicating a Patients' SPHM Needs

A process for documenting a patient's SPHM needs should be established that is both easy to complete and provides clear communication with all staff involved in patient handling and mobility activities.

The patient's mobility status, SPHM needs and all related information should be documented in the patient's care plan i.e., in the Electronic Health Record. In a hospital setting, this is usually completed by the nurse who assessed the patient after each SPHM mobility assessment is conducted.

Rehabilitation staff and UAP, such as certified nursing aids, should have designated areas in the SPHM care plan to communicate information related to a patient's SPHM needs for example, following completion of physical therapy, or handling and mobility activities.

Documentation of the SPHM care plan should be easy to find in the patients' chart. Information should be accessible to *all* caregivers who are responsible for caring for the patient, e.g., for review before performing SPHM activities.

There should be a method in the patient's chart to alert staff of any updates to an individual patient's SPHM mobility plan including changes in mobility status or required SPHM technology for handling and mobilization activities.

If your SPHM program is aligned with or will be integrated with fall prevention and/or early mobility initiatives, consider developing a custom real-time dashboard that presents SPHM mobility levels, fall risk assessment, and early mobility activities completed by nursing and rehabilitation staff for each patient. Turner et al., describes that this method of displaying patient mobility related data in one location "is used throughout the shift to check real-time progress during caregiver handoff to report needs for fall interventions and mobility, and by leaders while rounding on patients. Physical therapy staff also uses it to verify fall risk needs and to review mobility progress throughout the shift for each patient " (Turner et al, 2021).

Factors to consider when developing an individualized SPHM care plan are *listed in* ***Table 5.14.***

Communicating a patient's SPHM needs

In addition to providing information about a patient's SPHM mobility needs in their chart, it is important to use other methods to communicate a patient's mobility status and SPHM needs. This is especially important in an acute care environment where a patient's mobility status can change frequently.

Some caregivers may not have time to access a patient's chart before mobilizing them, such as those who may be called into a patient room to help urgently, or those receiving an inpatient in diagnostic areas (VHA, 2016).

General information such as SPHM ergonomic algorithms and SPHM mobility assessment protocols could be posted on a SPHM program resource page a facility's intranet platform, in patient rooms or break rooms and/or laminated and attached to SPHM technology as feasible (Matz et al., 2019).

The following are examples of how a patient's specific SPHM mobility needs can be communicated to caregivers and other employees.

- **Shift change handoff**
  A patient's mobility status and SPHM needs should be communicated between staff during shift

change handoff to ensure that all staff who may assist to mobilize the patient on the next shift are informed.

Due to the increase in patient-related violence in health care settings across the US, it is advisable to communicate information regarding a patient's potential risk for aggression or violence, whether verbal or physical. This information can influence decisions about when and how to mobilize the patient and determine the appropriate number of caregivers needed.

- **In a patient room**
  SPHM mobility needs may also be communicated via white boards in patient rooms and signage on room doors. Some hospitals have a designated whiteboard in patient rooms for posting HIPPA compliant SPHM information, including mobility status, SPHM technology used, and specific notes about patient needs.

- **Safety huddles**
  A patient's SPHM mobility needs and required changes to their mobility plan can be reviewed in routine unit- based safety huddles ***(Section 9)*** or during post-incident safety huddles ***(Section 7).***

- **Between departments**
  A process to communicate a patient's SPHM needs when they are transported and receive care in other departments such as imaging and perioperative care is also needed. For example, a patients' mobility level and SPHM technology needs are included in a 'Ticket to Ride' or electronic treatment order and transportation request systems.

- **Admission and Discharge**
  Incorporate patient mobility status and SPHM needs into admission and discharge protocols.

  For patients admitted from nursing homes or skilled nursing facilities, identify their mobility methods and any equipment or assistive devices used prior to admission. If SPHM technology was previously utilized, note the specific type and the style of slings or other components involved.

  Assisting discharge planning staff to communicate a patient's SPHM needs to a receiving facility such as a nursing home or home health provider as part of a comprehensive discharge plan, is important to facilitate safety for both the patient and the new caregivers.

- **Patient communications**
  Patients and families should be informed about the SPHM program's purpose, the SPHM technology that may be used to mobilize a patient during their stay, and the reasons for its use.

Quick Tip

Tips for facilitating caregiver use of SPHM mobility assessment and screening protocols.

- **Develop or choose a standardized mobility assessment tool that is easy to understand and quick to use .**
- **Pilot test the SPHM mobility assessment tool, documentation and communication processes and get caregiver input.**
- **Integrate the mobility assessment protocol into SPHM competency-based training including hands-on training/practice case studies using the chosen assessment tool.**
- **Ensure that the SPHM mobility plan is easy to find in patient care chart and use multiple methods of communicating a patient's SPHM mobility needs.**
- **Have SPHM unit-based champion or mobility coaching support across different shifts**

Whenever possible the patient (and family as appropriate), should be involved in the development of their SPHM mobility plan. Explaining the purpose of a mobility assessment, as well as how SPHM technology works and its potential benefits in helping patients reach their mobility goals can support collaboration between patients and families and caregivers. This approach may contribute to reducing risks for both patients and caregivers during handling and mobility activities.

A protocol for addressing patient and/or family refusal to use SPHM technology should be developed during program implementation planning ***(Section 7)***.

Protocols for documenting and communicating a patient's SPHM mobility needs should be regularly reviewed during periodic evaluation of the SPHM program to ensure relevance and effectiveness ***(Section 8)***.

Factors to Consider When Developing an Individualized SPHM Care Plan

Developing an individualized SPHM care plan entails a comprehensive assessment and evaluation of several factors that influence a patient's capacity for mobility and guide the selection of appropriate SPHM technology. Findings should be documented within the patient's care plan.

Factors that should be considered and incorporated into a patients SPHM care plan, as needed include:

- The patient's height, weight, and torso width and girth or body circumference at widest point and consideration of overall body habitus, to guide choice of appropriate capacity SPHM technology, sizing of slings, beds, chairs, hygiene equipment etc.
  *Refer to **Table 5.10** and **Tool 5b** for key measurements when fitting a sling.*
- The patient's current and past medical history
- Diagnosis/prognosis/care requirements, for example, rehabilitation or palliative
- How a patient mobilized before admission e.g., if admitted from a nursing home, what type of SPHM technology or other assistive mobility aids were used
- History of falls/Falls risk status
- History of violence e.g., history of verbal and/or physical violence when receiving medical care prior to admission or during the current admission(s). If applicable the assessed level of risk for violence (via validated screening tools such as the Brøset Violence Checklist (BVC), Dynamic Appraisal of Situational Aggression (DASA) etc.)
- Medication
- Medical orders related to activity restrictions such as bed rest or bilateral "non-weight bearing" orders

Conditions that may affect how handling and mobility tasks can be performed e.g.

- Level of Pain/discomfort
- Fractures, joint mobility restrictions

Factors to Consider When Developing an Individualized SPHM Care Plan

- Orthopedic considerations e.g., post-operative hip, knee, or shoulder replacement
- Recent surgery e.g., cardiac surgery with sternal precautions
- Unstable spine
- Paralysis/Paresis
- Muscle spasm, contractures
- Respiratory/cardiac compromise
- Amputation of upper or lower limbs
- Severe Osteoporosis
- Postural hypotension
- Sensory deficits related to sight, hearing, and/or touch.
- Skin integrity e.g., sensitive skin; pressure injuries, wounds, surgical dressings, stomas, severe edema etc
- Medical devices attached to a patient (e.g., intravenous line, catheters, feeding tube, chest tube, tracheotomy; monitors, orthopedic supports such as Halo brace, Thoraco-Lumbo-Sacral-Orthosis (TLSO) brace, traction of extremities).

Information that should be included in a patient's SPHM care plan

An individualized SPHM care plan should include relevant information from the above assessment and specify required SPHM technology and methods and expected mobility outcomes or goals.

