

Anterior Trunk Support Usage Guide



 Bodypoint®

The Role of Anterior Trunk Support

The position of the trunk impacts the position of the head and upper extremities, making it a critical element in postural alignment and stability.

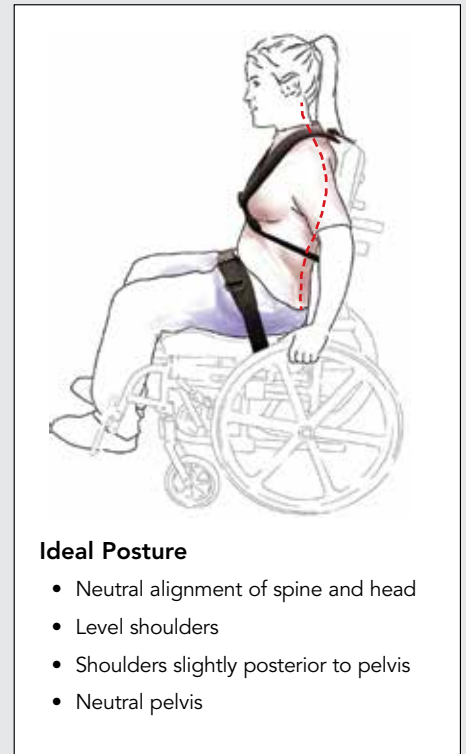
Achieving and maintaining good posture is a key element in function and comfort of wheelchair users. Benefits include increased ability to participate in activities of daily living, minimized development of skeletal asymmetries, increased tolerance for sitting, improved pressure distribution, normalized muscle tone and reduced active muscle requirements.

Good posture is the result of balancing the skeleton in relation to gravity. When it comes to the trunk, there are three points for external stabilization: the posterior, the anterior and the lateral. While this guide focuses on anterior trunk support, it is important to consider this in the context of the whole seating system, including posterior and lateral trunk supports as well as pelvic support. A holistic approach is best, as all these elements should work together.

Primary Support Surface Considerations

The best starting point for assessing anterior trunk support needs is with a stable pelvis and an appropriate, well-adjusted wheelchair and seating system. First take a look at the primary support surfaces and adjust them as needed. Do they meet these criteria?

- Fitted to the individual user
- Seat and back support provide appropriate level of support and stability
- Seat-to-back support angle accommodates range of functional movement and provides the trunk a position of rest
- Correct back support height based on the amount of trunk support needed



Ideal Posture

- Neutral alignment of spine and head
 - Level shoulders
 - Shoulders slightly posterior to pelvis
 - Neutral pelvis
- Appropriate use of lateral trunk supports, if needed
 - Correct arm support height to support the elbow
 - Achieves a functional balance between support and freedom of movement

Pelvic position should also be assessed and stabilized prior to, or in conjunction with, applying anterior trunk support. See the *Bodypoint Pelvic Support Usage Guide* for more information.

Let User Condition Guide Goals

Postural support solutions, like any other aspect of complex rehab technology, need to be tailored to the individual user and their needs. Depending on the user's diagnosis and current condition, goals for use of anterior trunk support may include:

- Support activities of daily living; increase ability to complete functional tasks
- Improve symmetry and anatomical alignment of trunk over pelvis
- Correct or accommodate kyphotic posture, lordosis, obliquity, or rotational posture
- Help prevent spinal and subsequent pelvic deformity
- Promote trunk extension
- Increase head control
- Maintain good visual field
- Improve respiratory capacity & breathing
- Facilitate swallowing; improve nutrition and hydration
- Improve speech and hearing
- Improve upper extremity function
- Improve balance and reduce risk of falling
- Improve pressure distribution

One key factor in determining individual goals is whether the user's posture and spinal position are fixed (structural; a non-reducible asymmetry), flexible (a reducible asymmetry), or partly flexible.

For a flexible posture, it may be feasible to correct the posture and re-align the trunk to a neutral position. If the user's posture is fixed, then the goal is to work within the physical limitations and accommodate the deformity in a way that best optimizes function and prevents or reduces further asymmetry. If partly flexible, then usually the goal is to balance correction and accommodation.

The following pages describe some typical postural support issues and how anterior trunk supports can be used to help. The included recommendations should be considered general guidance only. Solutions must be tailored to individual user needs and goals following an appropriate assessment.

Note: For both safety and effective positioning when using an anterior trunk support, a hip belt or other pelvic support should also be worn.

