Ergonomics Technical Advisory Group

Annex

Patient Care Ergonomics Resource Guide: Safe Patient Handling and Movement

Developed by the Patient Safety Center of Inquiry (Tampa, FL), Veterans Health Administration and Department of Defense

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Chapter 1 – Overview

❖ Purpose

The goal of this guidebook is to reduce the incidence and severity of job-related injuries related to patient handling and movement tasks. While there is much to learn about the science of safe patient moving and handling, the tools provided in their current form can serve as cognitive aids for both caregivers and patients. Derived from best practices within and outside health care, the program elements described in this guidebook have been tested within the Veterans Health Administration (VHA) and are being fully implemented on 25 nursing home care units and spinal cord injury units within VISN 8.

Similar programs are in various development stages elsewhere, including the private sector. As with any new product in field-testing, modifications may prove useful or necessary. Nevertheless, preliminary data from VHA and outside organizations suggest a decrease in the frequency and severity of injuries to caregivers through the use of this approach. In the long run, a decrease in the costs associated with such injuries, reductions in musculoskeletal pain, improved quality of life, and reductions in disability are anticipated.

❖ Target Audience

This resource guide is targeted for:

- A facility-based interdisciplinary team responsible for improving the safety of both caregivers and patients during the performance of patient handling and movement tasks.
- Caregivers involved in direct patient care and patient movement, including registered nurses, licensed practical nurses, nursing aides, and patient transport technicians.
- Risk managers, safety officers, quality managers, and administrators who influence workplace safety and support resources for lifting devices.

❖ Overview of Content

Over the last six years, the Tampa VAMC research team, under the leadership of Dr. Audrey Nelson, has worked with experts within VHA and nationally-recognized researchers to design a comprehensive program to eradicate job-related musculoskeletal injuries in nursing. The elements of a comprehensive program include:

- Ergonomic Workplace Assessments of Patient Care Areas
- Patient Assessment Criteria
- Algorithms for Safe Patient Handling and Movement

- Equipment Selection, Storage, and Maintenance
- Peer-Safety Leaders (Back Injury Resource Nurses)
- Lifting Teams
- After Action Reviews
- No-Lift Policy

These elements were developed over time, modified based on professional consensus and laboratory evidence, and pilot tested in several facilities. Each of these program elements represents a product in evolution. While facilities may opt to implement some combination of these program elements, it is critical that the No-Lift Policy be deferred until adequate infrastructure is in place. Furthermore, lifting teams offer a viable approach in settings where the number of lifts per day is low to moderate in volume, such as medical/surgical units. This strategy is less effective in long-term care where the volume of lifts is too high to make this a practical solution. The patient assessment criteria and algorithms should be implemented simultaneously. In order for staff to implement these tools properly, appropriate patient handling equipment must be available, including gait belts with handles, powered stand-assist lifts, full-body sling lifts, and friction-reducing devices. Peer-Safety Leaders, known as Back Injury Resource Nurses (BIRNs) show much promise as an effective program element for changing provider behavior. However, the cost of training and maintaining this program makes it most beneficial in high-risk nursing units and departments where the injury rates are high.

- *Chapter 2* includes a brief description of the problem of musculoskeletal injuries in nursing. Over 35 years of research reveal that many of the strategies to reduce the incidence and severity of job-related injuries in nursing have been largely unsuccessful. Several myths and facts related to safe patient handling and movement are delineated and successful case studies are presented.

- *Chapter 3* details a protocol for conducting ergonomic assessments of patient care environments. These key steps include collecting baseline data, identifying high-risk units, obtaining pre-site visit data, identifying high-risk tasks, conducting site visits, analyzing risk, forming recommendations, implementing the recommendations, involving staff in selection of equipment, and monitoring results to continuously improve safety.

- *Chapter 4* outlines patient assessment and care planning strategies to be used in conjunction with algorithms for high-risk nursing tasks. A Technical Advisory Group (TAG), working in collaboration with the National Center for Patient Safety, Public Health and Environmental Hazards, Patient Safety Center of Inquiry (Tampa, FL), and Healthcare Analysis and Information Group (HAIG) was formed. The TAG, under the leadership of Dr. Nelson, developed an algorithm for each of the key transfer and repositioning tasks. The algorithms were tested with different patient populations in a variety of clinical settings. The algorithms were designed to assist health care employees in selecting the safest equipment and techniques based on specific patient characteristics.

- *Chapter 5* provides resources for selecting the right equipment. Costly mistakes have been made in selecting equipment that is inappropriate for the patient population or that staff do not use. A process for conducting clinical trials and strategies for obtaining clinician buy-in are included.
- *Chapters 6 – 9* address a series of best practices for safe patient handling and movement. These strategies include a No-Lift Policy, Back Injury Resource Nurses, Lifting Teams, and After-Action Reviews. Each strategy is described and tools are provided to assist you in replicating these program elements at your facility.
- *Chapter 10* outlines a competency program for nurses related to safe patient handling and movement. It provides tools for training and evaluating staff in the mastery of principles of safe patient handling and movement. Additional slide presentation of the content in this guidebook will be available on the web site: patientsafetycenter.com
- *Chapter 11* delineates tools for monitoring progress and evaluating outcomes.

❖ How to Use this Guide Book

This guidebook was designed to include user-friendly tools to assist teams in implementing strategies that can improve safety related to patient handling and movement tasks. Ideally, an interdisciplinary team will be formed to develop the program, obtain administrative support and funding, provide oversight for implementation, monitor progress, and evaluate outcomes. Key members of the team include, but are not limited to:

- ***Team Leader*:** The person who will coordinate implementation of the program facility-wide.
- ***Group Leaders*:** If the facility is divided into segments or specialty areas, these group leaders will coordinate program implementation for specific areas, such as critical care or long-term care.
- ***Key Operators*:** Direct patient care staff, physical therapists or occupational therapists that will become trainers in the use of equipment. Key operators will receive comprehensive training in equipment function and will train and be resource personnel for other staff members to contact if they are having any problems.
- ***Specialty Staff*:** Other key personnel within the organization who will need to buy into the program if it is going to be successful.
- ***Administration:*** The member of senior administration who supports the program.

It is important to remember that to achieve success, staff must feel like they are part of program development.

> *NOTE: Any mention of brand names in this document is not intended to be an endorsement of this product by the authors and is for information or clarification purposes only.*

Chapter 2 – Background

❖ Introduction

Many organizations are spending much time and effort on back injury prevention programs with little resulting improvement. With some guidance, injury prevention efforts could be directed to best utilize existing resources. The focus of this chapter is to 1) describe the magnitude of the problem of musculoskeletal injuries in nursing, 2) describe common myths and facts related to strategies to improve safety in performing patient handling tasks, and 3) summarize successful case studies. This chapter presents a brief summary of lessons learned from other facilities while attempting to reduce the risk to caregivers during patient handling and movement tasks.

❖ Background

The health care industry is gradually accepting the reality that manually lifting and transferring dependent patients are high-risk activities, both for the health care worker and the patient being transferred. Nursing staffs have one of the highest incidences of work-related back problems of all occupations (Cust, Pearson, & Mair, 1972; Magora, 1970). The incidence rates continue to climb; from 1980 to 1990 incidences of back injuries have increased over 40% (Fragala, 1992). Direct and indirect costs associated with back injuries are estimated to be between $24 billion and $64 billion annually, with $20 billion of that attributed to the health care industry (Fragala, 1992; Fragala, 1993; Garrett, 1992; Williamson, et al., 1988). Over three quarters of a million working days are lost annually as a result of back injuries in nursing (Stubbs, Buckle, Hudson, & Rivers, 1983a), with an estimated 40,000 nurses reporting illnesses from back pain each year (Garrett, 1992). Preventive interventions are critically needed to control the hazards and economic burdens associated with patient handling tasks (Genaidy, Davis, Delgado, Garcia, & Al-Herzalla, 1994).

Data from the Bureau of Labor Statistics show a high number of strains and sprains reported by nursing staff. The back is the body part that is most frequently injured and the patient is the major source of injury for these same occupational groups. Information recently released by the Bureau of Labor Statistics for 1999 reported 271,000 occupational injuries suffered by hospital workers and 188,600 occupational injuries suffered by workers in nursing and personal care facilities (U.S. Department of Labor, 2001). Nursing injuries represented 30% of all injured VHA workers in 2000, more than six times as frequent as any other single occupational group. Job-related injuries that occurred during the performance of patient care activities cost the VHA over $23 million in the year 2000. Approximately 31% of injuries to nurses consisted of upper extremity injuries 25.5%, back injuries; and 19.1%, lower extremity injuries (Biomechanics Research Lab (BRL)). The vast majority of these injuries were related to patient transfer and repositioning tasks. Back injuries, although not the most

frequent injury, do result in the most lost workdays. The importance of developing reliable approaches to injury prevention is obvious.

❖ Ergonomics Standards

The National Institute for Occupational Safety and Health provided the scientific basis for safe practices for lifting and handling in the United States (Waters, Putz-Anderson, Garg, & Fine, 1993). A NIOSH Lifting Equation sets the maximum recommended weight limit at 51 pounds under ideal conditions. It applies to virtually all men and at least 75% per cent of women. Studies that applied the NIOSH lifting guidelines to nursing practice found the estimates of compressive force to the spine were all above the action limit permitted as safe (Nelson, 1996; Owen & Garg, 1991). However, it is expressly stated that the revised NIOSH lifting equation is not particularly applicable where tasks involve elements of holding, pushing and pulling (Waters, Putz-Anderson and Garg, 1994) which encompasses patient care tasks. The NIOSH equation makes a determination of lift acceptability based only on estimation of compressive spinal forces and does not take into account shear forces, which are substantial in nursing activities.

❖ Common Myths and Facts about Safe Patient Handling and Movement

Myth*:* Education and training are effective in reducing injuries.

Facts: Although it is widely accepted that classes in body mechanics and training in lifting techniques prevent job-related injuries, 35 years of research dispute this belief. These efforts have consistently failed to reduce the job-related injuries in patient care delivery (Anderson, 1980; Brown, 1972; Buckle, 1981; Dehlin Hedenrud, & Horal, 1976; Hayne, 1994; Owen & Garg, 1991; Shaw, 1981; Shaw, 1981; Snook, Campanelli, & Hart, 1978; Stubbs, et al., 1983b; Venning, 1988; Wood, 1987). There are several reasons why training alone is not effective, including the following:

1) Body mechanics training is based on research that is not likely generalizable to nursing practice.
2) It is difficult for nurses to translate classroom content to direct patient care.
3) Experts do not agree on what proper body mechanics include.
4) Manual patient handling tasks are intrinsically unsafe because they are beyond the capabilities of the general work force.

Therefore, traditional injury prevention programs based primarily on training and attempts to modify behavior of workers have not demonstrated widespread success.

Interestingly, body mechanics for safe lifting were based on research conducted with predominantly male subjects who lifted boxes vertically from the floor. While we have been teaching nurses “proper” body mechanics for years, it has only recently been questioned whether this research can be generalized to nursing. Why? Nursing remains a predominantly female profession. Furthermore, the science of body mechanics applies to vertical lifting. Many nursing tasks are accomplished in a lateral rather than vertical plane (e.g., moving a

patient from a bed to a stretcher). Ironically, using the "proper" body mechanics for lateral transfer of a patient may actually predispose a nurse to a higher level of risk.

The volume of lifting, turning, pulling and positioning of patients leads to fatigue, muscle strain and ultimately, injury. Unlike lifting a box that has handles, a patient lift is much more difficult. A patient's weight is not evenly distributed and the mass is asymmetric, bulky, and cannot be held close to the body. Furthermore, patient handling tasks are unpredictable; patients can be combative, experience muscle spasms, or suddenly lose their balance. The amount of assistance a patient can offer at any point in time will vary making the task somewhat different each time it is performed.

Furthermore, the hospital or home environment adds to the complexity of patient handling and movement tasks. Access to patients can be very difficult because of clutter around a bedside or small spaces, such as a bathroom. It can be very difficult for nursing staff to position themselves properly when trying to assist a dependent patient with toileting activities. Patient rooms are often crowded and awkward postures are often required when trying to gain access to a patient in a bed. The environment in which nurses care for patients can be very unpredictable and is constantly changing.

Education and training have not been effective because experts do not agree about the content of these initiatives. To date, *lifting techniques* have had limited value in hospital settings, primarily due to time, comfort, or safety issues. Experts do not agree on which lifting techniques are optimal for nursing tasks (Owen & Garg, 1990; Venning, 1988). Owen (1985) identified the discrepancies by experts in identifying effective lifting techniques, addressing studies by Jones (1973), Brown (1973), Hipp (1976), Dukes-Dobos (1977), and Chaffin (1975). Proper lifting techniques have often failed to consider one or more of the following:

1) While mechanical loading associated with lifting primarily involves the lower back, other body parts – particularly the knees and the shoulders – are particularly vulnerable and may be injured as a result of the repeated lifting of heavy loads; this is known as "transferring the overload to multiple other body parts" (Gagnon Chehade, Kemp, & Lortie, 1987).

2) Balance was virtually ignored when nurses were taught to lift loads from below the level of the knees in the position of flexed knees, with the back straight.

3) Not all stressful patient handling tasks are lifts; however techniques have focused exclusively on this task (Owen & Garg, 1990). Investigations show that 20 – 30% of the working time is spent in a position with a forwardly bent or twisted trunk during activities, such as bathing or dressing and undressing the patient.

4) Techniques have failed to consider that lifting, turning, and repositioning of patients often must be accomplished on a lateral plane, using the weaker muscles of the arms and shoulders as primary lifting muscles, rather than the stronger muscles of the legs.

5) The patient is asymmetric, bulky, and cannot be held close to the body; patient handling tasks are often unpredictable and can be complicated by patients who are uncooperative, combative, or severely contracted.

Therefore, education and training on body mechanics alone, for a variety of reasons, have not been effective in reducing injuries. Additional biomechanical evaluations are needed to address optimal lifting and patient handling techniques for caregivers and nursing staff.

Myth: Back belts are effective in reducing risks to caregivers.

Facts: Back belts were widely used in the 1990's as a strategy to prevent job-related injuries in nursing. However, there is no evidence these belts are effective (Alexander, Woolley, & Bisesi, 1995; NIOSH Back Belt Working Group, 1994; Wassell, Gardner, Landsittel, Johnston & Johnston, 2000; vanPoppel, Koes & van der Ploeg, 1998).

Back belts have been used by a variety of industries. They are made of a lightweight, breathable material normally having double-sided pulls that allow varying degrees of tightness and pressure. Those promoting the use of back belts claim they:

- Reduce internal forces of the spine during forceful exertions of the back.
- Increase intra-abdominal pressure, which may counter the forces on the spine.
- Stiffen the spine, which may decrease forces on the spine.
- Restrict bending motions.
- Remind the wearer to lift properly.
- Reduced injuries in certain work places.

In the comprehensive studies done by NIOSH, it is stated that these claims remain unproven. Lifting may produce a variety of forces within the body that contribute to the overall force acting on the spine from compressive, lateral, and anterior-posterior components, termed spinal loading. Many of the studies NIOSH reviewed sought to examine the impact of back belt use of loading. None of the studies provide sufficient data to indicate that industrial back belts significantly reduce loading during lifting. While the theory of increased intra-abdominal pressure remains controversial, some believe that if pressure is increased, it will counter-balance forces on the spine. The studies NIOSH reviewed were inconclusive, and the relationship between intra-abdominal pressure and spinal compression is not well understood. Therefore, even if a back belt increased intra-abdominal pressure, there is no evidence that it would reduce forces on the spine or decrease risk of back injury. Loading on the spine increases when a person has to bend as far forward as possible. Some feel if the ability to bend could be restricted by a back belt the risk of injury might be decreased. Although, back belts restrict range of motion during side-to-side bending and twisting, it was found that they do not have the same effect when a worker bends forward, as is the case in many patient lifting tasks. Regarding the claim that back belts remind workers to lift properly, there is little scientific evidence to support this. There have been anecdotal case reports of injury reduction at work places where back belts have been used. However, many companies that have instituted back belt programs have also implemented training and ergonomic awareness programs. The report of injury reduction may be related to these or other factors. On the basis of available evidence,

the potential effectiveness of back belts in reducing the occurrence of low back injuries remains unproven. There has been some concern that wearing a back belt may increase the potential for injury. A nurse may believe that he or she can lift more wearing a back belt. If nurses falsely believe they are protected, they may subject themselves to even greater risk by lifting more weight than they are capable of handling.

Myth: Mechanical lifts are not affordable.