- The patient's level of assistance needed to complete patient handling and mobility tasks e.g., a description or score based on the SPHM mobility assessment/screening tool used.
- Specific information on cognitive or physical limitations that could affect safe use of SPHM technology and practices as needed for caregiver awareness related to:
    - Communication level and ability, language, and comprehension.
    - Cognitive status such as ability to follow simple commands, be cooperative, and assist during the task on a consistent basis
    - Physical abilities related to upper and lower body strengths, coordination, and ability to bear weight
- The SPHM technology (type and weight capacity) that should be used to mobilize the patient for each high-risk patient handling and mobility task to be performed including information about the type and size of patient sling and any specific instructions for use e.g. sling loop length required to achieve desired patient position in a sling, padding needed for comfort etc. (as applicable)

Factors to Consider When Developing an Individualized SPHM Care Plan
• Any specific instructions related to use of SPHM technology and clinical contraindications, for example related to mobilization of patient with spinal injury fractures, wounds, use of certain styles of slings etc, and needs for patients of size. • Document the clinical reasoning for a SPHM technique or technology selection. This clarifies decisions for caregivers and future practitioners, especially in complex cases, allowing appropriate review and understanding. • A patient's actual versus perceived ability to support their weight during the transfer (if relevant). • Any patient preferences regarding mobilization activities to ensure their comfort and safety. This includes noting what matters and motivates the patient and family and how this affects a patient's ability to participate in handling and mobility activities. • The plan of care to promote the patient's independence or return to baseline as appropriate. (ANA, 2021).

Table 5.14 *Factors to Consider When Developing an Individualized SPHM Mobility Care Plan*.

Developing an SPHM Mobility Assessment Protocol

The importance of planning and implementing a sustainable SPHM program using a multidisciplinary collaborative approach has been highlighted throughout this toolkit.

Interprofessional collaboration and communication are crucial in the development and implementation of a standardized SPHM mobility assessment, documentation, and communication protocol.

Disciplines and groups involved in developing an SPHM mobility assessment protocol in an acute care setting should include:

- The SPHM manager/coordinator
- Rehabilitation/physical and occupational therapy
- Intensive/critical care staff including physicians
- Respiratory therapy
- Specialty care providers such as orthopedics, pediatrics, behavioral health, and bariatrics
- Nurse Informaticist/Information Technology
- Representatives (manager and caregivers) from units with pilot SPHM program

Developing SPHM mobility assessment protocols takes time as disciplines such as nursing and therapy determine the best approach to integrate SPHM protocols with existing early mobility and rehabilitation/therapy protocols.

As a result, development of SPHM mobility assessment protocols should start *early* in the program solution development phase ***(Section 4),*** as they are integral to the choice of SPHM technology to be purchased, and how and when technology will be used, and development of SPHM training content.

It is important to acknowledge that varying mobility related terminology and differing professional perspectives and goals can influence the success of SPHM programs (Waltrip, 2019).

Providing education to the team who will develop the SPHM mobility assessment protocols is essential. They should understand the need for and evidence-based benefits of implementing a specific standardized SPHM protocol for caregiver *and* patient safety, in comparison to using other available mobility-related and fall assessment tools. It is important that PTs and OTs know that an SPHM mobility assessment is not a substitute for the specific rehabilitation assessment tools and processes they use. Instead, an SPHM mobility assessment protocol can assist their patients to achieve rehabilitation goals while reducing the risk of injuries to therapists

Identification of any existing methods to assess, document and communication patient mobility needs between disciplines such as nursing, physical and occupational therapy should have been completed during program planning hazard identification and assessment activities ***(Section 3).***

Information collected during those activities should also include staff perception of common barriers to patient mobilization. For example, nursing staff do not feel it is safe to mobilize a patient within 24 hours of admission unless a physical therapy (PT) assessment is completed however, a PT consult may not occur within that time frame delaying early mobility activities. Therapists may express hesitation about using SPHM technology, as they view it primarily for passive transfers and may not recognize its potential to support safe mobility and facilitate rehabilitation activities.

Key elements and activities to consider when developing an SPHM mobility protocol.

The information in this section and the resources in ***Section 10*** can be used to support the development process.

- Define the purpose of the SPHM mobility protocols and how they are to be used or integrated with other patient care assessments and initiatives (falls, skin, early mobility, etc.), and with rehabilitation practices.
- Select the SPHM ergonomic algorithms that will be used (and customized as needed) to guide general decision making about use of SPHM technology and practices.
- Select a SPHM mobility assessment tool that to evaluate patient mobility and identify the safest way to handle and mobilize patients using SPHM technology.
- Identify SPHM mobility protocols for patient population with special SPHM needs e.g., patients of size.

Determine:

- Who will complete initial and ongoing SPHM mobility assessments and develop the SPHM mobility care plan? Define the specific roles of caregivers within the SPHM assessment protocols with consideration of state licensing laws for healthcare professionals.
- When will assessments be completed?

- How a patient's SPHM mobility needs will be communicated to all caregivers. Consider integration into the electronic health record; communication between caregivers in a unit; communication to staff on other units; admission and discharge communications etc.
- How and when a patient's SPHM mobility plan is updated/revised.
- The decision-making protocols needed to address unexpected changes in a patient's mobility status or unplanned situations that may hinder safe mobilization activities e.g., when caregivers, including UAP conduct a mobility screening just prior to mobilizing a patient.
- Consider developing a protocol to provide guidance for experienced rehabilitation specialists and nurses when they may need to develop customized approaches for unique SPHM needs and situations. Any customized SPHM solution should follow a thorough clinical and risk assessment, ensuring person-centered and balanced decision-making. The solution and rationale must be documented and communicated. Proper training is required for those caregivers implementing these solutions. All applicable regulatory requirements and manufacturer guidelines must be followed (Smith et al, 2023).
- How patients and their families will be involved in developing the patient's SPHM mobility plan and protocols for patient and/or family refusal to allow use of SPHM technology.
- How and when the SPHM mobility assessment protocol is to be implemented. It is advisable to conduct a pilot to evaluate the usability and effectiveness of the SPHM mobility assessment tool, documentation, and communication methods, and to solicit staff feedback.
- How and when will the SPHM mobility assessment protocol be monitored for compliance and evaluated for effectiveness? Note the use of the SPHM mobility assessment tool by caregivers can be evaluated during periodic SPHM audits and employee SPHM program surveys ***(Refer to Section 8 and Tools 8b & c).***

The Role of SPHM in Early Mobility Programs

The effects of immobility have long been recognized, dating back to Florence Nightingale's 1898 Notes on Nursing (Hallmark et al., 2015). Since then, the complications associated with immobility, such as reduced quality of life and higher mortality rates, have been thoroughly documented.

Numerous research studies have identified the necessity of implementing early mobility programs, particularly for patients admitted to Intensive Care Units (ICU), to address the cascade of physiological changes that may occur within the first 24 hours of immobility and reduce related hospital-acquired complications (Kielich et al., 2025; Wyatt et al., 2020).

Source: ARJO

Source: ARJO

Documented benefits of early mobility programs include reduced length of stay and readmissions rates; decreased fall rates, venous thromboembolism pressure injuries, pneumonia, incidence and duration of delirium, improved functional status at discharge, psychological well-being and reduced mortality and cost of care (Dayton et al., 2023; Nydahl et al., 2023; Wyatt et al., 2020).

Early mobility programs aim to restore patients to their baseline level of functional activity. These programs employ structured, sequential interventions that are initiated at the patient's current mobility level and are tailored to progressively increase the patient's ability to achieve their established mobility goals (Vollman, 2010).

Mobilization activities range from head of bed elevation, range-of-motion exercises, and repositioning in bed to transferring a patient to and from a bed to a chair and ambulation (Ernstmeyer & Christman, 2021).

However, there are reported barriers to early mobility activities such as ambulation of patients. These include lack of resources such as time, staffing, and equipment, and nurses' perception of risk to the patients, e.g., risk of patient fall, or risk of injury to themselves especially if they must mobilize the patient out of bed (Wyatt et al., 2020).

Patients who are more physically challenging to mobilize, e.g., are immobile with high body weight and mass, and/or who are confused and agitated, may not be moved as frequently as needed if manual handling is required (ASPHP, 2023).

As discussed in ***Section 1, Table 1.2***, ambulation of patients is a frequently reported missed nursing care task. Although there are many reasons why missed nurse care occurs, missed nursing care is associated with a higher incident of patient falls (Hessels, et al, 2019).

Source: Stock Image

Conversely, the increasing emphasis on the early and frequent patient mobilization to mitigate serious complications associated with immobility and reduce associated hospital acquired harms such as falls, may also increase the physical job demands for nurses, nursing aides, and rehabilitation professionals.

