

# APPENDIX C

## PHAM Equipment Categories

The patient handling and movement (PHAM) equipment categories discussed here are those most commonly used at present; however, not all categories will have a marked effect on design decisions.

To encourage use, the patient handling devices identified with an asterisk (\*) must be stored in accessible and appropriate locations; to accomplish this, consideration must be given to storage space specifications during planning for new construction and renovation projects. Furthermore, space must be provided in patient rooms and/or patient toilet/bath rooms for use of this equipment by one or more caregivers. This space must accommodate a sufficient turning radius in the toilet room, bathroom, patient room, and hallway. Use of bariatric (and therefore larger) variations of these equipment types is essential for protecting caregivers and bariatric patients, so the larger areas required for this equipment must also be considered during planning.

### **Powered Patient Lifting Equipment or Hoists**

Powered patient lifting equipment or hoists come in both overhead and floor-based designs. Caregivers use this equipment to help them lift and transfer patients, mobilize and ambulate patients, reposition patients side to side and up in bed, and lift patient limbs as well as other patient handling tasks. Some lifts can also be used to extract patients/residents from vehicles.

Lifts controlled with a handheld device are powered with a rechargeable battery pack. Presently, the two major categories of powered lifting equipment are full-body sling lifts and sit-to-stand (stand assist) lifts. Full-body sling lifts are further categorized as floor-based lifts, gantry lifts, or overhead lifts (including ceiling-mounted, wall-mounted, and portable lifts). The term “ceiling lift” is generally used in place of “overhead lift” to identify lifts with track systems that are

### **Notes**

1. A variety of terms are used to identify much of the equipment listed in this appendix. The terms used here are those commonly used in the United States.
2. The definitions in this appendix may refer to dependency levels based on physical limitations of patients. (See Table H-1: Physical Dependency Levels of Patient Populations in Appendix H for definitions.)

permanently affixed to the structural component of a ceiling or wall.

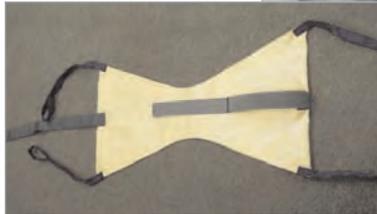
### **Full-Body Sling Lifts**

Full-body sling lifts utilize a variety of sling styles to provide total support and assistance for dependent and extensive-assistance patients as well as partial support for patients with some weight-bearing ability. Weight capacities range from around 350 lbs. to 1,200 lbs. for bariatric patients.

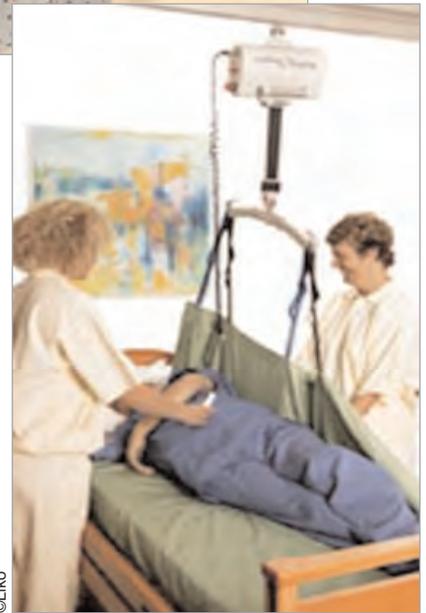
Of the three types of full-body sling lifts, ceiling lifts and floor-based lifts are by far the most commonly used. However, research points to significant biomechanical advantages to using ceiling lifts rather than floor-based lifts.<sup>1, 2, 3, 4, 5</sup> In addition, clinical staff generally prefer ceiling lifts because of their greater convenience and accessibility,<sup>6, 7, 8</sup> which leads to increased staff acceptance and thus greater use of ceiling lifts.<sup>9, 10, 11, 12</sup> Most clinical areas also benefit from the variety of usable sling applications available for ceiling lifts.

The real value of lifts to a health care facility is determined by sling usage and availability. A common sling, the *universal or seated sling* (Figure C-1), is used to transfer patients from seated positions to seated positions (e.g., bed to wheelchair, chair, toilet, or commode). *Repositioning slings* (Figure C-2) assist in repositioning patients side to side and up in bed. *Strap slings*, also known as *limb support slings* (Figure C-3), have a variety of helpful functions including limb support and

**Figure C-1:  
Seated Slings**



**Figure C-2:  
Repositioning  
Slings**



**Figure C-3: Strap or  
Limb Support Sling**



**Figure C-4:  
Ambulation Slings**





**Figure C-5:  
Supine Sling**



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In toilet room (©Ergolet)



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©Ergolet

a

d



c



f

**Figure C-6: Full-Body Sling Lifts  
Overhead/Ceiling Lifts**

lateral rotation. When attached to an overhead lift, *ambulation slings* (Figure C-4) serve to provide support for those who are in the process of rehabilitating and who have a goal of increasing mobilization capabilities. *Supine slings* (Figure C-5) keep patients in a flat position and are used to lift patients from the floor/ground, off of the bed in order to make the bed, and for lateral transfers and other tasks.

