

## DESCRIPTIONS OF MECHANICAL SUPPORTS AND ASSOCIATED RISKS

**This paper describes many of the supports used on wheelchairs and other devices. This list is not meant to be all inclusive. It is meant to be used as a guideline when considering the use of the various devices available.**

### **1. Anterior pelvic support (pelvic belt, seatbelt, etc.):**

An anterior pelvic support is a support such as a seatbelt that is meant to stabilize the pelvis in optimal alignment and help maintain position in a wheelchair or other chair. These include pelvic positioning belts (seatbelts or hip belts), subASIS bars (ASIS=anterior superior iliac spine of the pelvis), and leg harnesses.

#### **Risks:**

- a. Improper seated postures can:
  - i. cause increased risk of skin breakdown due to increased pressure over bony prominences;
  - ii. impair functional abilities by limiting upper extremity movement;
  - iii. contribute to head and neck positions that make it difficult to swallow or speak;
  - iv. contribute to body shape distortions such as scoliosis and kyphosis (abnormal curvatures of the spine).
- b. Seatbelts that can be loosened but not removed by the person pose a significant safety risk as the person could slip out of the chair and become hung up on the loosened belt. This can lead to asphyxiation and death.

Anterior pelvic supports are contra-indicated when they are not required for enhanced postural control but are often used for safety reasons to protect a person from falling or slipping out of the chair accidentally.

A pelvic belt on a wheelchair is not an adequate safety restraint while traveling in a moving vehicle and the occupant restraint system for that vehicle, which includes a shoulder strap, must be used.

### **2. Anterior Trunk Support (chest harnesses, etc.):**

Anterior trunk supports are used to maintain an upright trunk and head position and thus promote functional use of the arms, proper vision, breathing, and feeding for individuals who pull or fall forward. Anterior trunk supports include straps and pads which provide support at the sternum and/or shoulders and include shoulder straps, chest harnesses, vests, abdominal binders, and shoulder retractors.

#### **Risks:**

- a. They should always be used with appropriate anterior pelvic supports as otherwise the individual could slide down and strangle on the anterior trunk support.
- b. Care must be taken to ensure that they do not interfere with feeding tubes, ostomy sites, intrathecal medication pumps, etc.

Anterior trunk supports are contra-indicated when not required for postural control and stability. An anterior trunk support on a wheelchair is not an adequate safety restraint while traveling in a moving vehicle.

### **3. Lateral Trunk Support**

Lateral trunk supports provide optimal trunk position by promoting midline alignment, balance, and stability, and safety when an individual has decreased trunk control. Lateral trunk supports are also referred to as lateral thoracic or chest pads.

Lateral trunk supports are used:

- a. to help keep the body upright rather than leaning to the side which can result in respiratory problems, skin integrity issues and digestive problems, and
- b. to help facilitate stability to enable function of the upper extremities.

Lateral trunk supports can limit lateral trunk movement so are contra-indicated for individuals who do not require that kind of support.

### **4. Lateral Pelvic, Upper Leg or Knee Supports**

Lateral pelvic supports (hip guides) promote neutral alignment and symmetry of the hips and pelvis and promote midline spinal alignment.

Lateral upper leg supports can help to align the legs and allow the feet to maintain contact with the footrests. They prevent the lateral thighs from rubbing on the armrests.

Lateral knee supports can prevent the lower legs from rubbing on, or pressing into, the hardware of the chair which could cause skin breakdown.

### **5. Medial Knee Support (formerly called abductors)**

Medial knee supports can help in proper positioning to keep the hips from rotating inward and possibly dislocating. They are designed to separate the knees.

Medial knee supports should be used with anterior pelvic supports to prevent the individual from sliding forward into the support. Medial knee supports are never to be used to prevent the person from sliding out of the seating system.

Medial knee supports should only be used if needed for proper positioning as they limit the individual's ability to transfer out of the seating system.

### **6. Anterior Knee Support**

Anterior knee supports, also referred to as knee blocks, are placed in front of the knees to stabilize the pelvis by limiting forward movement of the pelvis. They are typically used as a part of standing wheelchairs to provide support of the lower extremities as the individual goes into a standing position.

### **7. Ankle/Foot Supports:**

Ankle/foot supports provide proper foot support, stability, pressure distribution, and postural alignment of the ankle and foot. Keeping the feet properly aligned on the footplates promotes proper positioning of the lower extremities and can prevent

injury to the feet.

Ankle/foot supports include ankle straps, toe locks, ankle huggers, and shoe holders.

**Risks:**

- a. Ankle/foot supports are to be used with seatbelts or other positioning supports to prevent the individual from sliding down in the chair while “attached” at the feet which could lead to injury.
- b. Individuals who do not wear shoes may be at risk for skin breakdown if improperly selected or fitted ankle/foot supports are used.

**8. Upper Extremity Supports (lap trays and arm troughs):**

Upper extremity supports are used to provide an appropriate support surface to maximize upper extremity (arm and hand) function and include lap trays and arm troughs.

Upper extremity supports are used to:

- a. assist in positioning the upper extremities in a position that allows use of the hands;
- b. support paralyzed or weak limbs and keep shoulders in proper alignment;
- c. to provide a large, firm, supportive surface to facilitate midline position of the trunk; and
- d. to support painful or swollen upper extremities.

Lap trays can be viewed as restraints when they are not easily removed by the person thus preventing him/her from getting up from a wheelchair.

**Risks:**

- a. Lap trays should not be used if the person becomes agitated or combative when in place
- b. Lap trays could pose a risk for injury by sliding down and under the device unless a postural support is also in place to prevent this.
- c. Lap trays can be accidentally pushed or pulled into a person’s abdomen, causing injury, if not securely fastened to the arm supports or frame of the wheelchair.