The Role of SPHM in Early Mobility Programs

This is particularly evident when mobilization activities such as pivot transfers and ambulation are performed manually rather than with the assistance of SPHM technologies such as powered patient lifts and sit-to-stand devices. These considerations are especially significant for patients who have weight-bearing precautions (ASPHP, 2023).

The Centers for Medicare & Medicaid Services (CMS) does not reimburse patient falls that occur in hospitals. As a result, King et al., observed that nurses faced intense pressure to achieve their institution's 'zero falls' target. However, nurses did not mobilize their patients due to the risk of a fall (King et al., 2018).

It should be noted that patient falls were identified as the most frequently reported sentinel event in the Joint Commission's annual reviews of Sentinel Event data for 2021, 2022, 2023, and 2024 (Twenter, 2025; TJC, 2025).

Ultimately, mobility activities will be avoided if patient and caregivers do not feel safe.

To effectively address this issue, it is essential that SPHM mobility assessment protocols and SPHM technology are utilized to ensure the safety of patients and caregivers during mobility-related tasks.

Source: Guldmann

There are numerous ways that SPHM technology together with ergonomic work practices can facilitate active patient participation in physical rehabilitation to support early, safe, and progressive mobility. *Refer to* ***Section 5 Engineering Controls*** for more information.

Although there is need for more research to demonstrate the impact of specific SPHM related interventions on early mobility, it appears that the use of SPHM technology plays a key role in facilitating mobilization of patients and reducing patient harms such as falls and pressure injuries especially when integrating into early mobility programs (Bassett et al., 2012; Dang et al., 2022; Dickinson et al 2018; Gibson, 2017; Kayser et al., 2020; Turner et al., 2021; Wyatt et al., 2020).

Source: Guldmann

Refer to ***Section 9*** *for more information about integrating SPHM into early mobility programs.*

It is also important to note that evidence supports the use of SPHM technology can increase patients' participation in their therapeutic activities and does not have a negative impact on functional independence measure (FIM) mobility scores (Darragh et al., 2012; Arnold et al., 2011; Campo et al., 2013; Darragh et al., 2013; Darragh et al., 2014; Mcilvane et al., 2011; Rockefeller, 2008).

Both the American Physical Therapy Association (APTA) and The American Occupational Therapy Association (AOTA) support physical therapists (PT), physical therapist assistants, and occupational therapy (OT) practitioners employing the concepts of safe patient handling and mobility while providing services (APTA, 2019; AOTA, 2021).

The Role of SPHM in Early Mobility Programs

As PT and OT professionals play a critical role in early mobility programs, it important that they are knowledgeable about how SPHM technology can be used to actively engage patients in rehabilitation tasks rather than viewing it as only useful for passive patient transfers.

Source: Baxter

Over the past decade there has been an increasing emphasis on addressing the serious complications from immobility in hospitalized older adults aged 65 and above.

The Centers for Medicare & Medicaid Services (CMS) 2025 Inpatient Prospective Payment System (IPPS) rule includes the Age-Friendly Hospital Structural Measure, a mandatory quality measure for hospitals with patients aged 65 and older. The aim of this measure is to have hospitals focus on the unique needs of older adults and deliver personalized care with the goal of improving overall outcomes and reducing the risks associated with hospitalization.

Source: Savaria/Handicare

Source: Savaria/Handicare

As discussed in ***Section 1 page 1-33,*** SPHM plays a key role in meeting the requirements of Domain 3 of the measure for Frailty Screening and Intervention.

In non-hospital settings, SPHM mobility assessment protocols and technology can also be used to reduce the risks associated with immobility by improving or maintaining a resident or client's functional mobility status and promoting independence.

Source: HumanFit

During clinical deterioration, SPHM technology and practices can allow caregivers to maintain patient dignity and comfort.

Case studies in long-term care have reported that residents experience an increase in physical functioning and activity level, lower levels of depression, improved urinary continence, lower fall risk, and higher levels of alertness during the day after SPHM programs were implemented (AIHA, 2024; Gucer et al., 2013).

More information about SPHM and early mobility programs can be found in ***Section 10.***

The use of SPHM technology and practices to facilitate early, safe, and progressive mobility and reduce fall risk further supports the critical value of an SPHM program to a healthcare organization.

Table 5.15. *The Role of SPHM in Early Mobility Programs.*

Section Summary

Hazard Control and Prevention – SPHM Solutions

This Section provides information about primary Engineering and Administrative Controls that can be used to mitigate the hazards and risks associated with manual patient handling tasks while enhancing patient safety.

Engineering controls isolate workers from hazards and aim to minimize caregiver injuries. SPHM technology—such as powered lifts ceiling or overhead-mounted lifts, and friction-reducing devices—reduces biomechanical strain during patient handling. Powered equipment is generally more effective than non-powered aids like sliding sheets. While SPHM technology is essential, its use relies on a strong safety culture and a comprehensive program to prevent WMSDs.

Detail information is provided about commonly used SPHM technology together with applicable safety regulations and standards.

Administrative controls support safe SPHM technology use by modifying work practices to limit hazard exposure. This section reviews mobility assessment protocols for planning care and selecting appropriate SPHM technologies to promote a patient's independence or return to baseline mobility as applicable. The critical role of SPHM in early and progressive mobility programs to promote preservation of patient functional status and improve clinical outcomes is also discussed.

The following tools provide information about work practice controls that support the SPHM mobility assessment protocol:

- ***Tool 5e*** offers guidance on performing a point-of-care pre-mobility safety check prior to initiating any patient handling or mobility activity.
- ***Tool 5f*** describes ergonomic best practices that can reduce caregiver exposure to risk factors for WMSDs when performing patient handling and mobility tasks and enhance safety for patients.

Additional administrative controls discussed elsewhere in this toolkit include:

- Unit-based SPHM champions/peer coaches to encourage proper SPHM technology use and ergonomic practices ***(Section 4)***
- Actively enforced written policies and procedures ***(Section 4)***
- Role-specific education and training programs promoting caregiver use of SPHM technology and ergonomics work practices ***(Sections 4 & 6)***

Refer to Section 10 for additional resources and references

Appendix A

Published Research on the Benefits of Overhead Lifts in Hospital Specialty Departments and in Non-Hospital Settings

A majority of research related to the use and benefits of overhead lifts has been conducted in patient care units within hospitals. However, there is some evidence that overhead lifts are effective in reducing caregiver injuries in long term care (Miller et al., 2006; Chhokar et al., 2005; Alamgir, 2008).

The following is a summary of published research or information about the use of overhead lifts in *specialty departments* within the acute care environment and within other non-hospital environments.

Overhead Lifts in OR and Imaging

Thomas-Olson et. al., reported that a hospital in Canada installed overhead lifts in Operating Room (OR) suites during construction of a new acute care hospital. Findings collected on the staff familiarity, usage, and perception of the overhead lifts in the OR were positive and showed that the lifts were used to complete key patient handling tasks (Thomas-Olson et al., 2015).

There are some reports that overhead lifts have reduced caregiver injuries related to lateral supine and seated transfers in imaging areas such as Computer Tomography (CT) and General Radiography (Rose, 2009; Smith, 2017; Kling & West, 2015).

Overhead Lifts and Pediatrics

The implementation of SPHM programs and the use of SPHM equipment in pediatric settings are relatively recent developments.

However, there are a few published reports that overhead lifts and other SPHM devices are being used successfully to promote pediatric patient mobility and reduce caregiver injuries in the hospital and home care setting (Motacki & Motacki, 2009; Haglund et al., 2010; Alexander & Johnson, 2011).

This author has observed overhead lifts being used in a pediatric ICU to facilitate repositioning tasks, including turning ventilated patients between supine and prone positions, and in medical and surgical units for in-bed repositioning; seated transfers and ambulation. They were especially useful when managing non-and partially mobile pediatric patients who required additional support due to their size.

Overhead Lifts and Rehabilitation

In both in-patient and out-patient *rehabilitation* settings, research indicates that SPHM technology, including overhead lifts, can be used by therapists to assist with rehabilitation activities, early ambulation, suspended balance, strengthening, and gait training, step climbing, limb exercises, and pool therapy while preserving and promoting patient recovery, and therapist safety (Arnold et al., 2011; Campo et al., 2013; Darragh et al., 2013; Darragh et al., 2014; Gershon et al., 2008; Halbert et al., 2013; McIlvaine et al., 2011; Perlow, 2016).