Trunk Scoliosis, Obliquity & Rotation

Clinical Presentation

- Lateral flexion of the spine, usually in the thoracic area
- Scoliosis (C-curve or S-curve), often seen in conjunction with pelvic obliquity (one side higher than the other) and/or pelvic and spinal rotation (one side more forward than the other)
- Shoulders are not level (obliquity) and/or one shoulder may be forward of the other (rotation)
- Rotation may be double, where a user with a rotated lower spine may rotate the upper spine in a compensatory posture in order to face forward.
- Increased and asymmetrical muscle tone (shortening one side of the trunk)
- Neck often laterally flexed in the opposite direction to align visual field
- Low tone in trunk, muscle weakness, and reduced function in upper extremities

Common Seating System Factors

- Inadequate postural support to prevent postural collapse to the side and/or pelvic rotation
- Inadequate lateral support
- Uneven seating surfaces (not intentional)
- A chair that is too wide for the user may cause the user to lean to one side to gain lateral or armrest support
- Contoured back support that is improperly fitted

Anterior Trunk Support Goals

For flexible or partly flexible postures, use an anterior trunk support in conjunction with appropriately placed lateral trunk supports and pelvic supports to de-rotate the trunk, correct uneven shoulder height, and align the trunk to midline if possible.

Within physical limits, the support is used to pull the forward shoulder back so that the trunk is aligned in the sagittal plane and the user can face forward without neck rotation for improved vision, swallowing, and breathing.

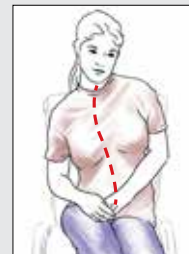
For fixed abnormalities, use an anterior trunk support in conjunction with lateral trunk supports and pelvic supports to accommodate the asymmetry. The goal is to support the body in a position that will maximize function while preventing further progression of the abnormality. Anterior supports that can be mounted asymmetrically and/or that adjust to accommodate an asymmetrical trunk position will best distribute pressure and provide optimum support.



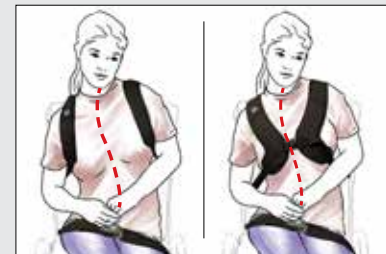
Uncorrected posture with scoliosis and trunk rotation.



Improved positioning for flexible posture with Trimline Shoulder Harness



Uncorrected posture with scoliosis and obliquity



Fixed scoliosis and obliquity accommodated with a Trimline Shoulder Harness (left) and a PivotFit (right). An asymmetrically mounted hip belt also helps support the user's position.

Anterior Trunk Support Options



A four-point shoulder harness like the **PivotFit™** provides balanced retraction from the shoulders down to the lower ribs. A swivel buckle on the sternum strap equalizes tension between the two sides to accommodate asymmetry.



A two-piece anterior support like the **Trimline Shoulder Harness** provides more focused shoulder retraction and easily accommodates asymmetry since the two pieces can be mounted in different positions. A single piece can be used for those who only need shoulder support on the forward side.

Trunk Kyphosis

Clinical Presentation

- Forward flexion of the upper trunk, usually thoracic area, with protracted shoulders
- Downward eye gaze; Individual may have to hyperextend neck to see straight ahead
- C-shaped spine; Contact with the back support is most prominent at the apex of the curvature.
- Lumbar flexion, commonly with posterior pelvic tilt ("sacral sitting") and sliding
- Low tone in trunk and muscle weakness
- Tight hamstrings and decreased hip flexion range

Common Seating System Factors

- Seat-to-back angle too closed for available range of motion; inadequate support to prevent postural collapse.
- Absence of a pelvic block for posterior contouring
- Seat depth too long
- Lack of appropriate hip belt for pelvic support, or inappropriate placement of it

Anterior Trunk Support Goals

For flexible or partly-flexible postures, use an anterior trunk support to extend the trunk as much as possible and retract the scapulas to reduce the kyphosis and align the trunk over the pelvis.

For a fixed posture, the goal is to support the body in its current position to promote function while reducing further abnormalities.

Trunk Instability

Clinical Presentation

- Decreased front-to-back or lateral stability of torso
- User is at risk of, or afraid of, falling forward or has a lateral flexion tendency
- May be intermittent; e.g., insufficient stability with power chair stop-and-go, or on uneven surfaces
- Low abdominal tone, no abdominal wall, and weak extensor muscles

Common Seating System Factors

- Poorly fitted back support
- Seat-to-back angle too closed
- Poorly fitted lateral trunk supports

Anterior Trunk Support Goals

An anterior trunk support pulls against the torso to stabilize it in an upright, neutral position and keep the user from falling forward or leaning to one side. Compressing the soft tissue at the belly also helps stiffen the trunk.