Facts: The long-term benefits of proper equipment far outweigh costs related to nursing work-related injuries. In nine case studies evaluating the impact of lifting equipment in health care facilities, the incidence of injuries decreased from 60 – 95%, Workers' compensation costs decreased by 95%, insurance premiums dropped 50%, medical and indemnity costs decreased by 92%, lost work days decreased by 84% – 100%, and absenteeism due to lifting and handling was reduced by 98% (Bruening, 1996; Fragala, 1993; Fragala, 1995; Fragala and Santamaris, 1997; Logan, 1996; Perrault, 1995; Stensaas, 1992; Villaneuve, 1998; and Werner, 1992).

As these studies show, the purchase of lifting devices benefits the facility, patient, and nursing staff. A higher quality of work life for health care workers results from occupational injury risk reduction, which translates into improved quality of care for the patient due to higher staff productivity and reduced turnover.

Myth: Use of mechanical lifts eliminates all the risk of manual lifting.

Facts: While lifting devices minimize risk, unfortunately the risk cannot be eliminated altogether. Even when using lifting equipment, the patient must first be rolled in order to insert the sling. Furthermore, human effort is needed to move, steady, and position the patient. However, since most injuries in nursing are cumulative, any steps to minimize risks in key nursing tasks will offer substantial benefits.

Myth: High-risk tasks in nursing are restricted to lifting patients.

Facts: Not all stressful tasks in nursing are patient lifts. Many patient-handling tasks are performed in a forwardly-bent position with a twisted trunk, such as feeding, bathing, or dressing a patient. Additionally, high-risk tasks completed on a horizontal plane are common. These tasks include lateral transfers from bed to stretcher or tasks that involve repositioning a patient in bed. Owen & Garg (1990) identified 16 stressful patient handling tasks in nursing. The most stressful tasks identified in rank order included:

1) Transferring patient from toilet-to-chair.
2) Transferring patient from chair-to-toilet.
3) Transferring patient from chair-to-bed.
4) Transferring patient from bed-to-chair.
5) Transferring patient from bathtub-to-chair.
6) Transferring patient from chair lift-to-chair.

7) Weighing a patient.
8) Lifting a patient up in bed.
9) Repositioning a patient in bed side-to-side.
10) Repositioning a patient in a chair.
11) Changing an absorbent pad.
12) Making a bed with a patient in it.
13) Undressing a patient.
14) Tying supports.
15) Feeding a bed-ridden patient.
16) Making a bed while the patient is not in it.

Furthermore, Nelson and colleagues (1996) identified the following nursing tasks as high-risk:

1) Bathing patient in bed.
2) Making an occupied bed.
3) Dressing a patient in bed.
4) Transferring a patient from bed to stretcher.
5) Transferring from bed to wheelchair.
6) Transferring from bed to dependency chair
7) Repositioning a patient in a chair.
8) Repositioning a patient in bed.
9) Applying anti-embolism stockings (TED hose).

Myth: Facilities should standardize the lifting equipment across all units.

Facts: Standardizing the lifting equipment has great appeal to purchasers for three reasons: 1) the slings are interchangeable, 2) maintenance is easier, and 3) buying larger quantities usually results in price discounts. Standardization also has great appeal to nursing administration, in that training is easier and there is less of a problem with staff competency in using equipment when they are floated between units. The disadvantage to standardization is that the equipment selected may not meet the needs of all staff and patients. Patient characteristics, physical environment, and staff acceptance should influence the purchase and may result in variations across patient care areas. Buying the wrong equipment for a unit in the spirit of standardization may mean staff will not use it. A more reasonable approach is to standardize among like units; e.g., critical care, long-term care, or medical/surgical, noting any unique aspects of units.

Myth: If you buy equipment and devices for safe patient handling and movement, staff will use them.

Facts: While use of mechanical lifting aid equipment has been shown to be far safer for nurses and patients (Harvey, 1987; Owen, Keene, Olson, & Garg, 1995), several limitations interfere with its use in practice. In two large studies (Prezant, Demers & Strand, 1987; Venning, 1985), nurses indicated that mechanical lifts were not appropriate for all patients, not feasible for use in confined areas, and too time consuming for regular use. Bell (1987) found that nurses did not use lifting aids because they were too much trouble and patients disliked them. Fragala (1993) identified several reasons why patient-handling equipment has failed in the past, including equipment that is neither patient- nor user-friendly and is unstable, hard to operate, difficult to store, not easily accessible or available, and poorly maintained. There are several strategies for avoiding costly equipment purchase errors. First, include staff in making the selection. This can be accomplished through an equipment fair or small clinical trial of equipment in the patient area where it will be used. It is important to include all staff that will be expected to use the equipment.

Another mistake commonly made is to purchase manual equipment rather than slightly more expensive powered versions. When making decisions about whether or not to use a lifting device, a nurse balances the amount of effort required with the amount of extra time it will take. Slight improvements to minimize effort can result in an increased number of staff members that use the equipment, making powered devices more cost effective.

Other common mistakes are to purchase insufficient quantities of devices, locate the lifts inconveniently, or fail to adequately maintain equipment. The way that nurses organize their work assignments must be carefully considered. Patient lifting tasks are not evenly distributed throughout a 24-hour period. Often, there are peak periods where staff must compete for lifting devices. If the expectation is that staff will use equipment to reduce risk, there should be a commitment to purchase sufficient quantities so this is feasible. Furthermore, few health care facilities have adequate and conveniently located storage space. Developing a plan for placement of equipment is critical to success. Additionally, a plan for routine service/maintenance is needed. This includes not only the motor and frame, but also cleaning of the equipment, laundering of the slings, and a plan for sling and battery replacement.

Myth: If you institute a no-lift policy, nurses will stop lifting.

Facts: In 1993, a national policy was instated in England prohibiting nurses from lifting patients. This “no-lift” policy resulted in a significant decrease in job-related injuries. This policy states that all hazardous manual handling tasks are to be avoided wherever possible. If hazardous manual handling tasks are unavoidable, they must be assessed in advance. Once they are assessed, action should be taken to remove or reduce the risk of injury. Dangers and hazards must be identified and equipment provided for safer working practice for staff and caregivers. Before any moving and handling procedure can be performed, the nurse should undertake a full risk assessment, completing the appropriate documentation. Implementation focuses on creating a safe workplace for caregivers rather than a punitive action for mistakes.

While a few hospitals in the United States have attempted to implement no-lift policies many have failed. In order to institute a no-lift policy successfully, the infrastructure must first be shaped to support the policy, including the provision of sufficient quantities of appropriate technological solutions.

Myth: Various lifting and patient handling equipment and devices are equally effective.

Facts: Operation of some lifting devices can be as stressful as manual lifting. Equipment needs to be evaluated for ergonomics as well as user acceptance. In a study conducted to redesign at-risk nursing tasks, Nelson, et al (2001) found that lifting devices were not intuitive and staff had difficulty using some equipment as it was designed. Furthermore, sling attachment mechanisms varied and some were significantly more stressful than others to use. A bio-mechanical evaluation of friction-reducing devices showed statistically significant differences in spinal loading between products, where cost was not predictive of effectiveness (Lloyd & Baptiste, 2001). Lifting devices that require manual pumping to raise the lift can be stressful to shoulders and may be more stressful than a two person manual transfer. Specialty hospital mattresses, designed to reduce patient risk for pressure ulcers, have been shown to increase caregiver exertion by 17%, by allowing the patient to sink low into the mattress and reducing access to the patient (Nelson, et al, 2001).

Myth: Nurses who are physically fit are less likely to be injured.

Facts: Multiple studies have explored *characteristics of the nurse that affect risk.* The underlying assumption of this research is that staff could be screened for employment or placed in jobs based on level of risk. This approach, viewed by many as discriminatory, has not been successful. Personal risks identified include level of fitness (Legg, 1987), obesity (Gold, 1994; Lagerstrom, Wenemark, Hagberg, & Hjelm, 1995; Patenaude & Sommer, 1987), genetics (Gold, 1994), height (Dehlin, Hedenrud, & Horal, 1976) muscular strength (Kilbom, 1988), age (Kelsey & Golden, 1988; Lagerstrom, et al., 1995; Lavsky-Shulan, et al., 1985), and stress (Hawkins, 1987). Nurses with a previous history of back injury are deemed at higher risk for re-injury (Fuortes, Shi, Zhang, Zwerling, & Schootman, 1994; Stubbs, Buckle, Hudson, Rivers, & Worringham, 1983a). Some health-related behaviors and habits might to some extent confound associations between occupation and low back pain, including drug/alcohol consumption (Bigos, et al., 1986; Manning, Leibowitz, Goldberg, Rogers, & Newhouse, 1984) and cigarette smoking (Frymoyer, et al., 1980; Frymoyer, et al., 1983; Heliovaara, Knekt, & Aromaa, 1987; Kelsey, 1975; and Kelsey, et al, 1984). Contradicting the studies identifying obesity as a risk factor, in a case control study of 306 automobile workers, Kerr, et al, (2001) found Body Mass Index (BMI) to be lower in those with reported work-related back pain. In a prospective cohort study of 961 female hospital nurses, Smedley, et al, (1997) found no relationship between BMI and the development of low back symptoms.

Intuitively, it would seem that nurses who were more physically fit would be injured less, although the literature does not support this. Why? These staff members are exposed to risk at a greater level; co-workers are four times more likely to ask stronger, fitter peers for help. Older, frailer nurses are less likely to be injured since co-workers rarely ask them to assist with lifting, they are less likely to be assigned heavy patients, and often co-workers cover for them.

Observations at the Tampa VA Hospital revealed that social relationships on a unit predicted staff who was at risk for a job-related injury as well as the number of workdays lost when an injury occurred. Specifically, nurses that were well-integrated on a unit were able to secure assistance from peers easier and more quickly than staff members who were marginally accepted. In addition to staff who was not well liked or respected by peers, other staff who had difficulty securing assistance included new staff and staff who floated to the unit. Once an injury occurred, staff who had positive relationships with their nurse manager was more likely to return to work sooner than staff with poorer relationships with management.

❖ Case Studies of Successful Implementation Strategies

We have examined successful case studies internationally to determine which program elements have the best chance for success and can be easily implemented. We have carefully selected interventions from England, the military, and non-health care industries. We have designed this program to facilitate provider acceptance as well as knowledge transfer throughout the VHA and health care industry.

Facilities that have developed and implemented ergonomic-based injury prevention programs using effective engineering controls have achieved considerable success in reducing work-related injuries and costs. Studies show that ergonomic approaches have reduced staff injuries from 20– 80%, significantly reduced workers compensation costs, and reduced lost time due to injuries (Bruening, 1996; Empowering Workers, 1993; Fragala, 1993; Fragala, 1995; Fragala, 1996; Fragala & Santamaria, 1997; Logan, 1996; Perrault, 1995; Sacrificial Lamb Stance, 1999; Stensaas, 1992; Villaneuve, 1998; Werner, 1992). Furthermore, several researchers have concluded that there is little evidence to suggest that intensive training schedules have decreased back injuries among direct care providers over a thirty-five year period (Anderson 1980; Brown, 1972; Dehlin, et al, 1976; Lagerstrom & Hagberg, 1977; Stubbs, et al, 1983a). *Table 1* summarizes ergonomic intervention case studies.

Table 2-1: Summary Table of Ergonomic Intervention Case Studies

Facility	Intervention	Post Intervention Results
Northern Virginia Training Center (Werner, 1992).	Mechanical lifts on 4 high-risk units.	73% reduction in injuries.
Wyoming nursing facility (Stensaas, 1992).	Lifting-aid devices.	60% reduction in injuries.
Kennebec Health System ("Empowering Workers," 1993).	Ergonomic management program; engineering controls, including lifting devices.	Lost workdays dropped to 48 from 1,097. Experience modification factor dropped from 1.8 (worse than average) to 0.69 (better than average). Insurance premiums dropped from $1.6 million to $770,293.
Texas hospital (Fragala, 1995).	Lifting equipment.	Workers' compensation costs for back injuries declined from $111,159 to $743.
Long-term care facility in CT (Fragala, 1996).	Ergonomics-based back injury prevention program, including lifting devices.	74% reduction in back injuries over a 3-year period. Workers' compensation costs $4500 vs. $174,412 pre-intervention. Lost workdays reduced from 1025 to 81.
United Kingdom (Logan, 1996).	Equipment for manual handling, ergonomics program for all aspects of hospital work systems.	Reduction in injuries among caregivers; 84% decrease in lost work hours. Absenteeism due to lifting and handling reduced 98%.

Facility	Intervention	Post Intervention Results
Surrey Memorial Hospital (British Columbia) (Bruening, 1996; Perrault, 1995).	Ergonomics-based program; no-lift policy.	Reduced injuries by 95%.
Lawrence and Memorial Hospital (Fragala and Santamaria, 1997).	Lifting aids on two high-risk units.	Occupational injuries improved approximately 80%. Lost workdays decreased from 69 to 0. Restricted workdays decreased from 133 to 6.
Quebec nursing facility (Villaneuve, 1998).	Ceiling-mounted lifts	Number of lost-time injuries dropped from 26 to 6.5 per year. Annual average lost days dropped from 983 to 67.
Maine facility ("Sacrificial Lamb Stance," 1999).	Policy for no manual lifting	Drop in medical and indemnity costs from $75,000 to $5,600.

As these studies show, ergonomic programs make sense and provide opportunities to create win/win situations in the VA system. When health care facilities apply innovative approaches to injury prevention, they benefit themselves, patients, and their caregivers. A higher quality of work life for health care workers results from occupational injury risk reduction, which translates into improved quality of care for the patient due to higher staff productivity and reduced turnover. These benefits can be achieved through a well-designed Ergonomic Management Program similar to the one embodied in OSHA's rescinded Ergonomics Rule (U.S. Department of Labor, 2000). These improvements through ergonomics should come as no surprise; many non-health care organizations have reaped benefits from ergonomics for many years. The VHA has an opportunity to be one of the first large health care systems to adopt this sound ergonomic approach and to transfer this technology to enhance safety and health.

Chapter 3 – Ergonomic Workplace Assessments of Nursing Environments

❖ Introduction

Ergonomics, matching job tasks to workers' capabilities, is receiving much attention today. The Occupational Safety and Health Administration (OSHA) made ergonomics an emphasis in the 1990's. Ideas presented for proposed standards on Ergonomics ask employers to study their workplace for the presence of risk factors. One principal risk factor is frequent or forceful manual lifting, as is found in patient handling and movement tasks. Once a job-related risk factor is identified in the workplace, OSHA recommended it be analyzed and a method to improve the job developed. Through the principles of ergonomics, jobs can be redesigned and improved to be within reasonable limits of human capabilities. The basic principles of ergonomics seem to offer the best hope in improving the problems associated with occupational musculoskeletal disorders in nursing. However, ergonomics is not a magical solution and to be effective, a well thought out system of implementation or an ergonomics management program must be developed. The purpose of this chapter is to present a protocol for conducting an ergonomic assessment of patient care environments. This approach represents one facet of safe patient handling and movement and is a step towards the goal of decreasing the incidence and severity of job-related injuries in nursing practice.

❖ Potential Benefits of an Ergonomics Program

In order to secure commitment from top management, some groundwork may be necessary to establish the need for a back injury prevention program. A review of injury statistics and costs are probably the two most important factors in establishing this need. This data can then be used to identify the units with the highest level of risk and establish a baseline from which you can evaluate the effectiveness of your interventions. As with any program, goals and objectives should be developed.

Key objectives for a comprehensive ergonomic program are delineated below. Each facility needs to select targets that are meaningful; e.g., you may target a 30% reduction in lost workdays related to patient handling and movement tasks.

- Reduce the incidence of employee injuries related to patient handling and movement tasks by ____%.
- Reduce the number of lost workdays related to patient handling and movement tasks by ____%.
- Eliminate by ____% of all manual patient transfers.

- Reduce direct costs by ____%.
- Decrease nursing turnover by ____%.
- Decrease musculoskeletal discomfort in patient care providers by ____%.

Opportunities to improve quality of care through ergonomics programs also exist. For example, the following patient benefits can be realized:

- Increase patient comfort, security, and dignity during lifts and transfers.
- Enhance patient safety during transfers as evidenced by decrease in patient falls, skin tears, or abrasions.
- Promote patient mobility and independence.
- Enhance toileting outcomes and decrease incontinence.
- Improve quality of life for patients.

Lastly, ergonomic programs can address several organizational goals, including:

- Become an employer of choice (e.g., improve recruitment, retention, safety, and satisfaction of staff).
- Enhance regulatory compliance.
- Improve staff efficiency.