Overhead lift technology allows therapists to use their hands for therapeutic touch, tactile cues, or other manual treatment techniques instead of struggling to hold the patient's body weight during treatment sessions (Latvala and Masterman, 2020). Using an overhead lift with a sling to support a patient allows therapists to better observe a patient's response since they are not in such close proximity.

Overhead Lifts and Outpatient settings

The Americans with Disabilities Act Access to Medical Care for Individuals with Mobility Disabilities Standard (ADA, 2010), requires medical and dental clinics to have lift equipment available to assist patients with mobility disabilities with transferring to and from a wheelchair to an exam table or treatment surface.

However, research indicates that the prevalence of overhead lifts and other lift equipment in the outpatient clinic setting is low partially due to practice administrators' and physicians' lack of knowledge and benefit of SPHM equipment to promote patient access to treatment (Yeung, 2015, Pharr, 2013).

Overhead Lifts and Home Care

Installing overhead lifts in home care environments can be especially challenging due to the physical design and construction of a home and the availability of lift installation personnel for a non-commercial environment.

In the US, fiscal challenges that also limit availability of overhead lifts in the home care environment include limited reimbursement and choice of lift equipment offered by Medicare for home care clients (Jackson 2017). Overhead lifts may be approved by Medicare as Durable Medical Equipment (DME), but because of their cost and other factors, the approval process can be more arduous than the more frequently approved mechanical hydraulic floor lift. Additionally, community providers may not realize that they can prescribe an overhead lift via DME or may not be aware of the benefits of overhead lifts.

Thus, many home care patients or their families, must pay directly for overhead lift systems if they want and need the functionality that overhead lift systems provide.

Home health care is one of the fastest growing industries in the US and musculoskeletal injuries are a leading cause of injuries to home health workers in the US (AIHA, 2021; Howard & Adams, 2016). Therefore, it is important that the health and safety of the labor force that is needed to meet community-based health care needs of an ageing population are preserved. The use of overhead lifts in the home care setting could play a role in reducing caregiver injury and facilitate patient independence.

A handful of studies related to overhead lift use in the home care setting in the US, Canada and Europe indicate that home health care workers perceive overhead lifts as reducing musculoskeletal pain and injury and are accepted as safe and comfortable by the recipients of home health services (Capewell, 2011; Marlow et al., 2005; Knibbe & Knibbe, 2007; Yassi, 2008). ***Refer to Section 10 for more information related to SPHM in Home Care Settings.***

Appendix B

Periodic Inspection and Maintenance of Overhead Lifts, Floor-Based Lifts and Sit-To-Stand Technology

Preventative maintenance and inspection of SPHM technology is a critical component of an SPHM program. The availability of well-maintained SPHM technology helps facilitate safe use of SPHM technology by caregivers and protects patients from harm. ***Sling inspection that includes ISO 10535 requirements is detailed on page 5-66.***

The following information is summarized from the sources listed at the end of this Appendix. It *does not* replace the manufacturer's preventative maintenance and inspection instructions for SPHM technology.

SPHM technology manufacturers should provide instructions for the routine maintenance, calibration (as needed), and repair of their lifts, and how to access replacement parts.

Information needed to verify whether a lift is properly installed and can be operated correctly and safely (inspection), and maintenance and calibration frequency should also be provided.

Only qualified and properly trained personnel familiar with the lift's/lift system's design, use, and maintenance should perform maintenance and inspections. The SPHM technology manufacturer may offer a fee-based inspection and maintenance service and/or provide training for health care facility's maintenance/engineering staff so that they can complete inspection and maintenance work.

Follow the manufacturer's guidelines for lift inspections and maintenance. Annual inspection of critical parts is recommended.

The health care facility/organization who owns the SPHM technology are responsible for inspection and maintenance of lifts (and slings). They should keep records of all inspection and maintenance activities.

Each lift should be identified in records by its serial number.

The records of all inspections and maintenance activities should include the inspector or technician's signature along with the date of the next required inspection or relevant notes and reported to the owner of the lift technology.

Labels on lifts and rail systems must clearly display the scheduled date (minimum month/year) of the next inspection or maintenance. Additionally, the label should state the name of the company, facility, or organization that conducted the most recent inspection and maintenance.

Inspection

A lift should be inspected visually and/or physically where applicable for the following:

- Visible irregularities and defects
- The presence and the legibility of the product information label
- Welds and corrosion
- Physical inspection and verification of fasteners, including those used to secure a stationary lift to a wall, floor, or ceiling
- Pivot and hinge points
- The operation of turntables, transition gates, and dynamic coupling

- Electrical installation
- Wheels of the portable floor-based lifts and sit-to-stand devices
- Hydraulic system if applicable
- Tracks on overhead lift systems
- That the instructions for use and/or the user's operating instructions are present or accessible

Inspection of *mobile or portable lifts* should include a full lifting cycle with *maximum load* of the lift.

For stationary lifts such as *overhead lifts,* the inspection should include a lifting cycle of a minimum of 500 mm or 19.69 inches. This should be performed at the top of the lifting range, using extensions if needed for safety. Inspection should include a test with the maximum load of the lift through the entire rail system.

Inspection of fastening systems of stationary lifts/overhead lifts

Inspect all rail system fastenings, including:

- Ensuring that all brackets and connection points are tightened to the recommended torque and
- All connection points and brackets to the rail system are secured using the specified torque values.

If the above inspection process is not possible, perform a load test according to maximum load of the rail system on crucial places/points and record results in the logbook. This includes:

- Deflection before load test
- Deflection with maximum load
- Deflection after load test.

Alternatively:

- Perform a static load test with 1.5 X maximum load (not full lifting cycle) of the rail system on crucial places/points, e.g., rail connections, rail ends etc., for a period of 20 minutes minimum.

After maintenance or inspection, clearly mark the lift and rail system as approved or not approved.

If the outcome is 'not approved', remove the lift and rail system (as applicable) from service.

Other considerations about who and how inspection and maintenance of patient lifts and other SPHM technology are listed in ***Tool 5a.***

References

The American Association for Safe Patient Handling and Movement. *Healthcare Recipient Sling and Lift Hanger Bar Compatibility Guidelines*. First Published April 2016. https://asphp.org/wp-content/uploads/2011/05/AASPHM-Sling-Hanger-Bar-Guidelines-2016.pdf

Enos, L. (2018) “The Role of Ceiling Lifts in a Safe Patient Handling and Mobility Programs.” International Journal of Safe Patient Handling and Movement, 8(1):25-45.

ISO 10535:2021(en) Assistive products — Hoists for the transfer of persons — Requirements and test methods. https://www.iso.org/obp/ui/#iso:std:iso:10535:ed-3:v2:en:sec:foreword

The Veterans Heath Administration (2016). VHA Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts Rev 2.1. https://www.publichealth.va.gov/docs/employeehealth/PreventitiveMaintenance.pdf

Appendix C

How Much SPHM Technology Do You Need?

Section 7 details considerations when selecting, purchasing, and installing SPHM technology including the importance of a collaborative approach when making decisions about the type and quantity of SPHM technology needed for a successful program.

Information gathered from hazard identification and assessment activities described in ***Section 3*** will provide information to help you determine the quantity of SPHM technology needed. This includes insight gained from employee perception surveys and interviews; manager surveys of units/department characteristics and site visit activities.

Factors to consider include:

- The number of beds on a patient care unit and number of single and double rooms
- Patient characteristics and variability e.g., medical (typical diagnoses), surgical (type), orthopedic, neurological, behavioral health, pediatrics, patients of size, etc.
- % Dependent (Total assist); Semi-Dependent (partial assist/weight bearing); Supervised and Independent patients requiring mobilization daily and in a worst-case scenario
- Patient Census (daily average; peak load; range)
- The number, frequency and average and range of length of stay of patients of size e.g., over 300 lbs. and over 500-600 lbs. This can help determine how many higher capacity lifts may be needed.
- The SPHM tasks that need to be performed in the care area and frequency of occurrence e.g., repositioning in bed; transfers to a stretcher or chair; early ambulation etc.
- Future changes to patient characteristics and/or census
- Future changes to unit/dept. design
- Staff mix and numbers per shift
- Existing equipment: functionality and use, etc
- Viability of and access to storage
- Evaluation of unit and patient room layout and physical attributes
- Structural feasibility of installing overhead lifts
- Staff perception of high-risk patient tasks

*Also refer to determining the number of slings required for patient lifts on **page 5-64.***

*The quantity of overhead lifts needed is discussed on **page 5-27** and related resources are provided in **Table 5.6** Overhead Lift Configuration, Design, and Installation*

The 2021 Veterans Administration (VA) *Safe Patient Handling and Mobility Design Criteria Requirements* provide the following information about quantity of SPHM technology needed.