**9. Arm Straps:**

Arm straps consist of various straps that are used at the wrist or forearm to assist with proper posture and function. They can provide stability needed for tasks as well as protection from injury for an arm that is weak, flaccid, or has muscle spasms and cannot maintain proper position on an armrest.

**Risks:**

- a. When arm straps are used, the pelvis must also be secure to prevent injury if the person slides forward on the seat.

The use of arm straps is contraindicated if the individual’s arms do not need to be maintained in position as they limit upper extremity function, thus acting as a restraint. In rare situations, arm straps may be needed to protect a person from severe

self-injurious behavior such as chewing on their fingers.

#### 10. Head Supports:

Head supports include head rests to provide support to the back of the head but can also include lateral supports, and anterior supports, such as collar or forehead straps for those with very little or no head control.

Head supports enable the person to have optimal head and neck positioning. They may promote improved vision/line of sight and communication. They may improve the ability to swallow thus reduce episodes of choking. They may be used for short periods of time as a place to rest the head when someone is fatigued or tilted back in the wheelchair.

Anterior head supports are contraindicated in those individuals that can maintain head position with head rests and lateral supports and would be considered a restraint as they limit available head movement and may lead to further loss of head control.

#### 11. Bed Rails:

Bed rails may be needed so that a person can help position him or herself in bed. If used in this way, a half bed rail that extends from the head to half the length of a bed should be used.

Bed rails are at times used as a safety device when someone repeatedly falls out of bed. When someone has the ability to get up out of bed and walk, a bed rail could be considered a restraint.

##### Risks:

- a. When a person attempts to crawl over a bed rail, a worse injury can occur due to falling from an increased height or from an awkward position.
- b. Injuries have also occurred when a person gets stuck or wedged in a bed rail.
- c. Individuals with osteoporosis are at risk for fracturing limbs if they strike them on the bed rail.
- d. Using a low bed and putting mats on the floor is a safer system for preventing injury from falls.

#### 12. Bed enclosures

Bed enclosures consist of a net or canopy surrounding a bed (usually a “hospital” type bed) and are used to prevent a person from falling out of bed. They allow freedom of movement within the boundaries of the bed without physically restraining movement of arms, legs, or head.

They can also be perceived as “cages” or restraints and should only be used if all other alternatives have failed.

They would be considered a restraint if used for a person who is independent in mobility and is able to get up and out of bed.

##### Risks:

- a. They should not be used for violent, aggressive, or combative individuals as there would be an increased chance for injury to occur.

- b. Entrapment can occur when enclosures are used, especially in individuals that like to burrow into the corners of beds.
- c. Constant rubbing against the surface of these can cause skin abrasions.

### **13. Personal alarms:**

Various types of alarms have been used to alert staff that a person is on the move. They include tab alarms, bed alarms, motion detectors, or pressure release alarms. They alert caregivers while still allowing freedom of movement. Alarms are reactive, not proactive as by the time an alarm sounds, the person has already moved and may have fallen.

These alarms can cause a false sense of security leading to less supervision by staff as staff persons are often under the false impression that the alarm should keep the person “safe”. In actuality, the alarm is only as good as the timely response from staff. By the time the alarm sounds, the person has often already fallen. Staff can also become desensitized to the sound of the alarm over time and thus not respond in a timely manner.

The sound of the alarm can cause agitation or startle a person into moving away from the sound which may lead to more falls. Studies have shown that these devices usually do not prevent falls but do alert staff to falls or to the impending potential for a fall to occur. Alarms may also cause the person to limit his/her movement in an attempt to prevent the alarm from activating. This lack of normal movement increases the potential for pressure sores as well as worsening muscle weakness.

### **14. Gait Belts:**

A gait belt (sometimes referred to as Posey belt or transfer belt) is a safety device used for moving or transferring a person from one place to another. The belt is used to help someone who is weak have better balance and gives some support while walking. Having the belt around a person’s waist allows staff to grip it and though it may not prevent a fall; it allows the staff person to control the fall so the person does not get injured.

A gait belt is never to be used as a “seat belt” or to keep someone from falling out of a chair or other surface.

### **15. Walkers, standers and gait trainers:**

These are specialized equipment that assists a person in standing and moving while in an upright position.

Standers have anterior and lateral knee, hip, and trunk supports which enable the person to remain upright. With some devices, they may be able to propel themselves by pushing wheels.

In general, standers help:

- strengthen accessory breathing muscles, upper trunk musculature, and upper extremity use
- maintain and improve bone density
- help with digestion and decrease constipation issues

- provide stretching for hip and knee contractures
- promote head control, and
- improve psychological interaction.

Walkers are used by those who are independent and safe to ambulate but need additional support to maintain balance or stability while walking. These can be difficult to maneuver and can result in poor back posture.

Gait trainers offer varied levels of trunk, head, pelvis, and leg support and control to allow a person to take steps. They can help strengthen muscles needed for walking.

## **16. Mechanical (Hoyer) lifts and other lift systems**

Mechanical lifts or lift systems are used for transferring individuals between support surfaces. They require the use of slings which must be the proper size and style for the individual and must be used correctly. Some transfer devices allow more participation by the individual than others.

A person should be moved as short a distance as possible while in the transfer system, and should be lifted only as high as necessary to clear the support surface.

### **Risks**

- a. If the person is not placed into the sling properly or the sling is not the proper size and style for the individual, the person could slide out and either fall to the floor or become entangled in the straps. This has led to significant injury.