❖ Ergonomic Systems Approach

Before beginning the actual implementation of an ergonomics systems approach, an appropriate foundation must be laid in order for the program to have a chance to succeed. The key to effective back injury prevention programs is the use of Ergonomic-based approaches that analyze job tasks and identify prominent risk factors with the purpose of changing unacceptable job demands. Ergonomic approaches are used to:

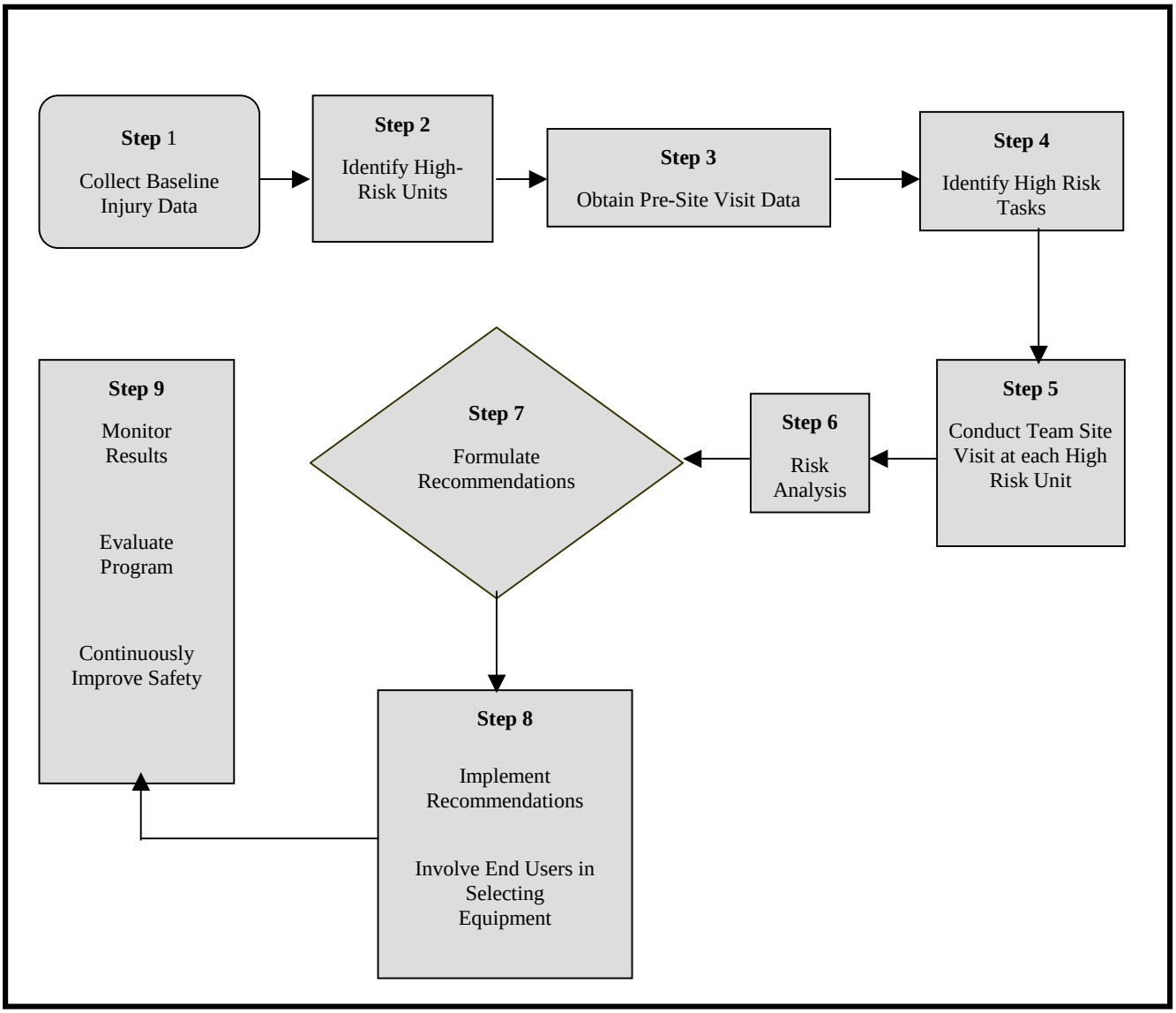
1) Design jobs and job tasks to fit people rather than expecting people to adapt to poor work designs.
2) Achieve a proper match between the worker and their job by understanding and incorporating the limits of people.
3) Take into account that when job demands exceed the limits of workers, there are problems.

Manual patient handling tasks are intrinsically unsafe because they are beyond the capabilities of the general work force; therefore, traditional injury prevention programs based primarily on training and attempts to modify behavior of workers have not demonstrated widespread success.

As with any program within an organizational structure, top management must be committed to the implementation of an ergonomics-based systems approach aimed at the prevention of back injuries. Without this support, chances for success will be limited. Some managers may be very well aware of the problems with musculoskeletal injuries within their organizations, and others may not be aware of the magnitude of the problem or may have the issue low on their list of priorities.

Next, the personnel who will work on this problem within the organization must be identified. In a large organization, it may be assigned to an appropriate operational unit. In a smaller organization, a committee or task force may be organized to work on the problem. With this groundwork in place, the organization is now prepared to embark on the implementation of an ergonomics based system. A summary of the ergonomic environment assessment protocol for patient care units can be found in *Figure 3-1*. Each step will be described.

Figure 3-1: Overview of Ergonomic Workplace Assessment Protocol for Patient Care Environments



Step 1: Collect Baseline Injury Data

There are several methods for collecting baseline injury data, including retrospective review of incident reports and OSHA Logs. Unfortunately, it is often difficult to understand the etiology of risk using retrospective injury data collection methods. For example, incident reports may not include critical information about staffing levels, whether equipment was being used, and other contributing factors. Prospective data collection, defined as collecting data as each injury occurs, allows you to ascertain details while the person is able to easily recall details. However, prospective data collection can be a time-consuming process.

Injury data should focus on injuries related to patient handling and movement. Each clinical unit should gather and record their individual information. Data should minimally capture a description of the incident including the patient care activity performed at the time of the injury (bathing, repositioning, transfer from bed to chair, etc.), cause of injury (pull, push, reach, struck, etc.), type of injury (sprain/strain, contusion, etc.), time of the incident, unit/location where incident occurred, body part/s affected, days of work lost, and modified duty days. A sample Injury Data Collection tool is found as *Attachment 3-2*. Typically, one year of data is collected and analyzed so that trends can be identified. Analysis should first be performed by unit to characterize each unit and then aggregated across units to assess a facility. Unit analysis will minimally address the incidence, severity (defined as lost and modified duty days), primary task/s involved in injuries, and the primary cause/s of injuries on the unit. Those units with high incidence and severity of injuries are classified as high-risk units. These units should be the initial focus of ergonomic interventions. Identifying the primary cause/s of injuries as well as the primary tasks performed when injuries are occurring will provide direction when making ergonomic recommendations.

Caregiver opinion regarding factors contributing to injuries can be collected through the use of staff surveys. A simple open-ended staff survey asking staff something like: "What is contributing to the injuries occurring on your unit?" may bring up significant issues such as lack of equipment, equipment maintenance and repair, storage, staffing, or problems with modified duty assignments. Management interviews may also bring up pertinent issues that cannot be gleaned from injury data. Ideally, such a management interview takes place during a walk-through of the unit.

The easiest method to judge relative cost associated with injuries is to utilize number of lost and modified duty days. It's easy to generalize that the more lost and modified duty days, the higher the costs. Injury costs can be estimated though, by multiplying the lost and/or modified duty days by the average daily salary of the injured employee. Another source of cost data is facility OWCP costs. This data is readily available, however because of its general scope, is quite limited in usefulness here. As opposed to facility-wide cost data collection, unit cost data collection requires the development of a comprehensive cost data collection tool. Cost data analysis by unit requires prospective analysis and therefore is time-consuming. Such analysis is complex and should be undertaken only by an expert. *Figure 3-2* is a sample form for collecting baseline data from the OSHA log, nurse manager files, facility accident stats, and/or OWCP.

See *Chapter 11* for more details on evaluation. It is important to integrate data collection into existing data sets available at your facility.

Figure 3-2
Patient Care Incident/Injury Profile

Patient Care Activity	Cause of Injury	Type of Injury	Body Part(s)	Location	Time of Injury	Lost Days	Modified Duty Days
Sample: Patient transfer bed to stretcher.	Reaching across stretcher for patient.	Strain	Upper back	Patient bedside	0930	3	5

Step 2: Identify High-Risk Units

Using baseline data on the incidence and severity of injuries, identify the high-risk units at your facility. While eventually you will want to include every unit in an ergonomic assessment, prioritizing time and resources are frequently necessary. High-risk units will have the highest incidence of patient handling injuries, the most workdays lost, and the highest concentration of staff on modified duty.

Step 3: Obtain Pre-Site Visit Data on High-Risk Units

A Site Visit Team will perform an ergonomic analysis of each unit to determine what improvements can be instituted to decrease risk. These recommendations will be made based on a walk-through (site visit) of each area, interviews with management and other staff, and through the evaluation of unit-specific information. In order to have a smooth and productive site visit, this unit-specific information should be collected and submitted to the Site Visit Team prior to their visit.

Generally, the Site Visit Team will evaluate injury data, equipment issues, space issues, storage availability, and maintenance/repair issues. Other factors such as patient population, and staffing information are needed to determine unit characteristics that will influence intervention needs.

The following data collection tools will aid in the collection of this information. In order to give nursing management adequate time to locate and compile information, these tools should be given to the nurse manager at least a few weeks prior to the site visit. This pre-site visit data should be submitted to the Site Visit Team at least one week in advance. *Figure 3-3* is the Pre-Site Visit Unit Profile. *Part I* of this tool describes the unit and includes information on space, storage, structure, and maintenance/repair issues. *Part II* collects information related to the patient population and staff.

While most of the questions on this survey are self-explanatory, one area, percentage of dependent patients, may need additional explanation. One approach for determining the percentage of patients on a unit who are physically dependent is the classification in the Health Care Finance Association (HCFA) Patient Assessment System, Section G titled, "Physical Functioning and Structural Problems". This coding is consistent with Activities of Daily Living (ADL) Self-Performance Codes for a patient's performance over all shifts during the last seven days and can be used in other patient-care areas. It is important to note that physical dependency is not the same as patient acuity. Definitions for levels of dependency are included in the tool and are also outlined below.

- **Total Dependence** – cannot help at all with transfers; full staff assistance for activity during entire seven-day period. Requires total transfer at all times.
- **Extensive Assistance** – can perform part of activity, usually can follow simple directions may require tactile cueing, can bear some weight, sit up with assistance, has some upper body strength, may be able to pivot transfer. Over the last seven-day period, help provided three or more times for weight-bearing transfers or may have required a total transfer.
- **Limited Assistance** – Highly involved in activity, able to pivot transfer and has considerable upper body strength and bears some weight on legs. Can sit up well, but may need some assistance. Guided maneuvering of limbs or other non-weight bearing assistance three or more times; help provided one or two times during the last seven days.
- **Supervision** – Oversight, encouragement, or cueing provided three or more times during the last seven days or physical assistance provided only one or two times during the last seven days.
- **Independent** – can ambulate normally without assistance, in unusual situations may need some limited assistance. Help or oversight may have been provided only one or two times in the last seven days.

In addition, each patient will be assessed with regard to such factors as mental acuity, ability to comprehend instructions and cooperate in lifts and transfers, combativeness, weight, upper extremity strength, ability to bear weight and specific medical conditions which may affect the selection of an appropriate means for lifting and transferring. For purposes to determine

the percentage of patients on these units who are physically dependent, only Class 4 and 3 patients are considered dependent. The other factors mentioned will be considered when determining the appropriate method of transfer of a patient.

Figure 3-3
Pre-Site Visit Unit Profile

Describe Unit, including # beds, room configurations (private, semi-private, 4-bed, etc.), and bathrooms:

Part I – Space/Maintenance/Storage

1. Describe current storage conditions and problems you have with storage. If new equipment were purchased, where would it be stored?

2. Identify anticipated changes in the physical layout of your unit, such as planned unit renovations.

3. Describe space constraints for patient care tasks; focus on patient rooms, bathrooms, shower/bathing areas.

4. Describe any routine equipment maintenance program or process for fixing broken equipment. What is the Reporting Mechanism/ procedure for identifying, marking, and getting broken equipment to shop for repair?

5. If potential for installation of overhead lifting equipment exists, describe any structural factors that may influence this installation, such as structural load limits, presence of asbestos, etc.

Part II - Patient Population/Staffing/Equipment Use

1. Describe the patients on your unit.

2. List your existing FTEE and also the typical number of filled positions.

   FTEE Assigned Ceiling: ____ RN ____ LPN ____ NA
   ____ Transport ____ Other (list)

   Typical positions filled: ____ RN ____ LPN ____ NA
   ____ Transport ____ Other (list)

3. Discuss projected plans or upcoming changes in staffing, patient population, or bed closures.

4. Discuss proposed changes in the average daily census over the next two years.

5 Identify typical distribution of patients by physical dependency level according to the definitions below.

> *Note: This is not the same as patient acuity. The total for the 5 categories should equal your average daily census.*

____ **Total Dependence –** Cannot help at all with transfers, full staff assistance for activity during entire seven-day period. Requires total transfer at all times.

____ **Extensive Assistance –** Can perform part of activity, usually can follow simple directions, may require tactile cueing, can bear some weight, sit up with assistance, has some upper body strength, or may be able to pivot transfer. Over the last seven-day period, help provided three or more times for weight-bearing transfers or may have required a total transfer.

____ **Limited Assistance –** Highly involved in activity, able to pivot transfer and has considerable upper body strength and bears some weight on legs. Can sit up well, but may need some assistance. Guided maneuvering of limbs or other non-weight bearing assistance three or more times, or help provided one or two times during the last seven days.

____ **Supervision** – Oversight, encouragement, or cueing provided three or more times during the last seven days or physical assistance provided only one or two times during the last seven days.

____ **Independent** – Can ambulate normally without assistance in unusual situations may need some limited assistance. Help or oversight may have been provided only one or two times in the last seven days.

6. Provide inventory of all patient care equipment; describe working condition and how frequently equipment is used.

Patient Care Equipment	**Manufacturer**	**Qty**	**In working order?** **Comment:**	**Describe whether it is used and why**	**Recommendations**
Sample: Mechanical Lifts.	ARJO	3	Yes	Used frequently, but there are not enough slings for all patients.	Need 1-2 additional lifts and 12 additional XL-size slings.
Sample: Surfboard friction-reducing device.	Not sure.	1	Yes	Rarely used – inconvenient to obtain and too heavy to carry to bedside.	Need easy-to-use friction-reducing devices stored at bedside for patients who require assistance with lateral transfers.

7. Perception of Problem Areas – what do you think are your problem areas?

8. What equipment do you think you need?

Person Completing this Report: _____

Title: _____

Date: _____

Step 4: Identify High-Risk Tasks

Next, it is important to identify and assess staff perceptions of high-risk tasks. The highest risk tasks are likely to vary between patient care units, depending on patient characteristics, availability of equipment, physical layout, and work organization. For example, some studies have indicated that bathing tasks, toileting tasks and transfers from beds to chairs are high stress tasks for patient handlers. Other units may prioritize lateral transfers from bed to stretcher, or turning patients from side to side in bed.

Through job observation, questionnaires to employees or brainstorming sessions with patient handlers, individual sites should determine what are the high-risk activities within their organization. *Figure 3-4* is a tool that can be used with nursing staff to identify and prioritize high-risk tasks.

You may consider this part of the Pre-Site Visit Data Collection process, however, it is important to include as many direct patient care providers as possible in delineating high-risk tasks. Keep in mind that there are likely to be variations by unit as well as by shift.

Figure 3-4
Tool for Prioritizing High-Risk Patient Handling Tasks

Directions: Assign a rank (from 1 to 10) to the tasks you consider to be the highest risk tasks contributing to musculoskeletal injuries for persons providing direct patient care. A "1" should represent the highest risk, "2" for the second highest, etc. For each task, consider the frequency of the task (high, moderate, low) and musculoskeletal stress (high, moderate, low) of each task when assigning a rank. Delete tasks not typically performed on your unit. You can have each nursing staff member complete the form and summarize the data, or you can have staff work together by shift to develop the rank by consensus.

Frequency of Task H = High M = Moderate L = Low	**Stress of Task** H = High M = Moderate L = Low	**Rank** 1 = High-Risk 10 = Low Risk	**Patient Handling Tasks**
			Transferring patient from bathtub-to-chair.
			Transferring patient from wheelchair or shower/commode chair-to-bed.
			Transferring patient from wheelchair-to-toilet.
			Transferring a patient from bed-to-stretcher.
			Lifting a patient up from the floor.
			Weighing a patient.
			Bathing a patient in bed.
			Bathing a patient in a shower chair.
			Bathing a patient on a shower trolley or stretcher.
			Undressing/dressing a patient.
			Applying anti-embolism stockings.
			Lifting patient to the head of the bed.