Number of Floor-Based Lifts per Clinical Unit/Area

The number of floor-based lifts needed per area is dependent on the overhead lift coverage and percentage of dependent patients or who require extensive assistance.

1) If all patient bedrooms on a floor, comprised of multiple Inpatient Units, are covered by overhead lifts, one floor-based lift should be adequate for the floor, depending on the units' proximity to one another.
2) For Units without 100% coverage (over all beds), there should be one lift for every 8-10 patients that are not covered by the overhead lifts.
3) In a Clinical Area, such as Primary Care or Imaging, the number of floor-based lifts is dependent on the proximity of areas to one another and the physical size of the area. Provide a minimum of one lift within a quick, easy walk to lift a fallen patient per Primary Care or Imaging room.

Number of Sit-to-Stand Assist Devices per Inpatient Nursing Unit

1) Provide at least one Powered Standing Assist Device on a Unit. Additional devices may be required based on percentage of patients who require partial.
2) In a Clinical Area, such as Primary Care or Imaging, the number is dependent on the proximity of areas to one another, the needs of the population, and the physical size of the area.

Number of Non-Powered Standing Aids per Clinical Unit/Area

1) Dependent on percentage of patients who require partial assistance.
2) Provide at least one Non-Powered Standing Assist Device on a Unit if a powered unit is not provided.
3) In a Clinical Area, such as Primary Care or Imaging, the number is dependent on the proximity of areas to one another and the physical size of the area.

Number of Air Assist Lateral Transfer Devices (AALTD) per Clinical Unit/Area

1) Surgical Suites: provide one mattress per operatory with 2 or more motors in Surgical Suite.
2) Emergency Department: provide one mattress per 1 – 2 stretchers with 2 or more motors in ED.
3) Number on Inpatient Units are dependent on frequency of moving patients in and out of Unit ('road trips'), the frequency of positioning patients with AALTPDs, and whether deflated mattresses are left under patients for ease in positioning.
4) Use of single-use AALTPD mattresses will increase the number required.

Number of Air Assist Lateral Lifting Devices (AALD) per Clinical Unit/Area

1) Provide one AALD for Emergency Departments;
2) Provide one AALD for Mental Health/Geri Psych Units;
3) Provide one AALD for each floor;
4) An AALD should be accessible for Diagnostics, treatment rooms, procedure rooms, Ambulatory Care, etc.

Number of Friction Reducing Devices per Clinical Unit/Area

1) Number required dependent on the specific needs of the clinical unit/area.

Number of Seated Slide Boards per Clinical Unit/Area

1) Number required dependent on the specific needs of the clinical unit/area. Most often used in Spinal Cord Units and Inpatient Rehabilitation Units, Inpatient, and Long-Term Care.

Number of Ergonomic Bathing, Showering, and Hygiene Assistive Devices per Clinical Unit/Area

1) Number required dependent on the specific needs of the clinical unit/area.
2) Provide at least one ergonomic shower trolley and/or ergonomic shower chair at each communal bathing/shower room, depending on the room design and size.
3) In Long Term Care or other patient areas, provide an ergonomic shower chair and/or shower trolley if patient room shower/bathing rooms are large enough, and if appropriate for patient.
4) In Spinal Cord Units provide an ergonomic shower trolley in patient room bathing rooms if the room can accommodate the equipment size.
5) In specific Clinical Units provide a powered toilet lift in each bath/toilet room.

Number of Motorized Patient Transport Units per Clinical Unit/Area

1) Number required is dependent on patient characteristics, thus needs of Clinical Unit/Area, and available storage space

Source: Safe Patient Handling and Mobility Design Criteria August 2021.
https://www.cfm.va.gov/til/etc/dcSPHM.pdf

The Facility Guidelines Institutes Patient Handling and Movement Assessments (PHAMA) 2019, provides additional useful recommendations for Floor-Based Lift Coverage by Patient Care Area in **Appendix J.** https://www.fgiguidelines.org/wp-content/uploads/2022/10/Patient-Handling-and-Mobility-Assessments.pdf

Appendix D

Cleaning and Disinfecting SPHM Technology

The following provides guidance about cleaning and disinfecting of SPHM technology and slings. Also refer to Sling Laundry and Cleaning on ***page 5-62***. *This information does not replace the manufacturer's cleaning and disinfecting instructions for SPHM technology.*

Cleaning, disinfecting[1] and laundering instructions for SPHM technology including lifts, slings, and accessories—differ by manufacturer.

A healthcare organization may use chemical disinfectants to clean medical devices that are not recommended or approved by a SPHM technology manufacturer for use with their product.

If manufacturers' cleaning instructions for their SPHM technology are not followed, then the expected lifetime of the product may be reduced, and the warranty may be voided.

So, it is essential for healthcare organization's infection prevention and control (IPC) and SPHM teams to collaborate with manufacturers to identify approved cleaning procedures for their technology and understand the risks of not following recommended protocols. They should also work together to select appropriate SPHM technology and protocols for patients in isolation to prevent disease transmission.

SPHM technology manufacturers should be able to provide a list of EPA-registered disinfectants for use against common pathogens that can be used to disinfect their device(s).

SPHM technology (hard surface) e.g., powered lifts, non-powered mobility aids, and slider boards

Some SPHM technology consists of a variety of hard structural components (e.g., plastic, aluminum, etc.), and sometimes soft components such as fabric straps, and foam padding.

The type of chemical disinfectants that can be safely used to clean a SPHM device will depend on the type of component materials present e.g., cleaning agents containing phenol or chlorine (sodium hypochlorite) can damage the aluminum, rubber, and the plastic materials, as well as create discoloration on painted and plastic surfaces.

Prolonged exposure to alcohol-based cleaners may disrupt adhesives, damage seals, cause certain plastics to swell and harden, which could make them more brittle and prone to breakage (Rutala & Weber, D., 2008).

How effectively an SPHM device can be cleaned will also depend on the design of features such buckles, Velcro type connectors, clips and fasteners, foam padding, etc. if present. The healthcare organization's IPC team should review use of and cleaning methods for such features.

Overhead lifts and some floor lifts have a flexible lift strap system that connects the lift motor to the hanger bar. Repeated use of some chemicals such as chlorine bleach can damage and weaken the lift strap, creating the risk of breakage especially when placed under load i.e., when lifting a patient.

When cleaning a flexible lift strap, it is important to fully lower the hanger bar to get access to the whole lift strap and avoid soaking the strap when wiping it down. After cleaning, the strap should be allowed to dry completely before raising the hanger bar to avoid potential damage to the strap and/or to the lift mechanism if stored with moisture present.

Overhead lift units and lift handsets, unless specified by the manufacturer, are not waterproof, so liquids should not be allowed to get inside of these components to avoid damaging the lift and creating the risk of user injury.

Some SPHM devices may have an anti-microbial coating on certain components e.g., lift straps. The manufacturer should be able to provide information about the coating material use and its effectiveness to reduce transmission of harmful pathogens, and if there are chemical disinfectants that would degrade the coating over time.

Before cleaning powered lift systems follow the manufacturer's instructions to deactivate the power supply before cleaning and disinfection e.g., unplug an electric floor lift from mains (AC power source).

Castors or wheels on floor based SPHM technology should be free from dirt and hair.

Visual safety inspection of SPHM technology before each use and routine periodic maintenance is important to detect deterioration or damage to lift system components and ensure the technology will function safely and reliably.

SPHM Slings, friction reducing devices and other soft accessories e.g., transfer belts

General principles for handling these devices after use (Chinn, R. Y., & Sehulster, L. 2003).

- Wear appropriate Personal Protective Equipment (PPE)
- Remove a device slowly and minimize agitation such as shaking to avoid airborne dispersal of pathogens and contamination of air, surfaces, and persons
- To minimize further airborne dispersal, stuffing the device in a trash or soiled laundry or linen bag as appropriate, and pushing the bag down to tie or secure it for removal, should be avoided
- Hold contaminated devices away from the body (uniform)
- Never share devices between patients unless cleaned per the organization's IPC policy

Single patient use devices e.g., slings, air assist mats and plastic friction reducing sheets

Single patient use (SPUs) or disposable accessories such as slings, can be used with patients in isolation however, it is not always necessary to do so. For example, for patients with Covid-19 as with bed linens, washable slings can be used if they are laundered per CDC guidelines. There is no recommendation for laundering linens etc. that are actually or potentially contaminated with SARS-CoV-2, separately from other washable items.