**Overhead lifts** (Figure C-6 a-f). Ceiling-mounted lifts are attached to fixed track systems. The motor/lift traverses a track that is attached to the building infrastructure, usually the I-beam or concrete floor above. Although this type of installation is preferred, structural deficiencies in existing buildings may prevent it. When that is the

case, if possible and appropriate, wall-mounted bracing systems can be used to support the track.

Ceiling motor/lifts are normally permanently attached to the fixed track system; however, some organizations opt to use portable motor/lift systems that can be moved from room to room when needed and attached to existing track in the room. Challenges similar to those encountered with floor-based lifts arise when using this type of portable system, and even though it may seem to be an economical solution, it often is not because staff compliance in using it is often low. Floor space requirements are not an issue with overhead/ceiling lifts, and they are the lift of choice, especially in new construction and in existing buildings with small rooms.

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**Figure C-6: Full-Body Sling Lifts**  
Floor-Based Sling Lifts

**\*Floor-based sling lifts** (Figure C-6 g-i). These portable/mobile lifts move along the floor surface on wheels attached to an expandable base for spreading around chairs/wheelchairs. Weight capacities range from around 350 lbs. to 1,000 lbs. for bariatric patients. Accordingly, space requirements vary with weight capacities and the size of the equipment. Obstacles to use of floor-based lifts include accessibility,<sup>13, 14, 15</sup> time to

locate and transport the lift to the patient room, and adequate storage requirements.<sup>16, 17</sup> Flooring characteristics such as flooring materials<sup>18, 19</sup> and thresholds impact the ease of use of this type of rolling equipment.<sup>20</sup>

**\*Gantry lifts** (Figure C-6 j). This type of mobile lift has two vertical side supports and a support bar that extends horizontally between the two side supports. The lift motor traverses across the horizontal bar. The gantry lift is placed over the bed of a patient and functions similarly to a ceiling lift. Usually these lifts are mobile, so they can be moved from room to room when necessary; however, they are not used to transport a patient from a patient room to another room or location. They are often leased but sometimes purchased when storage is adequate. When leased, they are most often used for very obese and bariatric patients when there is no ceiling lift available to move and lift these patients. The gantry lift is not recommended as a substitute for fixed ceiling lifts, but it has advantages over the use of floor-based full-body sling lifts for morbidly obese and bariatric patients.

### Bed/Mattress Patient Handling Features

- Electric/power movement
- Retractable footboard
- Percussion/vibration
- Raised knee platform
- Capillary perfusion enhancement
- Built-in scale
- Adjustable height
- CPR function
- Bariatric accommodation
- Motorized capability
- Lateral rotation therapy
- Others



**Figure C-7:  
Powered Sit-to-  
Stand Lifts**



**Figure C-8:  
Air-Assisted  
Lateral  
Transfer  
Devices**



### Powered Sit-to-Stand (Stand Assist or Standing) Lifts

These powered lifts (Figure C-7) are mobile and move along the floor surface on wheels attached to an expandable base that can spread around chairs/wheelchairs. The lifts are used for patients who can provide some assistance in transferring and ambulating (i.e., those with partial weight-bearing capability). These patients must also have upper body strength, the ability to grasp with at least one hand, and the ability to follow simple instructions. The lifts are used for transfers from seated position to seated position (e.g., bed to wheelchair or commode) and for assistance in dressing, pericare, toileting, and other activities. Sit-to-stand lifts with ambulation capability can also be used for assistance in patient mobilization and ambulation therapy.

Weight capacities range from around 350 lbs. to 1,000 lbs. for bariatric patients, and thus space requirements vary with weight capacities and the size of the equipment. Obstacles to use of floor-based lifts include accessibility of the lift,<sup>21, 22, 23</sup> time needed to locate and transport the lift to the patient room, and storage requirements.<sup>24, 25</sup> Architectural details such as the flooring materials<sup>26, 27</sup> and type of threshold impact the ease of use of this type of rolling equipment.<sup>28</sup>

### Lateral Transfer Devices

Lateral transfer devices provide assistance for moving patients horizontally from one flat surface to another (e.g., transfers to/from bed to stretcher to exam or treatment table). These devices minimize frictional resistance and thus decrease the pulling force required to move patients. Some of these devices may also be used for repositioning patients in bed, both up in the bed and laterally side to side. Currently available devices fall into one of three categories—air-assisted, mechanical, or friction-reducing lateral transfer devices.