Frequency of Task H = High M = Moderate L = Low	**Stress of Task** H = High M = Moderate L = Low	**Rank** 1 = High-Risk 10 = Low Risk	**Patient Handling Tasks**
			Repositioning patient in bed from side-to-side.
			Repositioning patient in geriatric chair or wheelchair.
			Making an occupied bed.
			Feeding bed-ridden patient.
			Changing absorbent pad.
			Transporting patient off unit.
			Other Task:
			Other Task:
			Other Task:

Adapted from Owen, B.D. & Garg, A. (1991). *AAOHN Journal*, *39*, (1).

Step 5: Conduct Team Site Visit for Ergonomic Assessment

Following identification of high-risk units from historical data, the ergonomics assessment team is convened for the purpose of conducting an on-site evaluation. This site evaluation serves to recognize the many direct and indirect factors that may contribute to risk potential and, with staff input, to identify potential solutions that will serve to minimize risk of injury to the caregivers and patients. The following process is completed for each high-risk unit.

Team members must understand the philosophy of ergonomics and ergonomic processes specific to patient-care environments, therefore, appropriate training, as offered in this tool, must be completed. Site Visit Team members include persons with training in the ergonomic process such as Industrial Hygienists, Occupational Medicine Practitioners and Ergonomists. At least one nursing service safety appointee should receive training and become a site team member. During the site visit on each unit, the Nurse Manager or designee from that unit will join the Team in order to answer questions specific to the unit. Additional staff involvement is suggested and important to accurately characterize a unit, so nursing staff members from each unit should also be invited. At a minimum,

additional staff members should take part in the pre-site visit data collection process. These staff will offer information through group and individual interviews. As many nursing staff as are available will broaden the scope of understanding of the unit.

Each unit begins the Site Visit process with an Opening Conference and may end with a Closing Conference. These meetings include Site Visit Team members and other designated nursing staff. The actual Site Visit walk-through takes place after the Opening Conference. The Opening Conference discusses and clarifies information obtained from the Pre-Site Visit Data Collection Tools and gathers additional information through interviews with nurse managers and nursing staff. If used, the closing conference summarizes information captured previously for accuracy and is helpful in prioritizing issues.

Key staff from the unit, including the nurse manager, supervisor, site coordinator and the back injury resource nurse meet with the ergonomics team to discuss operational issues and review data that was prepared in preparation for the site visit. This meeting may last from 30 minutes to 1 hour. Operational issues discussed include:

1) Future plans of the unit; whether the unit is to be expanded or reduced, increase or decrease in staffing, change in the type or number of patients, etc.
2) Patient transport issues, how and whose responsibility it is to transport patients for consults and treatments.
3) General equipment condition, storage and preventative maintenance programs (if any).
4) Staffing considerations.

During this meeting, staffing levels, scheduling practices and patient assignments are revisited in which we learn about:

1) Ceiling and typical patient census.
2) Staffing levels by shift.
3) Unique shift patterns.
4) Typical number of staff on modified or light duty assignment.
5) Staff turnover.
6) Peak workload periods
7) Workload distribution using special teams such as shower or lift teams.

Once you have the group of staff convened, solicit staff input into risks related to patient care activities. Samples of general questions are outlined below.

- What conditions or situations put you at risk to back strain and injuries?
- Which lifts or transfers are the most difficult and present the highest risk?

- What are the factors that make a lift or transfer a high-risk activity?
- What types of patient conditions contribute to high-risk situations?
- What do you think can be done to reduce or minimize a high-risk situation?
- How can we more effectively use lifting-aid devices?
- What are the important features to look for in a lifting aid device?

With a more complete understanding of operational issues specific to the unit, the ergonomics team requests a guided tour of the unit, which may take approximately 30 minutes. During this tour, the team pays particular attention to:

1) The availability, size and configuration of storage space.
2) Showering processes and equipment, whether private or communal.
3) Toileting processes and equipment.
4) Patient room sizes and configurations.
5) Provision and condition of equipment for patient transfer, including mechanical lifts, stand assist lifts, lateral transfer aids, etc.

Information derived from the site visits is compiled, by unit, into a summary data sheet (*Figure 3-5*). On this data sheet, the patient population and unit type is described, along with miscellaneous pertinent information, such as future plans of the unit. Availability and condition of equipment on-hand is noted. Problems identified by the ergonomics team are recorded in detail, allowing for the development and recording of proposed solutions.

Figure 3-5
Sample Summary Data from Site Visit

Unit: _____

Patient Description	Unit Description	Misc. Info.	Equipment	Problems Identified	Solutions
Sample: Spinal Cord Injury – includes new injuries and 4-6 ventilator dependent patients. 60% of patients are totally dependent.	This 34-bed SCI unit has two wings, 7 private rooms, 3 semi-private and 5 three-bed rooms. Showers are communal (2 areas), as are bathrooms.	Unit will be moving in 8 months.	3 ARJO Maxilifts. TotalLift II. Not Used: Mobilizer, Surfboard.	Most of injuries are from repositioning patient in bed. Lateral transfers are also problematic, and there is no equipment staff has found useful. No preventative maintenance program for equipment. One additional lift needed for peak periods on each shift; batteries on existing lifts are old, and not all lifts have scales. New batteries, two XXL slings, and one scale for ARJO Lift.	Pneu-Care mattresses for 10 beds – or – ceiling lift with clamps on sheets to pull patient up in bed – or parachute material for sheets. Get estimate of current mattress expenditures, and get turn-assist or rotational therapy added on. Explore best surface for pulling up in bed. Two Gait belts with handles. One powered, lateral-assist device. Explore value of friction reducing devices. Additional Maxi Lift with scale. Preventative maintenance program needed.

Step 6: Risk Analysis

Risk analysis involves careful review of the baseline injury data, pre-site visit data, identification of high-risk tasks, and observational data from the site visit. Through risk analysis, high-risk situations or job tasks are identified. Risk factors specific to the health care industry might include:

1) Reaching and lifting with loads far from the body.
2) Lifting heavy loads.
3) Twisting while lifting.
4) Unexpected changes in load demand during the lift.
5) Reaching low or high to begin a lift.
6) Moving/carrying a load a significant distance.

Environmental hazards are also identified, such as cluttered patient care areas, confined space in bathrooms, or broken equipment.

Step 7: Formulate Recommendations

Recommendations should be achievable and simple. When developing recommendations, it is necessary to factor in constraints, such as fiscal resources, administrative support, and environment. Generally, solutions fall into two categories: engineering controls or administrative controls. Each will be briefly described.

A. Engineering Design Solutions. These solutions usually involve a physical change to the way a job task is conducted or physical modification to the workplace. The changes can be observed as caregivers conduct the job task in a new way. Examples might include the introduction of lateral transfer aids, mechanical-lifting aids, height-adjustable beds to match with stretcher heights, or the use of wheelchairs that can be converted into stretchers.

These aids are usually more permanent solutions to problems. They may have a higher initial cost but may have a lower cost over the long term as a result of cost reductions realized from the implementation of the changes.

Through engineering controls, changes are made in job design to minimize or eliminate risk factors. Consider some high-risk patient handling activities with the idea of changing the high-risk components of the job. Tasks involving a bed-to-chair or chair-to-bed transfer can be very difficult. First, consider moving someone out of a bed and into a chair. The difficulty of the task will vary relative to the dependency level of the person to be moved. Considering a totally dependent person, staff members must reach across an obstacle (the bed) to access the person they need to assist. This involves reaching, and it is usually not possible to position oneself with bent knees since the caregiver is usually leaning up against a bed. The patient needs to be physically lifted and considering weight, the loads involved in the lift are unacceptable. Movement into a chair involves

moving the person to a different height level, and there is usually some carrying involved. The unacceptable risk factors of this job task involve reaching, lifting a heavy load, sub-optimal lifting postures, and carrying a load a significant distance. In order to redesign this task effectively, the optimum solution would be to eliminate these high-risk activities. Where task elimination is not an option, lifting aid devices can be applicable to this situation. Lifting aid devices include full-body slings, which are very useful for the totally dependent patient. In addition, the bed-to-chair transfer can be converted into a bed to stretcher transfer. Through the use of convertible wheelchairs that bend back and convert into stretchers and with height adjustment capabilities, a slide transfer rather than a lift may result.

If the patient is not totally dependent, a transfer such as bed to chair may be done by first getting the patient to a sitting posture. Again the amount of assistance required will depend upon the patient's status. Once to a sitting posture, a stand and pivot transfer can be conducted. Some health care workers are highly skilled in this transfer technique and have done it many times without suffering any occupational injuries. However, loads involved are heavy and if the patient does something unexpectedly, such as, collapses from a weakness in the legs, the health care worker must react and often times these unexpected occurrences can result in occupational injuries. Again through application of some lifting aid devices, the risk associated with this type of transfer can be minimized. A device that could be considered in this situation would be a standing-and-repositioning lift, which is a lifting device with a simpler sling for patients with weight-bearing capabilities.

B. Administrative Solutions. These usually involve the caregivers only in the way the work is done and do not involve a physical change to the workplace. Changes are apparent by watching how the work is conducted or how caregivers perform their jobs. Examples might include changes in scheduling, minimizing the amount of times a patient or resident must be transferred, job rotation where more people are involved in the process of transfers, or the introduction of lifting teams.

These recommendations are usually relatively fast and easy to implement and may have a low initial cost. However, implementation requires continual enforcement and re-enforcement and, although short-term successes may be realized, it is difficult to achieve long-term change and improvement.

Administrative controls may be applied to patient handling tasks. For example, the number of patient transfers may be reduced by effectively scheduling procedures that patients may require over the day. Rather than transferring patients from a bed to a wheelchair or transport device for a particular procedure or diagnostic test and then bringing them back to their room, putting them back to bed and redoing the transfer for a number of other procedures during the day, scheduling could be planned better. Scheduling might be done so that the patients will be transferred out of bed, brought from place to place for various necessary procedures, and then returned to their room.

Here is an example of how administrative controls can be used, involving rescheduling to minimize a high concentration of lifting activities for direct patient care staff. It takes place at a state department for the developmentally disabled involving facilities housing

highly dependent patients who are in need of much assistance to be moved. One of the most demanding times for patient transfers involved the part of the day when staff members were preparing patients to be picked up in buses and transported to their daily activities. Because of the way activities were scheduled and how the buses ran, staff members were rushing and highly stressed to prepare patients for transport in a short time period. Lifting aid equipment was considered and did improve the situation; however, the short window of time to get patients out of bed and prepared for transport was creating the problem. This was not an issue that staff caring for the patients could solve themselves. It involved many people throughout the entire facility, including those responsible for scheduling patient activity programs and meals, as well as the organization that had been contracted to provide transport services. Other than the direct patient care staff, the other groups were unaware of the problems encountered with the short time window provided to prepare patients for transport. After an initial meeting was held with these other operational groups at the facility, they understood the problem and were more than willing to consider options to improve the situation. Scheduled activities were adjusted and methods of transport pickups were also changed. This resulted in distributing the number of required transfers over a larger period of the workday and allowed for better use of lifting aid equipment. The implementation of this administrative control required some careful planning and presentation of the problem as well as cooperation from a wide segment of many operational groups within the facility. The end results were positive to all involved including the patients, who received better care. This was due to the fact that direct patient care staff had more time in preparation for the transport process and they could give more individual attention to patients.

C. Selecting Appropriate Lifting Aids. Based on the dependency levels of patients on the unit, specific methods of transferring and lifting will be designated. Based on the above assessments, the following methods of lifting and transfer should be employed at facilities.

1. *Total Dependence Patients – Level 4.* All patients classified as total dependence (Class 4) should be lifted and transferred between beds, chairs, toilets, and bathing and weighing facilities by means of a full-sling mechanical lift device. In some situations, if another means of transfer might be required, the first option considered should not involve manual lifting. Such an option might include use of a transfer chair that can convert into a stretcher configuration along with a powered lateral-assist transfer device. Determining the average number of Level 4 patients on a unit will help you determine how many devices are needed.

2. *Extensive Assistance – Level 3.* All patients classified as extensive assistance (Level 3) should be lifted and transferred between beds, chairs, toilets, and bathing and weighing facilities with the aid of a mechanical lift device. A full body sling lift is appropriate for all transfers. However, depending upon the patient's condition and weight bearing capabilities, a stand assist lift might be used if determined appropriate by professional staff conducting patient assessments. The determination of which lift to use should be noted and communicated to nursing staff in a standardized way by the facility. Use of a full sling lift may always be substituted for the stand assist lift at the discretion of the caregiver for the protection of the patient or caregiver. When

mechanical lifts are determined to be not appropriate, the first options considered should not involve manual lifting and transferring. Such an option might include use of a transfer chair that can transfer back into a stretcher configuration and a powered lateral-assist transfer device.

3. *Supervision/Limited Assisted Patients – Levels 2 and 1*. An individual patient handling plan should be developed for each patient whose mobility level is assessed as requiring supervision or limited assistance (Level 2 or 1). This plan should be developed by professional medical staff, which may include nurses or physical therapists based on the individual assessment of the patient. The basics of this plan should be accessible and communicated to the nursing staff in a standardized way by the facility. In some cases, supervision/limited assessment patients may require a stand assist lift. Depending on the patient's condition, stand assist aids may be appropriate. These might be mounted on the bed or free standing and include walking aid devices. The electric height adjustment of a bed may also be used to assist these patients to a standing position. Those patients who require assistance in standing may also be unsteady on their feet and require a walker for assistance. These non-powered assist devices provide safety and support to patients while allowing them to use and maintain their current abilities. The use of gait belts with handles or transfer belts that allow the caregiver to get a firm grasp on the patient may also be appropriate for this class of patient. Other lifting aid devices such as sliding boards, which provide a bridge and means for the patient to slide from a bed to chair in a seated position, can also be considered. The patient's handling plan should specify what transfer or lifting devices are needed, as well as the number of caregivers required to assist in the transfer. Depending on the patient's condition and ability to assist in the transfer process, at times two caregivers may be required for the transfer. In some situations, because of a patient's weight, a mechanical lift might be specified for safety to protect against an unexpected event during the transfer process.

4. *Independent Patients – (Level 0).* Independent patients (Level 0) are normally capable of bearing their own weight and walking without assistance. They do not normally require mechanical assistance for transferring, lifting, or repositioning. However, a patient's condition may vary due to any number of factors, and caregivers should be trained to be alert to a patient's changing abilities. Anytime a patient is unable to bear weight or come to a standing position and must therefore be lifted, regardless of how that patient was originally assessed, and extensive assistance is required during the lift or transfer process, both the patient and caregiver are at risk of injury. Therefore, mechanical lifting devices and lifting aids may be required.

5. *Lifts from Floor*. In almost all situations where a patient must be lifted from the floor, a full sling mechanical lift will be required. A patient who has fallen to the floor should be assessed for injury prior to being lifted. Training will be provided to nursing staff regarding when a patient should not be moved at all and when a mechanical lift should not be used due to patient injury. A plan should be specified in advance for moving and lifting patients in these situations. The plan should specify a minimum number of caregivers needed to assist – in any manual lift, as well as the need for specially trained or selected caregivers. Special training should be provided

when such manual lifts are required. Where a patient has fallen and can regain a standing position with minimal assistance, a transfer belt or gait belt with handles can be used as a lifting aid, provided an adequate number of staff members are available to provide needed assistance

6. *Repositioning.* Where possible, attempts should be made to minimize the need for repositioning of patients. Where patients require frequent turning or repositioning for therapeutic needs, treatment surfaces on beds should be sought which can meet therapeutic needs and minimize the need for repositioning. Proper and optimum use of bed control adjustments should also be used to minimize the need for repositioning. Proper bed adjustment can minimize a patient sliding down in bed. When a patient does slide down to the foot end of the bed, and repositioning in bed is required, bed controls and features should be evaluated and utilized to the full extent possible to maximize ergonomic advantage to the caregiver during these activities. Where possible, beds should be raised to the height of the caregiver's elbow. When beds have a capability of assuming the Trendelenburg position (where the head of the bed is lower than the foot of the bed), this position should be used to facilitate the repositioning process. A variety of friction reducing devices and small hand slings are also available to assist in the repositioning process. Where possible, the use of a mechanical lift should be considered when a major bed repositioning is required. All repositioning in beds should be performed by at least two caregivers. Where patients are capable of assisting, they should be involved in the repositioning process.

   Appropriate chairs and chair adjustments should be used to minimize the need for repositioning of patients in chairs. Features such as the tilt in space should be sought for chairs to help maintain proper positioning of a patient. When there is a need to reposition a patient in a chair, proper use of a stand assist lift should be considered as a first option. Gait belts, transfer belts and hand slings may be used to facilitate the repositioning process. Where these lifting aids are used, at least two caregivers should be involved in the repositioning process.

7. *Situations in Which Mechanical Lift Devices Cannot Be Used.* Unusual situations in which mechanical lift devices cannot be used should be identified in advance and specific lifting procedures should be designated for those situations. For example, when a patient weighs in excess of the safe lifting capacity for the standard mechanical lifts at a facility, appropriate mechanical lifts that are able to accommodate higher weight limits should be obtained. Standard mechanical lifts will normally accommodate 350 to 400 pound patients. More substantial lifts will accommodate 600 pound patients, and bariatric lifts are available that can lift patients up to 1000 pounds.