Washable devices e.g., slings, air assist mats and nylon or fabric slide sheets

To destroy microorganisms, the CDC states that 'a temperature of at least 160°F (71°C) for a minimum of 25 minutes is commonly recommended for hot-water washing. The use of chlorine bleach assures an 'extra margin of safety.' Dryer temperatures and cycle times are dictated by the materials in the fabrics. Synthetic fibers (i.e., polyester, and polyester blends) which are often used for manufacture of slings and require shorter times and lower temperatures to avoid deterioration of the fabric after repeated high temperature drying. Detailed recommendations for laundry including the use of oxygen-based bleach of healthcare bedding, clothing and other textiles can be found in the 2003 CDC Guidelines for Environmental Infection Control in Health-Care Facilities (Updated July 2019).
https://www.cdc.gov/infection-control/hcp/environmental-control/index.html

Wipeable devices e.g., slings, air assist mats, transfer belts, and slide sheets

It is important to check that all parts of a wipeable SPHM device are made of materials that can be wiped clean. For example, a sit-to-stand sling may have fabric straps and belt component. The device manufacturer should be able to provide documentation that the device is fully wipeable together with a list of EPA-registered disinfectants that can be used to clean their product.

Wipeable products with heat-sealed or welded seams may be wiped more effectively than those with stitched seams where needle holes can be potential entry point for pathogenic microorganisms.

Ensure a standardized process for how to effectively clean wipeable products is implemented. The process should consider the surface space needed to spread or lay out the product for cleaning if applicable; how to clean all sides of the product without re-contaminating a cleaned surface; and what should happen to the product if it is very soiled and cannot effectively be wiped clean.

For reusable and wipeable slings, slide sheets etc., manufacturers usually recommend an initial wash and dry or wipe down as appropriate, *before* placing into first use after purchase.

For some devices such as, reusable air assist mats, disposable covers are recommended to minimize device contamination.

Lastly, every time before using slings, friction-reducing devices, and other soft accessories, it is critical that *inspection* occurs to detect any damage, and if damage is found, the device is removed from service immediately.

A critical component of an effective IPC program is employee training and reinforcement in the use of proper IPC protocols. Providing simple pictorial and highly visible job aids that show employees how to clean & inspect SPHM technology, together with rounding on units and in-person coaching e.g., using unit-based SPHM champions, may increase compliance with IPC processes. Providing an adequate and easily accessible supply of cleaning supplies and PPE will also facilitate compliance.

1. **Cleaning** refers to the *removal* of pathogenic microorganisms or 'germs,' dirt, and impurities from surfaces and objects. Cleaning with water, soap (or a neutral detergent) and some form of mechanical action (brushing or scrubbing) does not kill germs, but by removing them, it lowers their numbers and the risk of spreading infection and can increase the effectiveness chemical products used for disinfection. Cleaning is an essential first step in any disinfection process.

   Disinfecting refers to using chemicals, for example, EPA-registered disinfectants or thermal methods, to kill many or all pathogenic microorganisms, except bacterial spores, on surfaces and objects. This process does not necessarily clean dirty surfaces or remove germs, but by killing germs on a surface *after* cleaning, it can further lower the risk of spreading infection.

   The disinfectant *concentration* and *contact time* are also critical for effective surface disinfection.

   Disinfection is less lethal than sterilization which can render an object free (to a very low probability) of all forms of viable microorganisms.

   Contact time (or dwell time): This is the time required for a disinfectant to be in direct contact with the surface or item to be disinfected e.g. a surface must remain visibly wet and untouched with disinfectant or a sanitizer for 10 minutes to allow the chemical to kill the microorganisms on that surface. For surface disinfection, this period is framed by the application to the surface until

complete drying has occurred. Contact time *varies* between disinfectants and maybe different for different viruses and other microorganisms.

References

Rutala, W. A., & Weber, D. J. (2008). Guideline for disinfection and sterilization in healthcare facilities, 2008. Update: June 2024. Centers for Disease Control. https://www.cdc.gov/infection-control/media/pdfs/guideline-disinfection-h.pdf

Chinn, R. Y., & Sehulster, L. (2003). Guidelines for environmental infection control in health-care facilities; recommendations of CDC and Healthcare Infection Control Practices Advisory Committee (HICPAC). Updated: July 2019. https://www.cdc.gov/infection-control/hcp/environmental-control/index.html

Other Resources

The Association for Professionals in Infection Control and Epidemiology (APIC) https://apic.org/

The Environmental Protection Agency (EPA). EPA-registered disinfectants, including links to lists of products registered against common pathogens like SARS-CoV-2 (CoVID-19) or Norovirus. https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants

The Joint Commission. Infection Prevention and Control Resources. The Joint Commission. https://www.jointcommission.org/resources/patient-safety-topics/infection-prevention-and-control/

Stewart E., & Smith R. (2017). Guidelines for the Selection and Use of Surface Disinfectants in Healthcare. American Industrial Hygiene Association (AIHA) https://online-ams.aiha.org/amsssa/ecssashop.show_product_detail?p_mode=detail&p_product_serno=1278

Appendix E

Regulations and Standards Related to Design and Installation of SPHM Technology

The following guide provides information on regulations and standards related to SPHM technology; it is not comprehensive. Collaborate with your facility's Clinical Technology/Engineering Services, Facilities Maintenance, Design and Construction departments to ensure SPHM technology purchased and installed meets all required federal, state, and local standards for health care settings.

U.S. Food and Drug Administration (FDA)

SPHM technology are considered medical devices in the U.S., and as such are regulated by the U.S Food and Drug Administration (FDA). The FDA classifies medical devices based on the level of risk or potential harm they pose to patients.

- **Class I:** Devices with low risk, such as bandages and elastic bandages.
- **Class II:** Devices with moderate risk, such as powered wheelchairs and infusion pumps.
- **Class III:** Devices with the highest risk, such as life-sustaining devices like pacemakers and other implants.

Manufacturers of medical devices must meet certain FDA requirements that vary according to the device's risk classification before a device can be made available for use. Class 1 devices are subject to the lowest level of regulatory control.

Most SPHM technology including non-AC powered patient lifts i.e., floor-based lifts, sit-to-stand lifts, and overhead lifts are considered *Class 1 devices.*

Powered patient transfer devices such as air assist mats and AC powered patient lifts are considered *Class 2 devices.*

In some cases, Class 1 devices such as overhead lifts are designated as a Class 2 device when the FDA recalls a specific model and the device poses a moderate risk of injury or an adverse event occurring.

The classification of SPHM technology can be checked via the FDA Product Classification database https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPCD/classification.cfm

Recalls of SPHM technology can be checked via the FDA's Medical Device Recall Database https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfres/res.cfm

Look for press releases, product updates, and other information about recalls on the SPHM technology *manufacturer's* website.

More information about FDA regulation of medical devices can be found in the Code of Federal Regulations Title 21 Food and Drugs; Chapter I Food and Drug Administration, Department of Health and Human Services; Subchapter H Medical devices. https://www.ecfr.gov/current/title-21/chapter-I/subchapter-H

FDA reporting requirements for medical device-related adverse events.

Manufacturers of medical devices such as SPHM technology are required to report to the FDA when they learn that any of their devices may have caused or contributed to a death or serious injury.

A ***"device user facility"*** must report a suspected medical device-related *death* to both the FDA and the manufacturer. User facilities must report a medical device-related *serious injury* to the manufacturer, or to the FDA if the medical device manufacturer is unknown.

Although a user facility is not required to report a device malfunction, they can voluntarily inform the FDA of such product problems through MedWatch, the FDA's Safety Information and Adverse Event Reporting Program. Healthcare professionals within a user facility should familiarize themselves with their institution's procedures for reporting adverse events to the FDA.

A "device user facility" is a hospital, ambulatory surgical facility, nursing home, outpatient diagnostic facility, or outpatient treatment facility, which is not a physician's office

For more information go to: Medical Device Reporting (MDR): How to Report Medical Device Problems. https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems

The Manufacturer and User Facility Device Experience or MAUDE database houses medical device reports of adverse events submitted to the FDA.