#### Air-Assisted Lateral Transfer Devices

Air-assisted lateral transfer devices (Figure C-8) float patients on a layer of air from one surface to another and are used not only for lateral transfers but also for repositioning patients up and from side to side in bed. The devices consist of a motorized blower, hose, and mattress with pin holes on the bottom. The blower forces air into the mattress and the air escapes through the holes, providing a layer of air for ease in sliding patients as well as decreasing shear forces on the patient's skin. There is some evidence that the decreased shear force on the skin diminishes the occurrence of skin tears associated with manual patient

**Figure C-9:  
Mechanical  
Lateral  
Transfer  
Device**



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**Figure C-11:  
Transfer Chairs**

handling. Air-assisted devices also provide excellent reduction in force on the spine of a caregiver. Research in a medical intensive care setting found this style of lateral transfer device was preferred over other designs.<sup>29,30</sup>

#### **\*Mechanical Lateral Transfer Devices**

Mechanical devices (Figure C-9) are powered by an electric motor or manual crank. They attach to a draw sheet or something similar and, when energized, pull the patient from one surface to another. Another variation operates by extending a rigid surface under the patient, which is then used to move the patient from place to place.

#### **Friction-Reducing Devices (FRDs)**

FRDs (Figure C-10) are very low-friction sheets or membranes that readily slide across other materials or each other to decrease frictional resistance when manually sliding a patient.<sup>31, 32</sup> Depending on the type of material, some are used for lateral transfers and for repositioning patients up and side to side in bed. Some are designed with one low-friction side and one high-friction side, which reduces the tendency for patients to slide



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**Figure C-10: Friction-  
Reducing Devices (FRDs)**

down in the bed and/or in a chair/wheelchair. FRDs are especially helpful when inserting and removing patient lift slings underneath large patients.

#### **\*Transfer Chairs**

Transfer chairs (Figure C-11) are used to eliminate the need to perform vertical (seated to seated) transfers. They convert from a chair position to a flat (supine) position in which the patient can be laterally transferred to a bed, exam table, stretcher, or other table.

#### **\*Non-Powered Standing Aids**

Non-powered standing aids are useful for patients who are able to help themselves rise from a sitting to a standing position. The equipment furnishes a secure, steady handle or something similar for patients to grab onto while pulling themselves up. Some aids may be used without the assistance of a caregiver and therefore facilitate independence for the patient. Many styles exist; some are free-standing, and some attach to beds.



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**Figure C-12: Stretcher**



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**Figure C-13: Transport Assistive Device**



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**Figure C-14: Ergonomic Shower Chair**

### Sliding Boards/Devices

Sliding boards/devices function to bridge the space between, for example, a bed and wheelchair or bedside commode. They are used by more independently functioning patients and afford patients a degree of autonomy, since patients can often perform transfers on their own with these devices. However, some patients still require caregiver assistance. The devices are made of a rigid material with a smooth surface for greater ease in moving from one place to another.

### Beds

Beds are also considered patient handling technology. They raise and lower patients to advantageous work heights and can be made coplanar with other surfaces onto which a patient is to be laterally transferred. In emergencies, when time is of the essence, they are used for patient transport.

Some beds and mattresses have features that provide assistance with patient handling tasks (see sidebar) such as lateral rotation therapy, percussion, and bringing patients to a sitting position. In addition, motorized patient beds have become more common. However, the dimensions of many of these motorized beds and bariatric beds are greater than those of standard patient beds, and

this becomes a problem when elevators and doorways are not large enough. (For example, bariatric bed widths can exceed 48" and therefore cannot fit through the typical 48"-wide hospital door.)

### \*Stretchers/Gurneys

Stretchers and gurneys (Figure C-12) with special features can facilitate transporting patients, laterally transferring patients, lifting patients from the floor, and so on. Motorized stretchers or gurneys are especially helpful in facilities with walkways of various levels that require caregivers to push up an incline and limit acceleration when pushing down the incline. Special features important to reducing risk from patient handling include either motorization or a wheel system that helps move and maneuver a non-motorized stretcher. A hydraulic lift or some other powered raising and lowering mechanism can also decrease the ergonomic risk involved in lifting a patient from a low position.

### \*Transport Assistive Devices

Transport assistive devices (Figure C-13) assist caregivers in pushing heavy rolling objects such as beds, wheelchairs, and heavy equipment.<sup>33</sup> These devices are usually battery-powered and attach to the equipment, the head of a bed, or the back of a

wheelchair. To operate them, a caregiver simply steers the device in the right direction. However, when the devices are used with a patient bed, they extend the length of the bed, making them of limited use when beds must be moved between floors unless a device can be located on each floor where one is likely to be needed. Transport assistive devices are especially helpful in facilities with walkways of various levels or whenever caregivers must push patients up an incline or limit acceleration when pushing down an incline.

### \*Ergonomic Shower Chairs

These chairs (Figure C-14) position patients so that staff can easily access a patient's body areas without squatting or excessive bending. Most ergonomic shower chairs are height adjustable and can tilt the patient into a reclining position.

### Endnotes

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