   A mechanical lift might not be appropriate due to a patient's medical condition. Other methods of transfer might include the use of transfer chairs. These chairs convert into a stretcher configuration transforming a standard bed to chair transfer to a lateral transfer. Where these transfer chairs are employed, lateral transfer devices should be used. These include mechanically-powered transfer devices which pull the patient across from one surface to the other; and friction-reducing devices that aid the

sliding of a patient from one flat surface to another. In other situations where mechanical lifting devices are not appropriate, lifting aids such as sliding boards, transfer belts, and gait belts with handles may be specified by the medical professional. In these situations, the minimum number of caregivers needed to assist in the transfer as well as the need for specially trained or selected caregivers will be identified. Special training should be provided for such assisted manual lifts.

8. *Combative and Mentally Impaired Patients.* It is expected that in most situations, a combative or mentally impaired patient requiring a lift based on dependency needs can be lifted using the appropriate mechanical lifting aid device. Combative or uncooperative patients may require more caregivers to assist in the process. In the unusual circumstance where a mechanical lift is deemed not appropriate for a particular patient due to the patients mental condition or behavior, that determination should be made by a member of the facilities professional staff and noted in the accessible records for that patient. Under such circumstances a specific plan for lifting and transferring that patient should be developed in advance, specifying the number and type of caregivers needed to assist.

9. *Equipment Availability.* An adequate quantity of appropriate equipment should be available for use. Equipment should be stored and available in accessible areas. An appropriate maintenance program should be instituted to ensure that equipment is in good working order and that batteries are charged regularly and are readily available. An adequate amount of equipment accessories such as slings must be available in a convenient location. An adequate variety of slings including various sizes as well as toileting and bathing mesh slings should be made available. In addition to mechanical lifts, facilities should seek out appropriate friction reducing devices, sliding boards, transfer belts, and gait belts with handles.

D. Allocation of Resources. There are many issues to be considered by the evaluations team in determining the best and most appropriate use of available funds:

1. Are appropriations best utilized for the acquisition of new technologies, or for the upgrade or replacement of old equipment? Assuming that an effective maintenance program is in place, older equipment will have a long operational life. Certainly, technological developments lead to substantial improvements in patient handling equipment that can lessen the burden on caregivers. If existing equipment is properly functioning, then cost of upgrades, other than those required through FDA audit are typically cost-prohibitive and so funds may be best spent on the acquisition of new technologies rather than on the replacement of old.

2. Should you purchase or lease patient handling equipment? The answer to this question lies in demand. If a product were needed for frequent use, then the best return on capital investment would be to purchase the products outright. For equipment less in demand, such as bariatric care products, leasing may suffice. As a general rule of thumb, if the anticipated costs of periodic leasing of a product over a four-year span exceed the purchase price of the product, then purchasing might be the most cost-effective long-term solution.

3. Is it better to purchase ceiling-mounted lifts or portable floor lifts? Laboratory-based studies at the Tampa VA have shown that ceiling-mounted lifts require 55% less effort than portable floor lifts. In the clinical setting, use of floor lifts typically decreases the number of patient handling injuries by 30% over 12 months, while ceiling-mounted lifts reduced injuries on one 60-bed nursing home by 100% over 12 months. The costs for these two types of lifts are comparable, but more ceiling lifts may need to be purchased to provide full coverage for the unit.

4. Should you provide ceiling-mounted lifts throughout the unit? Not necessarily. We have discovered that an appropriate coverage for a unit is equal to the proportion of totally dependent patients. This provides for at minimum adequate coverage for those patients whose care is most demanding on nursing staff. A typical medical-surgical unit may have 40% dependent patients. If this unit has an average daily census of 40, 16 beds would need ceiling lifts, which would be accomplished by installing four ceiling lifts, one in each 4-bed room.

5. What features are needed for ceiling lifts? In laboratory and field studies conducted at the Tampa VAMC, staff preferred the two function (up/down) lifts. When offered the multi-functional systems with powered tracking, we found that the nurses actually worked against the motor because the powered tracking was too slow. Furthermore, the absence of powered tracking requires that the caregiver manually move the patient around the room. This requires minimal effort, but the nurse has hands on involvement with the patient at all times, which both makes the patient feel more secure and is in compliance with VA policy. The slight additional capital investment in H-track or transverse track systems provides much greater flexibility for tasks than the single-track systems. However, this poses some logistical problems with existing light fixtures and privacy curtains.

6. A number of accessories are available for lifting systems. These accessories can add significantly to the overall cost. We have found that there is worthwhile benefit in adding scales to the lift systems, where patients are weighed frequently or daily. The availability of this technology replaces a task that can otherwise be stressful to the nursing staff, can place the patient at risk for falls, and allows the caregiver to spend more time addressing other patient needs.

7. Aging or inadequate quantities of battery packs can affect the availability of powered lifting systems. Where existing equipment on the units is not fully utilized due to battery problems, purchasing of additional or replacement battery packs might be a very wise investment. An actual schedule or procedure may be necessary to assure a reliable system for switching and recharging batteries. Depending on the types of batteries and charging technologies used by the lifting systems, additional battery packs might be warranted. For example, if the type of battery requires total discharge before recharging to extend battery life, then the system would be out of commission until the battery again reaches full charge. An additional battery pack would be warranted in this case and would add to the overall purchase price of the system. Engineering staff are available to assist in this determination. In one case there was an increase in staff injuries on night shift. Investigation revealed that the batteries for

the patient lifts needed to be recharged overnight and were not available to staff on this shift. A back-up battery was purchased to allow the lift to be in use 24 hours/day and resulted in a significant reduction in injuries.

8. Slings for ceiling, floor-based and stand-assist lifting systems, are available in a variety of amputees, or special applications, e.g., bathing, that the general use slings are widely applicable. Careful consideration needs to be given to the number, sizes, and types of slings selected for each lift. Laundering procedures may necessitate purchase of extra slings if laundering is accomplished off the unit and delays access to a set number of slings/day. Infection control policies may mandate separate slings for each patient. Insufficient numbers of slings has been identified as one reason staff do not use existing lifting equipment.

9. Lateral transfer of dependent patients, e.g., from bed to stretcher or convertible dependency chair, is a problem within the health care industry that is beginning to receive recognition. Prior to the availability of powered lifts, the risk of injury associated with lateral transfer was moderate compared with the major risk of manual lifting. Now that patient lifting is being properly addressed with advanced powered lifting systems, the new issue of lateral transfer is emerging. In laboratory studies at the Tampa VAMC, we have discovered that forces required to perform an unassisted lateral transfer using a draw sheet equate to approximately 70% of the weight of the patient. Even if three nurses perform this task, the risk of cumulative injury to the back is unacceptable. To address this problem, new technologies are now reaching the marketplace. These technologies include a variety of friction reducing devices and mechanical and powered lateral transfer equipment. Presently the operation of mechanical lateral transfer devices is inadequate where the forces, while minimized are transferred to lesser capable joint, such as the shoulders. This is an unacceptable solution. The high cost of powered lateral transfer technologies may be warranted where a high-volume of lateral transfers are regularly performed on a unit. Up to 30 low-cost friction reducing devices may be acquisitioned for the same price as a single powered lateral transfer technology.

10. The quantity of various devices should be determined as a function of both patient needs and concurrent responsibilities of nursing teams. If, for example, during the morning shift, several teams require the availability and continuous use of a particular product then sufficient quantities must be acquisitioned to satisfy this need. When not in use, product should ideally be stored central to all operations, such as in a storage room or rooms mid-way along the length of the unit.

11. With the elimination of bed rails as a high-risk entrapment hazard, the concern of patient falls from beds has risen. In addressing this problem, some units have adopted low beds and/or fall injury prevention matting that is placed on the floor. Both solutions are commendable, but in addressing patient injury concerns, risk of injury to nursing staff has been grossly ignored. Where low beds are used, those beds must have the capability to be raised to an acceptable working height. Nursing staff, must be encouraged to utilize this function rather than addressing patient needs at a low level. Where mats are used, nurses might either first move the sometimes heavy mats

before addressing patient needs, or walk across the mats, which presents a cause for instability. Furthermore, these mats must be frequently moved by housekeeping staff for cleaning purposes. Low weight, more stable mats are now becoming available, but this is an interim solution until the larger issue of patient fall risk can be adequately addressed without restraint.

Step 8: Implement Recommendations

Implementation of recommendations will involve changes to the workplace. To enhance chances for success, a well thought out process needs to be developed. If engineering solutions, such as new furnishings and patient lifting aid equipment are to be introduced, programs for educational awareness and detailed training are necessary. An implementation team must be recruited, and this team will formulate a plan, where each member of the team understands their role in the plan (Refer to *Chapter 1* for suggested team member composition.)

The objective of this ergonomic-based injury prevention program is to redesign high-risk job tasks related to manual handling or patient transfers. Through educational awareness sessions, this message should be delivered throughout the organization. Through hands-on training sessions, staff must be taught to use the new equipment competently and confidently. During this implementation phase, remember that changes are being made in the way work is done. To achieve success, staff must feel like they are part of the program development. In this implementation phase, through new directions of training, patient care handling staff should learn to assess risk factors in their job and be encouraged to minimize these risk factors with the assistance of management and the implementation team.

When back pain does occur, case management will continue to be an important part of the overall program. Through effective medical management, lost time can be reduced, and caregivers can return to work without lengthy disability. For injury prevention, set up systems for early intervention to detect any early symptoms, and when injuries do occur, develop mechanisms for close follow-up to monitor progress. The objective should be to get caregivers back in the workplace as soon as possible. To accommodate any temporary occupational disability a caregiver might experience, modified duties should be designed to allow them to return to the workplace. Recognizing that while a caregiver may not be at 100 percent physical capacity, he or she can still be a productive contributor.

The Implementation Team.

The implementation team will be the group whose responsibility is to formulate recommendations and integrate into the operational activities at the facility. Members of the implementation team may be selected from the initiation team or new members with new ideas and much enthusiasm can be added. All of the work done thus far will depend on the plans and efforts of the implementation team. Below are ideas offered for implementation.

Successful Ergonomics Programs

Experience has shown that essential elements of an ergonomics program are not technical systems, but rather it is the ability to motivate participation and the use of other fundamental management skills and practices that are most critical to success.

A. Disseminate Information Across Stakeholder Groups: In order for the overall program to be successful, a careful plan of introduction is necessary. Before any new lifting or bathing equipment is placed in service, much groundwork is necessary. Three sets of educational awareness programs should be conducted:

1. *Education for Managers of Direct Patient Care Staff:* Management must be convinced of the value of the equipment and understand how new equipment will play an important part in the overall back injury prevention program for the organization and improving the quality of care.

2. *Education for Direct Patient Care Staff:* Before new equipment is introduced, direct patient care staff should receive in-service education on the philosophies of an ergonomic program, as well as why the new equipment is being introduced into their work site. Many caregivers may have been involved in the risk assessment phase. However, at this implementation phase, heavy involvement with the work force is needed in order for equipment to be accepted by staff. The benefits that equipment will have for the caregiver and patients should be highlighted.

3. *Education for Patients:* Plans should be discussed on the new equipment will be introduced to patients for better acceptance. Patients may be concerned with:

   - *Safety*
   - *Loss of independence*
   - *Dignity issues*
   - *Comfort*

B. Involve End-Users in Selection of Equipment: To be most effective, it is paramount that ergonomic interventions for injury risk reduction meet the formal or informal approval of the end-users. In the health care industry there are two end-user groups: 1) the nurse/caregiver and 2) the patient. The common thread of strategies for acceptance of ergonomic interventions is that the end-user participates in the decision making process. Such strategies could include equipment fairs and clinical trials.

Equipment fairs are a process by which multiple vendors are given the opportunity to demonstrate their products at a facility. Oftentimes, vendor-initiated demonstrations offer no comparative measure. Therefore, if a facility foresees the acquisition of multiple units of a particular type of product, it would be of tremendous benefit and timesaving advantage to invite all known vendors of applicable products to exhibit their technologies simultaneously. A conference facility or large meeting hall at the hospital might be an appropriate venue for such an event, which hospital administrators, engineering and contracting representatives, and involved caregivers are invited to attend. Much like an exposition, at this event, staff have the opportunity for hands-on interaction with like technologies, to learn from and ask questions of the vendors. We have found that a most useful method for capturing the perceptions of the staff is to ask that a simple questionnaire be completed for each reviewed technology. Following the equipment fair,

questionnaire results can be compiled to learn the expressed wishes of the staff. *Chapter 5* outlines strategies for end-user evaluations.

Similar to an equipment fair, clinical trials offer the opportunity to learn about staff perceptions regarding particular products. This strategy may be employed where there are few competitive products that directly meet defined needs, or if findings of the equipment fair do not clearly identify a preferred solution. Clinical trials involve operational trials of products for patient handling and movement tasks. Vendor(s) are invited to trial their product at a facility for a pre-determined period, typically one month. During this period, staff are invited to use the new equipment for appropriate tasks. Feedback may be solicited from the staff either by structured or unstructured interview techniques following the completion of the trial, or by questionnaires, similar to those used in the equipment fairs. Patients might also be invited to express their opinions using similar techniques.

Step 9: Monitor Results and Continuously Improve Safety on the Unit

A system for monitoring and evaluation should be developed to determine what successes and failures have occurred so appropriate adjustments can be considered, as necessary. The monitoring and evaluation system is also critical to maintaining an adequate level of interest and attention for the program. The monitoring function also requires a system for data collection, similar to risk assessment. It must be determined what information will be useful in the evaluation process. *Chapter 11* outlines the evaluation process in detail.

Chapter 4 – Equipment and Devices for Safe Patient Handling and Movement

❖ Equipment Categories for Safe Patient Handling and Movement

Below is a brief definition of each category of equipment.

Air Assisted Lateral Sliding Aids:

These are devices where a flexible mattress is placed under a patient in the same manner as a transfer board. There is a portable air supply attached to the mattress that inflates the mattress. Air flows through perforations in the mattress and the patient is moved on a cushioned film of air allowing staff members to perform the task with much less effort. These technologies are particularly suitable when performing lateral transfers involving patients with special medical conditions, such as pressure sores.

❖ Friction Reducing Lateral Sliding Aids:

Friction Reducing Lateral Sliding Aids can assist with bed-to-stretcher type transfers. These devices can be positioned beneath the patient or resident similar to a transfer board and provide a surface for the patient to be slid over more easily due to the friction reducing properties of the device. These are simple low cost devices, usually made of a smooth fabric that is foldable and very easy to store. Properly designed handles can reduce horizontal reach, as shown in the example.

Mechanical Lateral Transfer Aids:

Stretchers are available that are height adjustable and have a mechanical means of transferring a patient on and off the stretcher. Some are motorized and some use a hand crank mechanical device. Mechanical means of mechanizing the lateral transfer are also available as independent options able to be used with most beds and stretchers, as shown. These devices eliminate the need to manually slide the patient, minimizing risk to the caregiver.

Transfer Chairs:

Some new wheelchairs and dependency chairs can convert into stretchers where the back of the chair pulls down and the leg supports come up to form a flat stretcher. These devices facilitate lateral transfer of the patient or resident and eliminate the need to perform lift transfer in and out of wheelchairs. There are wheelchair devices that convert to stretchers which also have a mechanical transfer aid built in for a bed to stretcher or stretcher to bed type transfer.

Powered Full Body Sling Lifts:

Probably the most common lifting aid device in use is a full body sling lift. A number of models and configurations are available. The majority of sling lifts are mounted on a portable base; however, use of ceiling mounted sling lifts is growing. The portable base and the ceiling mounted devices have their advantages. With a ceiling mounted device, there is no need to maneuver over floors and around furniture. These units are quite easy to use; however, transfers are limited to where overhead tracks have been installed. Where overhead tracks are not available or practical, portable bases can be used to suspend full body sling lifts. Sling lifts are usually used for highly dependent patients. They can be used to move patients out of beds, into and out of chairs, for toileting tasks, bathing tasks, and for any type of lift transfer. These lifts are available with many features and there is a wide variation in the types of slings available. The newer sling designs are much easier to install beneath the patient or resident.

Powered Standing Assist and Repositioning Lifts:

These lifts provide an alternative to full body sling lifts. These types of lifts are very useful where patients are partially dependent and have some weight bearing capabilities. They are excellent to move patients in and out of chairs and for toileting tasks. Powered standing assist and repositioning lifts are easily maneuvered in restricted areas, such as small bathrooms. There are some variations in the sling design, but the basic concept is of simple design as illustrated, and very easy to place around the patient.