You can search this database to review if issues with SPHM technology from a specific manufacturer have been reported.

You can access the MAUDE database at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfmaude/search.cfm

You can learn more about the MAUDE database at http://fda.gov/medical-devices/mandatory-reporting-requirements-manufacturers-importers-and-device-user-facilities/about-manufacturer-and-user-facility-device-experience-maude-database

International Organization for Standardization (ISO) 10535:2021

Manufacturers of powered mobile and stationary patient lifts and slings worldwide are expected to meet the requirements of the International Organization for Standardization (ISO) 10535:2021 *'Assistive products - Hoists for the transfer of persons - Requirements and test methods'* when designing, manufacturing, and selling patient lifts and slings. https://www.iso.org/obp/ui/#iso:std:iso:10535:ed-3:v2:en:sec:foreword

This globally recognized standard details the design, testing, and other safety requirements that manufacturers of patient lifts and slings should adhere to before their products are made available for use in any healthcare or home/community environment. Recommendations for periodic maintenance and criteria to facilitate sling and lift compatibility and safe use are also provided.

ISO 10535:2021 applies to portable floor-based lifts and sit-to-stand lifts and aids and overhead lifts together with lift slings, which are fixed on ceilings, walls, floor-based support systems or gantries, and lifts mounted in or on another product.

ISO 10535 is recognized as the voluntary consensus standard for medical products by the FDA thus, to be able to distribute or sell their SPHM products in the US, manufacturers should at a minimum meet the requirements of this ISO standard (ANA, 2021; FDA, 2024).

ISO 10535:2021 also lists other ISO standards that should be met when designing and manufacturing patient lift devices.

Health care facilities are encouraged to obtain a copy of ISO 10535:2021 and ask patient lift vendors to demonstrate compliance with this and any other applicable standards required during the SPHM technology selection process.

Electrical Standards and Fire Standards

Manufacturers of powered lift technology also have to ensure a lift and it's charging system are safe and in compliance with electrical standards such as ANSI/AAMI ES60601-1:2005/A2:2021 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance that is adapted for specific U.S. regulatory requirements from the International Electromagnetic Commission IEC 60601-1 series.

National Fire Protection Association (NFPA) standards for electrical equipment in healthcare facilities (NFPA 99 and 70) also must be met. Other standards and building codes such as NFPA 13 standard for the installation of sprinkler systems may also apply when installing overhead track systems.

The above standards also apply to all other types of electrically powered SPHM technology such as air assist blowers.

Some states, such as Oregon, have additional regulations related to the testing and labeling of medical electrical equipment.

The Americans with Disabilities Act

The '**Americans with Disabilities Act**: Access To Medical Care For Individuals With Mobility Disabilities *Standard* (2010) – Use of patient lifting equipment in clinics' (ADA, 2010), states that that lift equipment such as overhead and floor-based lifts, be available to improve access to treatment for patients who need assistance with transfers e.g., to and from a wheelchair and exam table or treatment surface.

For more information see 'Access to Medical Care for Individuals with Mobility Disabilities Last updated: June 26, 2020' at https://www.ada.gov/resources/medical-care-mobility/ and the Code of Federal Regulations Title 36 Chapter XI Part 1195 – Standards for Accessible Medical Diagnostic Equipment. https://www.ecfr.gov/current/title-36/chapter-XI/part-1195

Facility Guidelines Institute (FGI) Guidelines

The Facility Guidelines Institute (FGI) Guidelines (https://fgiguidelines.org/) are used for planning, designing, and constructing healthcare facilities such as hospitals, outpatient clinics, and residential care facilities. They are primarily used by state and federal agencies to regulate new construction and major renovations of these facilities, ensuring safe and efficient patient care through minimum space, infection control, and design requirements.

43 states have adopted some edition of the FGI Guidelines for use in their regulation of the licensing or construction of health care and residential care facilities with some states adopting specific editions or allowing for equivalency

From 2018 on, the FGI Guidelines include specific design requirements for patients of size including the use of overhead lifts to facilitate care (FGI, 2023).

The importance of incorporating SPHM into facility design and construction standards and associated standards is discussed further in ***Section 9***.

Centers for Medicare & Medicaid Services (CMS) Durable Medical Equipment (DME) Quality Standards

Suppliers of DME must meet the CMS durable medical equipment, prosthetics, orthotics, and supplies (DMEPOS) quality standards effective August 12, 2024, for accreditation and Medicare billing. These standards include the requirement that DME be appropriate for home use and that suppliers follow manufacturer guidelines for structural safety. https://www.cms.gov/Research-Statistics-Data-and-Systems/Monitoring-Programs/Medicare-FFS-Compliance-Programs/Downloads/Final-DMEPOS-Quality-Standards-Eff-01-09-2018.pdf

DMEPOS Quality Standards https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/DMEPOSQuality/DMEPOSQualBooklet-905709.html

Appendix F

Sling and Lift Compatibility: A Brief Summary

The following is a summary of considerations related to sling and lift compatibility.

Background

In 2012, the FDA released a list of best practices related to the safe use of slings and lifts which includes the following statement:

"Users of patient lifts should: Match the sling to the specific lift and the weight of the patient. A sling must be approved for use by the patient lift manufacturer. No sling is suitable for use with all patient lifts." (FDA,2018). To date, this statement remains unchanged.

This statement *does not* mandate that a sling and lift must be purchased from the same manufacturer. However, it has caused a lot of confusion for purchasers of lifts and slings who may be told that this is not the case (AASPHM, 2016). There is *no* regulation or standard in the US that states a healthcare organization *must* purchase lifts and slings from the same manufacturer.

Relevant Standards

As indicated in ***Appendix E,*** patient lifts and slings are classified as medical devices in the United States and are regulated by the Food and Drug Administration (FDA). Manufacturers of patient lifts and slings are required to meet, at a minimum, the standards set by ISO 10535:2021, which is recognized by the FDA as a consensus standard (FDA, 2025).

Safety requirements related to the design and testing of slings and information that must be supplied by the manufacturer to the user of the slings, to facilitate the safe combination and use of lifts/hanger bars and slings, have been greatly enhanced in ISO 10535:2021.

The International Standards Organization (ISO) 10535:2021 Assistive products - Hoists for the transfer of persons-Requirements and test methods states the following about Sling and Hanger Bar Compatibility:

> ***Clause 4.3 Requirements for body-support units (i.e., slings).****
>
> "The manufacturer of the sling shall indicate which lift(s) and hanger bar(s) (e.g. hanger bar with 2, 3, 4 or more attachment points) it is compatible with, and which type of connection means, e.g. loop, clip or other, in order to ensure a safe combination.
>
> The method by which the sling can be adjusted or removed shall be clearly stated in the accompanying operating instructions.
>
> ***Any organization that purchases*** patient lifts and slings shall make sure that the combination(s) is/are safe either by requiring compatibility documentation for the combination(s) from the manufacturer(s) or by performing compatibility testing themselves, hereby transferring the responsibility for a safe combination to the organization. NOTE Further information can be found in Annex C."
>
> Annex C further addresses compatibility of patient lifts, hanger bars and slings and the specific information manufacturers of slings and lifts are requested to provide to users or prescribers. Checklists for safe use, inspection, and attachment of a sling to a lift for prescribers and operators of lifts are also provided in order to reduce foreseeable misuse (ISO, 2021).

Note: of ISO 10535:2021 Section 8 Non-rigid slings and Section 9 Rigid slings - Specific requirements and test methods, describes additional requirements for sling manufacturers.

*ISO terminology for patient lift, sling and hanger bar has been changed to reflect terms used in the US.

Challenges in mandating use of a sling and lift from the same manufacturer

- In the US - Some manufacturers only make and sell slings
- Some non-US lift manufacturers only sell overhead lifts in the US but not slings
- Manufacturers do not always have slings needed to meet clinical needs
- Slings typically have a 1-year warrantee

Other factors to consider

- 3rd party manufacturing by sling vendors for lift manufacturers
- Purchasing groups that buy slings based on ability to lower cost
- Other medical device 'systems' have components from different manufacturers e.g., Intravenous pump, lines, cannula, and solution container

Adverse events associated with hanger bars and slings

The ISO standard was revised by an interdisciplinary group of experts representing the national standards institutes from numerous countries worldwide.