Standing Assist and Repositioning Aids:

Some patients or residents may only need a little support to stand. In this case, they can help themselves if they have a support to grasp. Various types of devices can be provided to assist a patient from a seated to standing position by allowing them to hold on to a secure device and pull themselves up, such as demonstrated in the figure. These devices may be freestanding or attached to beds.

Bed Improvements to Facilitate Transfer or Repositioning:

Current bed technologies incorporate many ergonomic improvements. Some examples include beds that eliminate the need for bed to chair transfers by easily converting to a chair configuration. Another innovation in bed design, referred to as shearless pivot, reduces the need to constantly reposition a patient in the bed by minimizing the amount of slippage down to the foot of the bed experienced by the patient when raising the head of the bed. Further innovations with bed mattress surfaces can aid rotation and move a patient as needed in many intensive care units, by utilizing air bladders incorporated into the mattress surface. The above example shows a transfer conveyor system integrated into bed frame, which moves the patient from the bed into a wheelchair and back.

Sliding Boards:

For seated bed-to-chair or chair-to-toilet type transfers, low cost sliding boards are available. Sliding boards are usually made of a smooth rigid material with a low coefficient to friction. The lower coefficient of friction allows for an easier sliding process. These boards act as a supporting bridge when seated slide transfers are performed. Some, but substantially reduced, manual lifting is still required to move the patient, however, sliding boards do offer considerable improvement at a minimal cost. The illustrated example is suitable for independent or assisted transfers from wheelchair to bed.

Gait/Transfer Belt with Handles:

An object with handles improves the grasp opportunity for the worker and thereby reduces the risk. Gait/transfer belts are installed on patients or residents, usually around the area of the waist providing handles for a worker to grasp when assisting or transferring a partially dependent patient or resident, as shown. Small hand-held slings that go around the patient can also facilitate a transfer by providing handles. These options are available for patients with weight bearing capability that needs only minimal assistance.

❖ Equipment Evaluation Process

Equipment evaluations are typically used to compare the usability of competitive equipment types for a specific application. As such, development of an equipment evaluation protocol is highly dependent on equipment type and application. The Safe Patient Movement TAG has defined twelve equipment categories. Further, eight product applications have been defined by this group. This presents 90 or more equipment type/application combinations, each requiring an individualized evaluation protocol.

Patient Handling Equipment	Equipment Applications
Sliding Boards	Nursing Home Care Units
Air Assisted Lateral Sliding Aids	General Rehabilitation Units
Friction Reducing Lateral Sliding Aids	Acute Medical/Surgical Units
Mechanical Lateral Transfer Aids	Operating and Recovery Rooms
Transfer Chairs	Spinal Cord Injury Units
Gait belts with handles	Outpatient Clinics
Powered Full Body Sling Lifts	Inpatient (General)
Powered Standing Assist and Repositioning Lifts	Intensive Care Unit (ICU)
Standing Assist and Repositioning Aids	Home Care
Other Ergonomic Transfer Devices	
Bed Improvements to Support Transfers or Repositioning	
Dependency or Geriatric Chairs	

❖ Evaluation Team

Three possible team options are available for conducting equipment evaluations:

- Central evaluation team – a core group consisting of, at minimum, an Ergonomist, Risk Manager, Health and Safety Officer, and Nursing professional.
- On-site evaluation team – a group comprised of members from the clinical site.
- Central evaluation team with on-site champion.

Utilization of a central evaluation team, while an excellent means of standardizing subjective influences would be personnel intensive. For field studies, at least one member of the central evaluation team would need to be on-site throughout the process. Further, since outsiders to the facility, the team may not have the full cooperation of site staff and patients.

While it is hoped that an on-site evaluation team would have the full-cooperation of facility staff and patients, this approach would introduce substantial training needs. It is also anticipated that this would introduce uncontrolled subjective variability into the process, such that the findings from one site may not be directly applicable across other clinics with the same intended equipment application.

A central evaluation team with an on-site champion appears to be a reasonable solution, drawing on the strengths of each approach.

Train-the-trainer meetings might be appropriate to introduce on-site champions to the central evaluation team and provide educational resources to those individuals. Further, an electronic resource such as a news group or list being served could be set up to encourage communication and sharing of ideas/solutions among site champions.

❖ Sources of Information

Information may be derived from a variety of sources, each with unique advantages and disadvantages. These information sources are outlined in *Table 2*.

Table 2: Strengths and Weaknesses of Sources of Information

Sources of Information	Strengths	Weaknesses
Product Information.	Rapid assessment.	Biased information.
External Evaluations/Literature Review.	Rapid source of information.	Typically conducted by manufacturer and therefore may be biased.
Maintenance.	Objective accounting Cost of operation.	Information may be difficult to attain from references; references typically provided by manufacturer.

References.	Rapid assessment.	References typically selected by manufacturer; highly subjective.
Field evaluations.	Caregiver input. Patient input. Moderate timeframe.	Typically subjective. Must be comparative, either control or competitive products, to be meaningful.
Lab based evaluation.	Comprehensive approach. Objective. Caregiver input. Patient input.	Time-consuming. Costly. Must be comparative, either control or competitive products, to be meaningful.

The complexity of a particular evaluation may be determined based upon anticipated equipment use and caregiver/patient risk. For example, if a particular product is anticipated to be used only periodically and the expected risk to the caregiver and patient is expected to be minimal, then it would be an unjustified use of resources to perform a comprehensive laboratory-based evaluation of competitive products. Any evaluation should include a variety of the above information sources.

❖ Preliminary Equipment Evaluation Process

The process should typically be initiated by identifying all products that could be used to perform the desired application in a reasonable and safe manner. It will be useful to develop criteria for the desired product type. (See attached criteria worksheet.) A Request for Information (RFI) based on these criteria may be published in Commerce Business Daily. Local contracting staff can assist with this process. Literature for each of these product types should then be requested from each identified product manufacturer.

Following an initial review of the product literature to eliminate those products that would not be suitable for the intended application, the evaluation team should approach each manufacturer requesting information on any previously performed or ongoing field and laboratory-based equipment evaluations. Be aware that if the product manufacturer has performed the equipment evaluation, not an outside research facility, then the findings of such evaluations might be biased or incomplete. A literature search, both peer review and newspaper/industry magazine, should be conducted to determine if other information is available for each product.

Local contracting staff should be involved early in the process and may assist with performance or cost of operation measures pertaining to both the equipment and vendor. Performance measures considered by contracting staff include:

- Special features of the product not offered by comparable products.
- Trade-in considerations.
- Probable life of the product compared to comparable products.
- Warranty considerations.

- Maintenance requirements and availability.
- Past-performance.
- Environmental and energy efficient considerations.

Contracting staff may also contact the Federal Drug Administration (FDA) and National Reporting Office for any information pertaining to equipment-related incidents and recall information.

Discussion with vendor customers/equipment owners, by referral from the vendor, can present very useful information for the evaluation process. If possible, follow-up meetings with select referred facilities might be conducted at their site. The purpose of such meetings would be to view operation of the equipment, discuss with facility staff and patients, and try to attain cost of operation information (incidence/maintenance and adverse events). An unstructured form is attached to this document to facilitate note-taking for cost of operation reporting. A referred facility might even be willing to provide access to patients and staff for a field study of mutual benefit.

❖ Selection of Products for Field or Laboratory-Based Evaluation

Before embarking upon either a field or laboratory-based evaluation, it will be necessary to reduce the number of products to be tested to ideally three and at most five competitive products. Often, due to the specialized nature of the equipment, this will be achieved by carrying out an effective preliminary equipment evaluation. If the preliminary process yields only one suitable product, and that product appears to reasonably satisfy the task requirements without imposing increased risk to either the patient or caregiver, then the evaluation is probably complete. If the preliminary process identifies more than three suitable products, it will be necessary to further select products for inclusion in a field or laboratory-based assessment.

There is no set rule as to how to identify a select few products for further evaluation, but a good rule of thumb is to identify the:

- Best choice based upon the preliminary evaluation.
- Most popular based on sales information.
- Upper and lower functionality extremes – e.g., most basic and most comprehensive products on the market.
- Any product which presents an innovative approach to the task.

Oftentimes, one particular product will satisfy two or more of the above criteria, thereby reducing the overall number of products for further evaluation.

Equipment vendors might also be invited to present their products on-site to the entire nursing staff and appropriate patient populations at an “Equipment Day” exhibition. Product samples may be setup and demonstrated within the hospital auditorium. Nurses and patients should be encouraged to examine each product and to provide feedback via a structured evaluation

questionnaire. Compilation of results from this rapid evaluation process can be useful in identifying the top three to five products for further evaluation.

❖ Field Evaluations

Field evaluations are the preferred method for comparative equipment evaluations as they yield reasonable results for minimal time and resource investment. *See Attachments 4-1 through 4-5* for tools to facilitate a field evaluation.

Contact manufacturers of products identified from the above preliminary evaluation and pre-selection processes to provide a product sample for on-site evaluation purposes. It is highly likely that all manufacturers will be eager to provide a sample for the chance of future sales.

The number of groups involved in the field study should equal the number of products available for testing, plus a control group, that performs the task in the same manner as typically performed. The groups should be balanced, where each study group should include 25-30 participants. This number is not determined based on any statistical power analysis, but is based on experience and should provide reasonably reliable results. If selected products are quite dissimilar, it may be possible to reduce the number of subjects to 10-15, whereas if the products are highly similar, it might be necessary to increase the number of patients. If there are not enough caregivers and patients within the facility (or department) to provide adequate numbers of subjects for each group then it will be necessary to perform evaluations on each product in random order.

Institutional Review Board (IRB) approval may be necessary before enrolling any caregivers or patients in the field evaluation study. If a product already has FDA approval for its intended application, the evaluation may be exempt from IRB review. Check with your local IRB office for clarification at the earliest opportunity.

Caregivers should be provided training in the appropriate use of the equipment, typically provided by the product manufacturer immediately preceding use of that equipment. If the equipment is highly complex, it might be necessary to provide a resource for questions and a follow-up training session several weeks after introduction of the equipment. A follow-up training session also provides an opportunity to train staff who may have been off-duty during the initial training session.

Objective methods of data collection are rarely utilized in field studies, though simple measurement systems, such as EMG (muscle activity monitoring) or video/photography might be utilized for a select few subjects as an alternative to performing a costly laboratory-based evaluation. Data for field evaluations is often compiled based on caregiver and patient reporting. To minimize subjective variability, a structured form is often developed for this purpose. Dedicated forms are developed for caregiver and patient populations. See *Attachments 4-1 through 4-5* for tools to facilitate a field evaluation.

One method is to identify the key features across product types and ask each caregiver and patient to report their perceived findings on a structured scale. Key features might include: length, balance, texture, grip, aesthetics, safety, stability, durability, comfort and ease-of-use, etc. Reporting scales may be numerical, 0 to 10, where the subject circles the number that

meets their perception of acceptability of that feature, or might be a continuous line where a mark is placed between the two end-points indicating perception of acceptability. While the latter method is more sensitive to differences among products, it is an often-misunderstood method and therefore requires vigilance by the evaluation team or local Peer Leader. The first method is used when constant vigilance is not available, as is often the case. An alternative approach could be to present categories or indicators that are highlighted by the subject to represent their perception of acceptability. Such indicators might be ”reasonably comfortable,” “very comfortable,” etc.

Questionnaires may be presented to each subject at defined intervals throughout the evaluation process. These intervals should be determined by the evaluation team based upon the protocol and may be weekly, monthly, or at the commencement and conclusion of the evaluation period.

One advantage of the cross-design method is that it allows caregivers and patients to rank design features across all products tested, since they have had the opportunity to personally experience each product. At the conclusion of the study, all product samples should be made available to the participants, who are asked to rank their preferences for each feature.

As discussed earlier, protocol development is highly dependent upon equipment types and applications. As such, it is not possible to present one questionnaire that could be used across all equipment evaluations. These questionnaires should be developed with the assistance of the central evaluation team for each equipment evaluation. Examples of Product Rating Forms for both caregiver and patient are attached.

❖ Laboratory-Based Evaluation

In certain circumstances it might be necessary to perform a comprehensive laboratory-based evaluation of competitive products. Such evaluations are typically costly and time-intensive, and often require grant support. A laboratory-based evaluation would be justified under the following conditions:

- Field evaluations do not yield easily interpreted findings.
- Risk of injury to caregiver and/or patient is high under current methods.
- Considerable equipment acquisition is anticipated.

Laboratory evaluations involve complex biomechanical and subjective assessment of various features of the selected products. Due to the nature of laboratory evaluations, there may be dissimilarities between evaluation protocols and field use due to compromises demanded by limitations of the measurement systems. The Department of Veterans Affairs has constructed a state-of-the-art Biomechanics Research Facility at the James A. Haley VA Hospital in Tampa, which is an available resource to assist in such evaluations.

❖ Purchasing Decision

Once a decision has been reached, local contracting staff must be consulted to assist with negotiating the purchasing procedures. Since the procurement of assistive transfer devices is intended to reduce risk of injury to caregivers and patients, we have, in the past, successfully negotiated a guarantee with equipment vendors. Knowledge of this process might prove to be useful in your own purchasing negotiations. Essentially, vendors are asked to guarantee that procurement of their product will lead to a certain percentage reduction in injuries among staff. Anticipated injury reduction may range from 20% to 50% and is dependent upon the equipment type and application. If the negotiated injury reduction potential were not achieved within a specified time frame, then the contract would call for a purchase refund. This process achieves many objectives, including capital investment justification to equipment procurement committees and enhanced after-sales service from the equipment vendor.

❖ Criteria for Selection of Lifting and Transferring Devices

1. The devices should be appropriate for the task that is to be accomplished.
2. The device must be safe for both the patient and the caregiver. It must be stable, strong enough to secure and hold the patient, and permit the caregiver to use good body mechanics.
3. The device must be comfortable for the patient. It should not produce or intensify pain, contribute to bruising of the skin, or tear the skin.
4. The device should be understood and managed with relative ease.
5. The device must be efficient in the use of time.
6. Need for maintenance should be minimal.
7. Storage requirements should be reasonable.
8. The device must be maneuverable in a confined workspace.
9. The device should be versatile.
10. The device must be able to be kept clean easily.
11. The device must be adequate in number so that it is accessible.
12. Cost.

❖ Challenges in Bariatric Care

Between 5% and 10% of the population is considered obese. Managing obese patients presents special challenges to nursing care staff. For example, difficulties in turning, transferring, or ambulating patients can lead to immobility-related skin breakdown such as pressure ulcers. Overweight hypoventilation syndrome from excess fat on the rib cage and chest results in

respiratory insufficiency. Colostomy care can be difficult due to the presence of skin folds and a large abdominal apron of fat. The best way to provide safe patient handling and movement is through the use of special mechanical equipment designed for the obese.

Please refer to Chapter 12 for information on safely moving and handling bariatric patients. This chapter includes information on selection of and types of bariatric equipment, bariatric classification parameters, and algorithms for use in handling bariatric patients.

❖ Bariatric Equipment Providers

The Veterans Administration has not conducted tests on this equipment to verify it meets manufacturers' performance claims and specifications. Until this is done, individual facilities should choose a vendor based on patient needs, whether the equipment is available for rental or purchase, immediate availability of equipment, and availability and willingness of vendor staff to provide in-service, price, and the existence of a VA contract. Facilities who admit bariatric patients frequently should consider buying a bed, walker, commode chair, and wheelchair to have on hand. Infrequent users should consider renting as the demand arises. Rental vendors promise to have the equipment to the facility within 24 hours.

Attachment 4-1

Product Feature Rating Survey (Caregiver)

Caregiver #: _____	**Product #: _____**	**Date: _____**

Please examine the product very carefully and answer the following questions as they relate to this product ONLY. Please answer each question using a scale from 0 to 10, by circling the number that matches your impression, where 0 indicates a very poor design and 10 indicates a very well designed feature.

We encourage you to express any ideas you may have for improving the product design. Please make your comments alongside the appropriate feature rating.

1. How would you rate your OVERALL COMFORT while using this product?

Very Poor 0 1 2 3 4 5 6 7 8 9 10 **Very Good**
Average

2. What is your impression of this product's OVERALL EASE-OF-USE?

Very Poor **0** 1 2 3 4 5 6 7 8 9 10 **Very Good**
Average

3. How EFFECTIVE do you think this product will be in reducing INJURIES?

Very Poor 0 1 2 3 4 5 6 7 8 9 **10** **Very Good**
Average

4. How EFFICIENT do you feel this product will be in use of your TIME?

Very Poor 0 1 2 3 4 5 6 7 8 9 10 **Very Good**
Average

5. How SAFE do you feel this product would be for the PATIENT?

Very Poor 0 1 2 3 4 5 6 7 8 9 10 **Very Good**
Average

Attachment 4-2

Product Ranking Survey (Caregiver)

Caregiver #: _____	**Date:** _____

Finally, look at each of the five products you have just used. We would like you to rank each of these products, in order of preference. Placing the letter assigned to each produce (A-E) alongside the rank order which you feel is most appropriate, where 1 is your most preferred design, and 5 is your least preferred design. Note any comments you may have in the space provided. *[Note this form can be revised if more or less than 5 products are being evaluated.]*

Overall Comfort : 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Comments:

_____

_____

Ease-of-Use: 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Comments:

_____

_____

Stability: 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Comments:

_____

_____

Durability : 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Comments:

_____

_____

Versatility: 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Comments:

_____

_____

Attachment 4-3

Product Feature Rating Survey (Patient)

Patient #: _____ Product #: _____ Date: _____

This questionnaire examines ONLY the product that you have just used. Please rate each of the following design features on a scale from 0 to 10, by placing a mark along the line, where 0 indicates a very poor design and 10 indicates a very well designed feature.

We would also appreciate any ideas you may have for improving the product design. Please make your comments alongside the appropriate feature rating, or overleaf if more space is required.

1. Overall Comfort

Very Poor 0 1 2 3 4 **Average** 5 6 7 8 9 10 **Very Good**

2. Security

Very Poor 0 1 2 3 4 **Average** 5 6 7 8 9 10 **Very Good**

3. Safety

Very Poor 0 1 2 3 4 **Average** 5 6 7 8 9 10 **Very Good**

4.

Very Poor 0 1 2 3 4 **Average** 5 6 7 8 9 10 **Very Good**

5.

Very Poor 0 1 2 3 4 **Average** 5 6 7 8 9 10 **Very Good**

Attachment 4-4

Product Ranking Survey (Patient)

Patient #: _____ Date: _____

Finally, look at each of the five products you have just used. We would like you to rank each of these products, in order of preference. Placing the letter assigned to each produce (A-E) alongside the rank order which you feel is most appropriate, where 1 is your most preferred design, and 5 is your least preferred design. Note any comments you may have in the space provided.

Overall Comfort : 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Comments:

_____

_____

Security: 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Comments:

_____

_____

Safety: 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Comments:

_____

_____

: 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Comments:

_____

_____

Attachment 4-5

Incidence, Maintenance, and Adverse Events for Patient Handling Equipment and Devices

Product: _____

Incidence Reporting:

_____

_____

_____

_____

Maintenance Issues:

_____

_____

_____

_____

Adverse Events:

_____

_____

_____

Storage Requirements:

_____

_____

_____

Chapter 5—Patient Assessment, Care Planning & Algorithms for Safe Patient Handling and Movement

❖ Purpose of Patient Assessment Criteria

The following patient assessment criteria will assist health care staff in considering critical patient characteristics that affect decisions for selecting the safest equipment and techniques for patient handling and movement tasks. Health care staff members have become accustomed to using whatever limited lifting aids are available, rather than carefully matching equipment to specific patient characteristics. It is expected that careful use of this assessment and planning tool will improve safety for both patients and caregivers. Patients will receive assistance appropriate for their functional level, assuring safety and comfort. For caregivers, the goals are to decrease the incidence, severity, and costs associated with job-related injuries, as well as decreasing the intensity, duration, and frequency of job-related musculoskeletal pain and discomfort.

❖ Background

A Technical Advisory Group (TAG), working in collaboration with the Public Health and Environmental Hazards, Patient Safety Center of Inquiry (Tampa, FL), and Healthcare Analysis and Information Group, was formed. The TAG developed an algorithm for each of the key transfer and repositioning tasks. The algorithms were tested with different patient populations in a variety of clinical settings. The algorithms are designed to assist health care employees in selecting the safest equipment and techniques based on specific patient characteristics. These guidelines were prepared based on scientific and professional information available in March 2001. Users of this guideline should periodically review this material to ensure the advice herein is consistent with current reasonable clinical practice. As with any guideline, this content provides general direction; professional judgment is needed to assure safety of patients and caregivers. *Attachment 5-1* depicts a form that can be used in patient care areas for assessing patients.

❖ Key Points for Caregivers

- Assess the patient.
- Assess the area.
- Decide on equipment.
- Know how to use equipment.

- Plan lift and communicate with staff and patient.
- Work together, including actions of more than one caregiver as well as the patient.
- Have the right equipment available, in good working order, and conveniently located.

❖ Key Assessment Criteria

- Ability of the patient to provide assistance.
- Ability of the patient to bear weight.
- Upper extremity strength of the patient.
- Ability of the patient to cooperate and follow instructions.
- Patient height and weight.
- Special circumstances likely to affect transfer or repositioning tasks, such as abdominal wounds, contractures, or presence of tubes, etc.
- Specific physician orders or physical therapy recommendations that relate to transferring or repositioning patients. (For example, a patient with a knee or hip replacement may need a specific order or recommendation to maintain the correct angle of hip or knee flexion during transfer.)

❖ Care Plan Considerations

- Type of task to be completed, e.g., transferring, repositioning, ambulating, or toileting.
- Type of equipment or assistive devices needed.
- Number of caregivers needed to complete the task safely.

❖ Process for Using Assessment and Planning Criteria

The specific process for assessment and care planning may vary by facility, patient population, or level of care. However, key elements need to be considered and integrated into the assessment and care planning process for safe patient handling and movement.

- Who completes the assessment?
- How often assessment is completed.
- Communication plan.
- Updating/revising the plan as needed.

Attachment 5-1

Assessment Criteria and Care Plan for Safe Patient Handling a

I. Patient's Level of Assistance:

_____ Independent —Patient performs task safely, with or without staff assistance, with or without assistive devices.
_____ Partial Assist —Patient requires no more help than stand-by, cueing, or coaxing, or caregiver is required to lift no more than 35 lbs. of a patient's weight.
_____Dependent—Patient requires nurse to lift more than 35 lbs. of the patient's weight, or is unpredictable in the amount of assistance offered. In this case, assistive devices should be used.

An assessment should be made prior to each task if the patient has varying level of ability to assist due to medical reasons, fatigue, medications, etc. When in doubt, assume the patient cannot assist with the transfer/repositioning.

II. Weight Bearing Capability

_____ Full
_____ Partial
_____ None

III. Bi-Lateral Upper Extremity Strength

_____ Yes
_____ No

IV. Patient's level of cooperation and comprehension:

_____ Cooperative — may need prompting; able to follow simple commands.
_____ Unpredictable or varies (patient whose behavior changes frequently should be considered as "unpredictable"), not cooperative, or unable to follow simple commands.

V. Weight: _____ **Height:** _____
Body Mass Index (BMI) [needed if patient's weight is over 300][1]:_____
If BMI exceeds 50, institute Bariatric Algorithms

The presence of the following conditions are likely to affect the transfer/repositioning process and should be considered when identifying equipment and technique needed to move the patient.

VI. Check applicable conditions likely to affect transfer/repositioning techniques.

_____ Hip/Knee Replacements	_____ Postural Hypotension	_____ Amputation
_____ History of Falls	_____ Severe Osteoporosis	_____ Urinary/Fecal Stoma
_____ Paralysis/Paresis	_____ Splints/Traction	_____ Contractures/Spasms
_____ Unstable Spine	_____ Fractures	_____ Tubes (IV, Chest, etc.)
_____ Severe Edema	_____ Severe Pain, Discomfort	_____ Respiratory/Cardiac Compromise
_____ Very Fragile Skin	_____ Wounds Affecting Transfer/Positioning	

Comments:_____

VII. Care Plan:

Algorithm	Task	Equipment/ Assistive Device	# Staff
1	Transfer To and From: Bed to Chair, Chair To Toilet, Chair to Chair, or Car to Chair.		
2	Lateral Transfer To and From: Bed to Stretcher, Trolley.		
3	Transfer To and From: Chair to Stretcher, or Chair to Exam Table.		
4	Reposition in Bed: Side-to-Side, Up in Bed.		
5	Reposition in Chair: Wheelchair and Dependency Chair.		
6	Transfer Patient Up from the Floor		
Bariatric 1	Bariatric Transfer To and From: Bed to Chair, Chair to Toilet, or Chair to Chair		
Bariatric 2	Bariatric Lateral Transfer To and From: Bed to Stretcher or Trolley		
Bariatric 3	Bariatric Reposition in Bed: Side-to-Side, Up in Bed		
Bariatric 4	Bariatric Reposition in Chair: Wheelchair, Chair or Dependency Chair		
Bariatric 5	Patient Handling Tasks Requiring Access to Body Parts		
Bariatric 6	Bariatric Transporting (Stretcher)		
Bariatric 7	Bariatric Toileting Tasks		

Sling Type (circle choice): Seated_____ Seated (Amputation)_____ Standing_____ Supine_____
Ambulation_____ Limb Support_____
Sling Size: _____
Signature: _____ **Date:** _____

[1]If patient's weight is over 300 pounds, the BMI is needed. For Online BMI table and calculator see:
http://www.nhlbi.nih.gov/guidelines/obesity/bmi_tbl.htm

❖ PURPOSE OF ALGORITHMS

This chapter provides assessment criteria to assist health care staff in the planning for safe handling and movement of each patient. The following algorithms should be used as guides when planning the following patient transfer and repositioning tasks. These algorithms are targeted for persons directly involved with patient handling and movement, such as registered nurses, licensed practical nurses, nursing assistants, orderlies, physical/occupational therapists, radiology technicians, and patient care technicians.

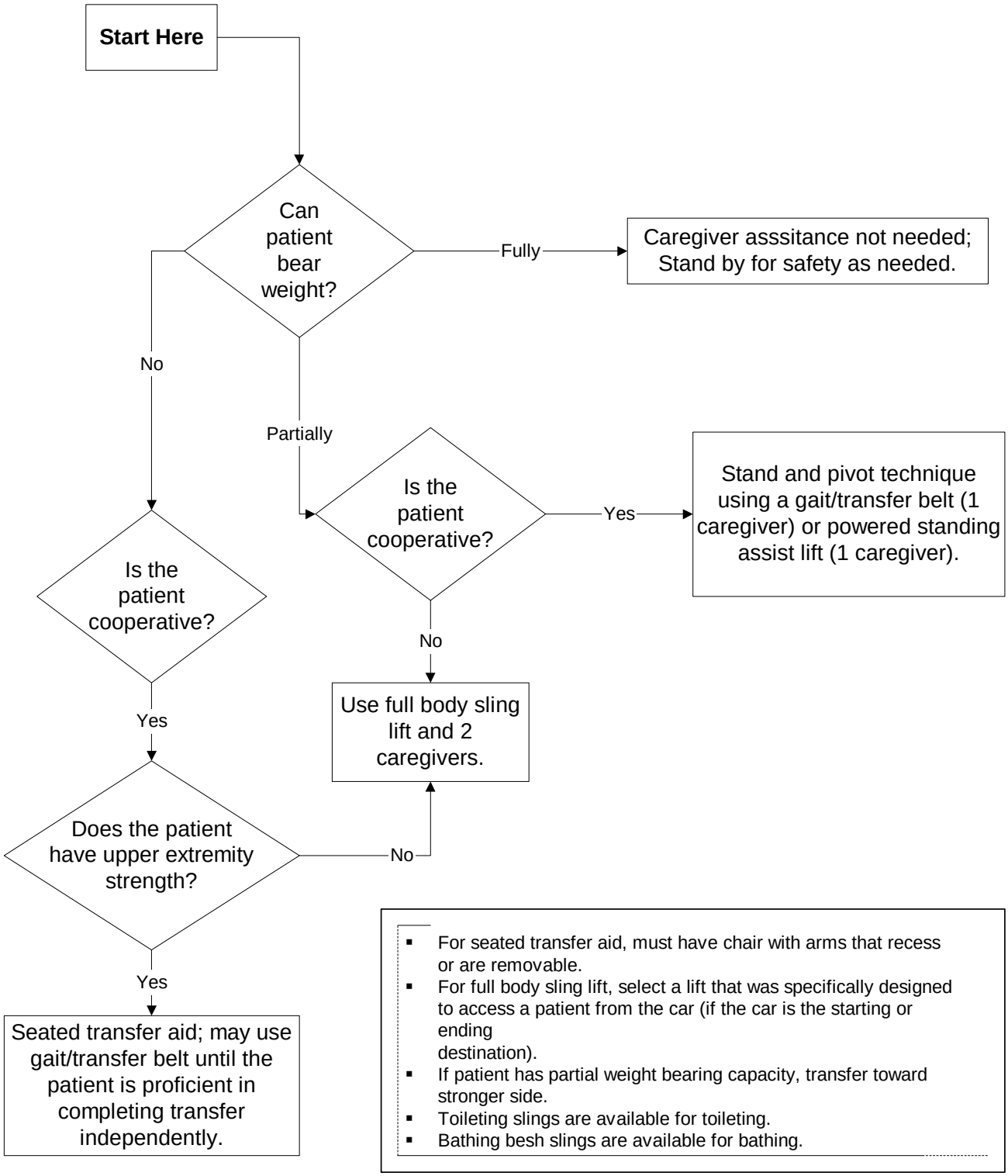
❖ BACKGROUND

The algorithms are designed to assist health care employees in selecting the safest equipment and techniques based on specific patient characteristics. These guidelines were prepared based on scientific and professional information available in March 2001. Users of this guideline should periodically review this material to ensure the advice herein is consistent with current reasonable clinical practice. As with any guideline, this content provides general direction; professional judgment is needed to assure safety of patients and caregivers.

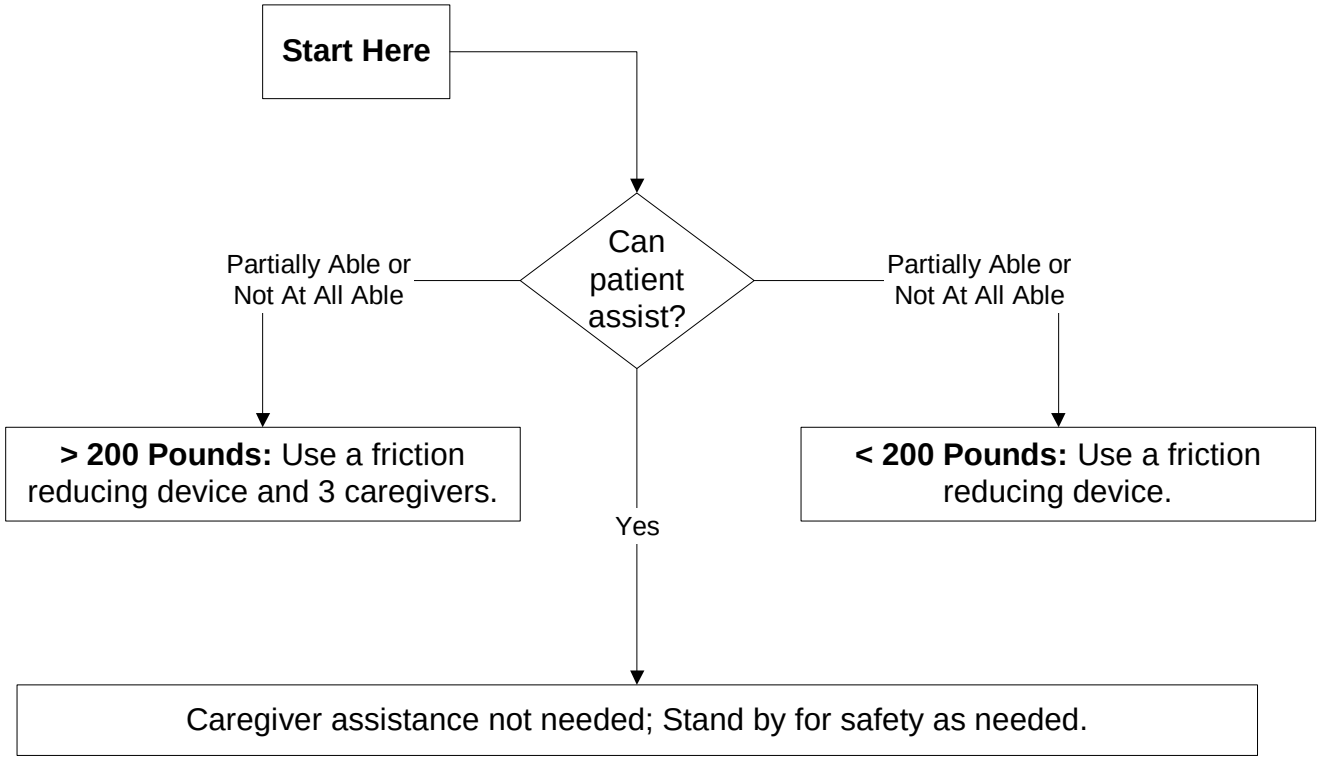
These algorithms were tested with different patient populations in six clinical areas (Intensive Care Units; Acute Care Units; Nursing Home Care Units; Outpatient Areas and Clinics, and Emergency Rooms; Operating and Recovery Rooms; and Spinal Cord Injury Units and Rehabilitation Units). The algorithms were reviewed and approved for use by Veterans Health Administration (VHA) nurse executives.