The group conducted extensive research when updating the standards. This included review of existing medical device safety and risk standards; peer reviewed articles and guidelines related to sling and lift safety and compatibility; and mandatory reports made to the FDA related to lifts and slings via the Manufacturer and User Facility Device Experience (MAUDE) database and to other medical device regulatory entities in Australia, New Zealand, Canada, and the United Kingdom.

The following are examples of common issues noted in reports of adverse events from several countries related to the use of patient lift hanger bars and slings that ended in patient harm primarily due to a fall from a lift:

- Failure to attach the sling correctly to a hanger bar
- Wrong size or type of sling was used e.g., a sling that was too large for the patient or provided inadequate support
- Wrong configuration of sling attachments connected to a hanger bar that resulted in the wrong position of the patient
- Sling unit loop or clip connection means was broken, damaged, or worn
- Sling material and seams damaged or worn
- Sling was incompatible with lift hanger bar, e.g., clip connections attached to hanger bar designed for loop connections and vice versa

Note: These events occurred with a variety of slings styles both washable and disposable and many brands of slings.

The cause of the above issues can be broadly categorized as follows:

— Lack of, or poor sling inspection e.g., prior to first use, periodically, and before each use by a caregiver

— Variable laundry processes i.e., washable slings are not laundered to manufacturers requirements

— Lack of periodic hanger bar inspection and maintenance

— Inadequate education and training of caregivers related to correct choice of sling for the patient's physical and clinical needs; for the lift/hanger bar to be used; and safe use of slings

— Lack of standardization of lifts and slings within a facility

Summary

As cited by the FDA there are many factors that must be considered when choosing the correct sling for a patient, the type of lift it is to be used with and the safe use of a sling and lift (FDA, 2018; FDA 2014)

There is no guarantee that purchasing a sling and lift from the same manufacturer will prevent the adverse events listed above.

Ensuring the safe use of patient lifts and slings and specifically sling and hanger bar compatibility requires that healthcare organizations implement an evidence-based Safe Patient Handling and Mobility program that includes a sling inspection system and laundry management, patient assessment and risk protocols, caregiver training, and periodic lift inspection and maintenance.

It is the healthcare organization in which patient lifts and slings are used that is ultimately responsible for the appropriate choice, safe use and maintenance of patient lifts and slings to prevent harm to patients and caregivers.

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Appendix G

Sling Labels

Sling labels should provide the user with the necessary information for proper selection and safe use.

Therefore, it is important that sling labels are designed to meet Human Factors standards and guidelines to ensure that they are legible and meaningful to the caregiver or 'user-friendly.' More information on application of Human Factors to the design of medical devices and device labeling can be found at the FDA Human Factors and Medical Devices. https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/human-factors-and-medical-devices

ISO standard 10535:2021 currently requires that the following information should be included on a label that is permanently fixed to the sling:

1. The size of the sling i.e., the maximum load in lbs./kgs.
2. A warning/attention mark which will refer the caregiver to the instructions for use of the lift and/or sling
3. Marking to indicate *if* the sling is designed only to be used on one dedicated type of hanger bar
4. Marking to indicate how the sling is to be cleaned and/or disinfected. A symbol can be used to indicate this information. Symbols used should comply with ISO 3758 Textiles -- Care labelling code using symbols.
2. A unique device identifier (UDI) that includes both device and production identifiers (such as expiration date and lot or serial number). The FDA requires this to adequately identify medical devices through their distribution and use (FDA, 2022).
3. The sling manufacturer's name or logo, or registered trade name, website, address, telephone, and country of origin and, in addition, name and address of the supplier if different from the manufacturer.
4. Lot or batch and/or serial number. Serial number is preferred for traceability and inspection records.
5. Year and month of manufacture

Although the ISO standard states that some of the following information can be included in the manufacturer's instructions for use if it cannot be placed on the sling label, it is strongly recommended this be included on the sling label as feasible, to reduce the risk of user error.

- Definition of the model or type of sling.
- The health care setting where the sling can be used e.g., intensive care and/or general patient care use in acute care, long term and home care, and outpatient settings and directions for use. A symbol for and/or written description of intended use, directions for use (icons/text) or indication to refer to the manufacturer instructions for use.
- The method of lifting, particularly the position of the patient in the sling e.g., sitting, sitting/recumbent or recumbent, and any other important information regarding choice of type, design, and application method such as sling dimensions.

- A symbol and description of the hanger bar and a 2, 3, 4, 6 and/or 8-point bar that the sling is to be used with, and the type of hangar bar connection point that is compatible for the sling (e.g., a loop or key/clip).
- Contraindications for use e.g., if a sling is unsuitable for a patient(s) with a specific clinical condition(s).
- A warning not to use a damaged or badly worn sling.
- A warning that indicates if a sling is not intended to be laundered. This symbol should be used (ISO7000-3123).

- A warning that indicates if a non-washable sling has been laundered and must not be used.
- A place to indicate 'Date of First Use.'

Other information that should be provided by the manufacturer:

Details about:

- The materials used in the manufacture of the sling including information about flammability
- The method by which a sling can be connected to, adjusted or removed from a hanger bar
- A warning to the user of the lift and sling that a risk assessment must be carried out to ensure that the correct size, type, and shape of sling is being used for the patient/client.

A note about lift and sling compatibility should also be provided ***(Refer to Appendix F).***

Overall requirements related to labeling slings:

- All warnings used as risk control must be clearly labelled.
- Symbols for use in the labelling of medical products must be in accordance with ISO 15223-1:2021

Information provided on sling labels such as text and symbols should be easy to read and meaningful for the user population.

The use of well-designed icons can assist to convey some of the information above and facilitate comprehension for users who may not read or understand English well. They can also help conserve space on a sling label.

Information provided on labels of washable/wipeable slings should also be colorfast and not fade through repeated laundering or cleaning.

Other information to be included in instructions for use if it cannot be provided on the sling label (AASPHM, 2016):

- Expected lifetime of the product and inspection recommendations
- Technical specifications of a sling i.e., dimensions and maximum load
- Sufficient drawings/illustrations to show the key dimensions
- How to get assistance from the manufacturer

Figure A illustrates an example of a Sling label with essential information to aid correct selection and use of a washable sling.

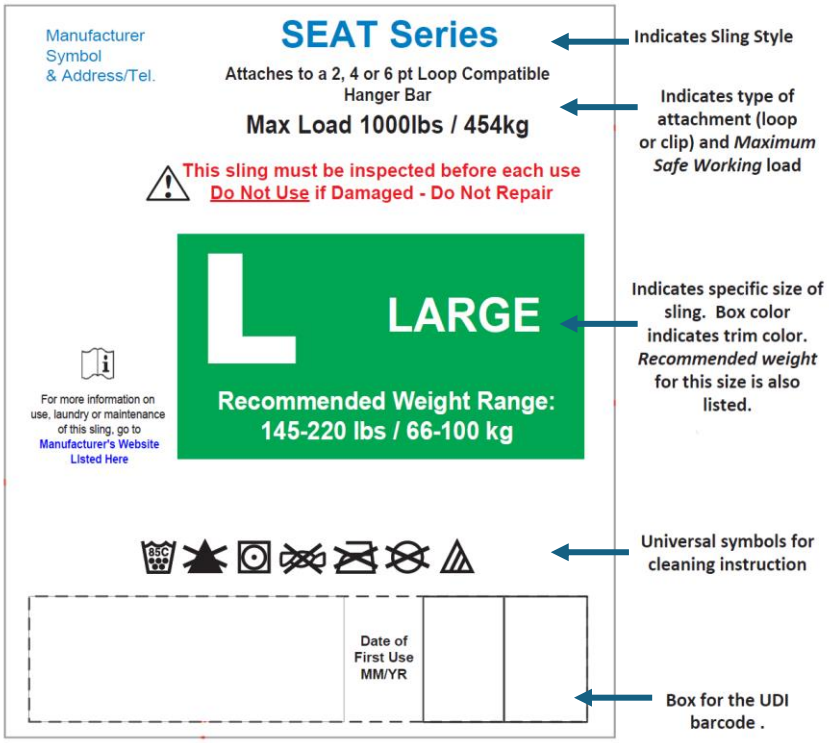

Figure A. *Example of a Sling Label with Essential Information to Aid Correct Selection and use of a Washable Sling.*

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