Algorithm 1: Transfer to and From: Bed to Chair, Chair to Toilet, Chair to Chair, or Car to Chair

Last rev. 4/1/05

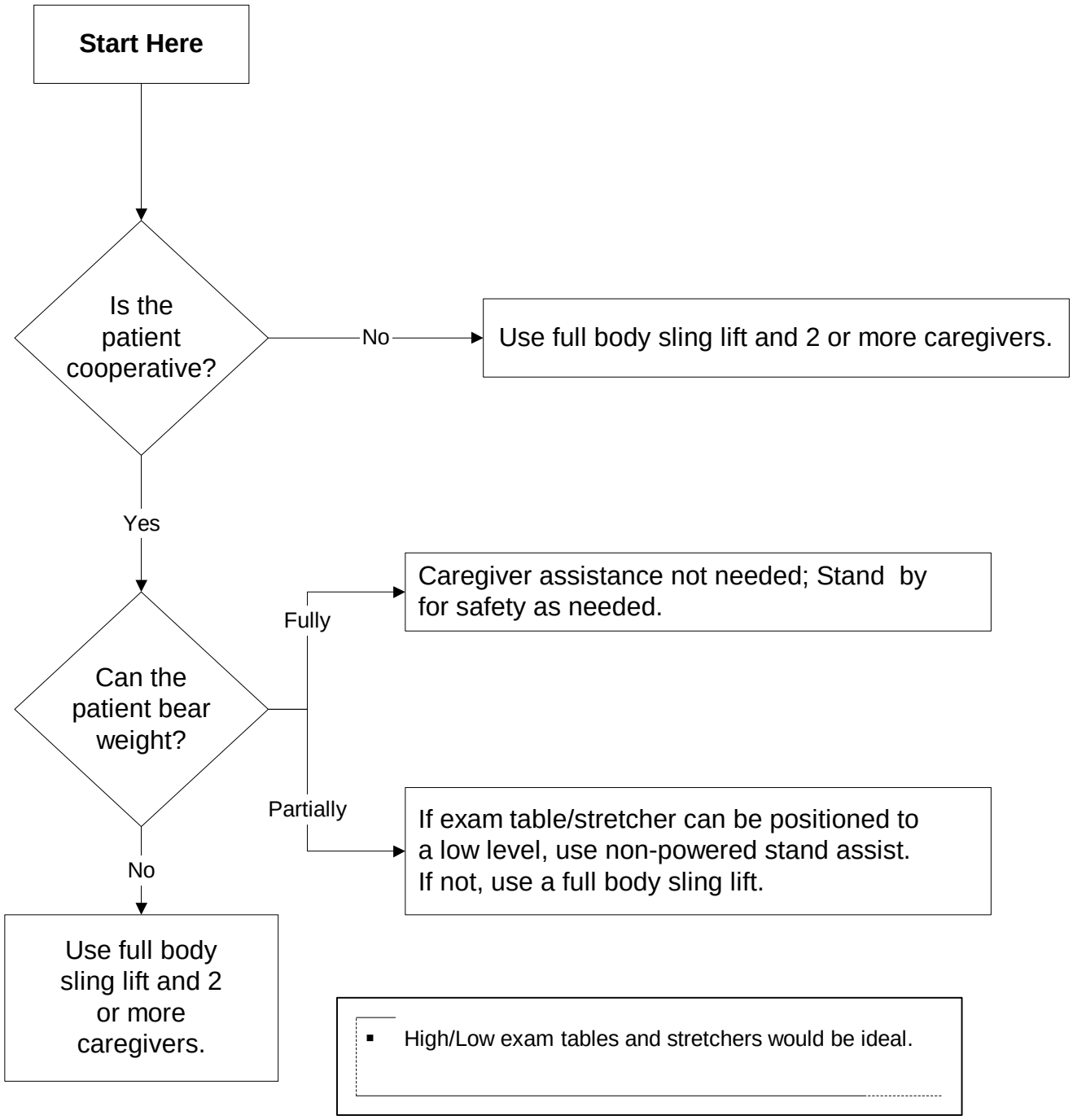


Algorithm 2: Lateral Transfer To and From: Bed to Stretcher, Trolley
Last rev. 4/1/05

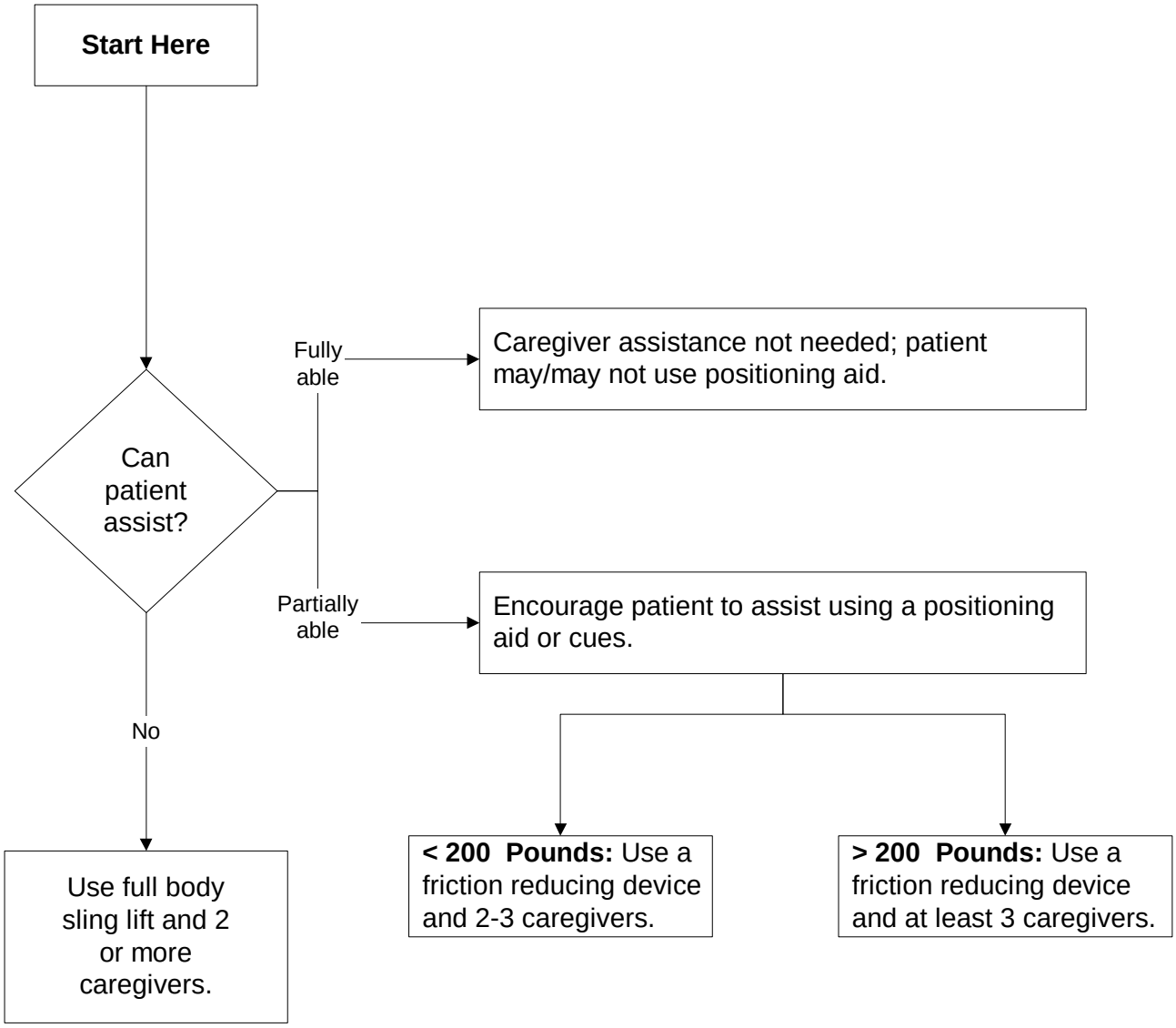


- Surfaces should be even for all lateral patient moves.
- For patients with Stage III or IV pressure ulcers, care must be taken to avoid shearing force.

Algorithm 3: Transfer To and From: Chair to Stretcher or Chair to Exam Table
Last rev. 4/1/05

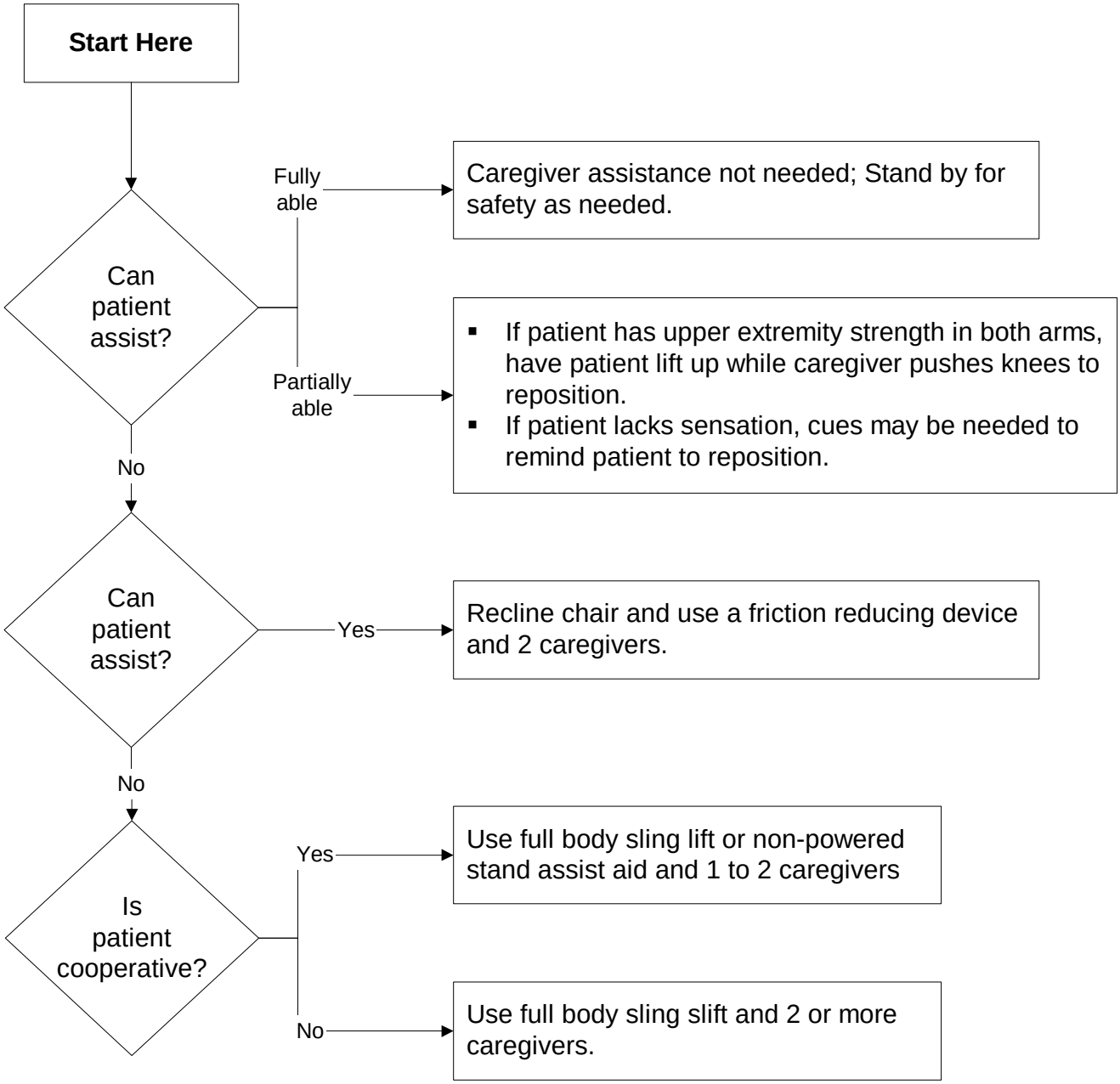


Algorithm 4: Reposition in Bed: Side-to-Side, Up in Bed
Last rev. 4/1/05



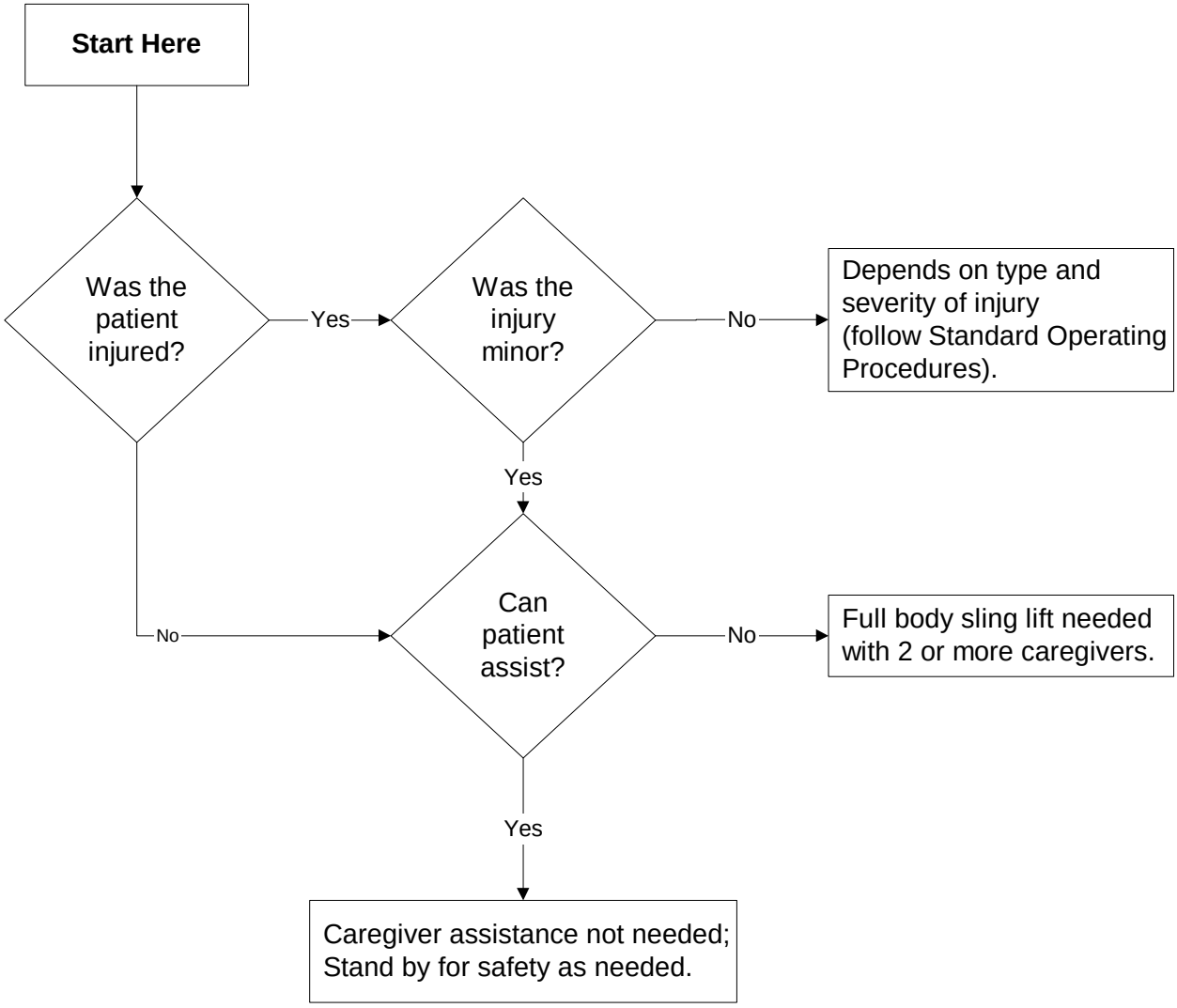
- This is not a one person task: DO NOT PULL FROM HEAD OF BED.
- When pulling a patient up in bed, the bed should be flat or in a Trendelenburg position to aid in gravity, with the side rail down.
- For patients with Stage III or IV pressure ulcers, care should be taken to avoid shearing force.
- The height of the bed should be appropriate for staff safety (at the elbows).
- If the patient can assist when repositioning "up in bed," ask the patient to flex the knees and push on the count of three.

Algorithm 5: Reposition in Chair: Wheelchair and Dependency Chair
Last rev. 4/1/05



- Take full advantage of chair functions, e.g., chair that reclines, or use arm rest of chair to facilitate repositioning.
- Make sure the chair wheels are locked.

Algorithm 6: Transfer a Patient Up From the Floor
Last rev. 4/1/05



- Use full body sling lift that goes all the way down to the floor (most of the newer models are capable of this).