Uncorrected kyphotic posture



Improved positioning with a PivotFit™ Shoulder Harness

Anterior Support Options



An advanced H-style harness like the **PivotFit Shoulder Harness** distributes pressure across a broad area and retracts at the shoulders rather than the sternum. A swivel buckle on the sternum strap equalizes tension between the two sides and helps accommodate asymmetrical positions. Both Standard (fixed) and Dynamic (stretch) styles available.



A dynamic, four-point harness like the **Stayflex Chest Support** provides firm pressure on the sternum to hold the user's trunk in a more upright position, while stretch fabric allows controlled movement. Available with and without zipper, and in two widths.



Uncorrected instability with forward-leaning tendency



Trunk stability improved with a Monoflex

Anterior Support Options



Monoflex



Chest Belt



Universal Elastic Strap

A low-profile two-point support is often sufficient when stability is the primary need. A padded, dynamic support like the **Monoflex** provides strong but comfortable support. A **Chest Belt** with hook-and-loop closure can also be used, with or without a Slip-on Pad. For temporary or short-term use, consider a hardware-free support like the **Universal Elastic Strap**.

Trunk Lordosis

Clinical Presentation

- Hyper-extension of the spine, usually the lumbar area, with anterior tilted pelvis
- Shoulders retracted; may be hyper-extended over the top of the back support
- Cervical spine may also be hyper-extended, causing upward eye gaze
- Limited mid-torso contact with the back support
- Tight hip flexors; increased extensor muscle tone

Common Seating System Factors

- Seat-to-back angle too closed, so that the individual has to over-extend to remain upright
- Reversed biangular back with inadequate support to prevent postural collapse
- Too much contouring in the lumbar area instead of contour and support above the apex of primary lordosis

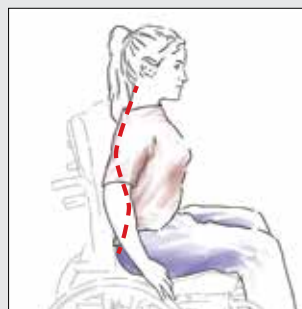
Anterior Trunk Support Goals

For flexible or partly flexible postures, the goal is to increase contact of the back against the back support, reducing the lordosis and facilitating posterior pelvic tilt to achieve a more neutral pelvis with the trunk aligned over it. Shoulder retraction is reduced, facilitating function.

For a fixed posture, the goal of the anterior trunk support is to support the body in its current position to promote function while reducing further abnormalities.

If the user is capable of active trunk flexion, using a dynamic support may allow more anterior movement for functional reach, while still providing stability and improved posture.

For some users, reducing lordosis may require additional postural support at the lower ribs and abdomen.



Uncorrected posture with trunk lordosis



Improved positioning for flexible posture with a Stayflex™ Chest Support.

Anterior Support Options



Stayflex™ Chest Support (Standard style with zipper)

A four-point harness like the **Stayflex Chest Support** provides firm pressure on the sternum to promote contact of the thoracic and lumbar spine with the back support. Stretch fabric allows controlled movement. Available with and without zipper, and in two widths.

Alternately, a **PivotFit** might be used if shoulders are not too retracted. A two-point support such as a **Monoflex** or **Chest Belt** across the lower ribs is another option.

Poor Respiration

Clinical Presentation

- Poor breathing, particularly exhalation
- Low tone in trunk

Common Seating System Factors

- Poorly fitted back support
- Seat-to-back angle too closed
- Poorly fitted lateral trunk supports

Anterior Trunk Support Goals

Placing a firm but flexible support across the abdomen just below the solar plexus helps lift the diaphragm, compensating for low muscle tone and driving air out of the lungs for exhalation.

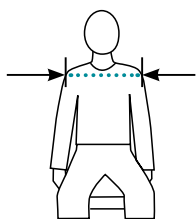


Monoflex Chest Support used across the upper abdomen to help improve respiration. (Two-piece style shown.)

Anterior Support Options



A strong but elastic support like the **Monoflex** across the upper abdomen can help improve respiration. (One-piece style shown)



Sizing

Bodypoint anterior trunk supports are available in a range of sizes to fit pediatric through adult users. Size selection for four-point harnesses is determined by outside shoulder width (bideltoid breadth). If the shoulder width falls between two sizes, consider other factors such as growth, weight changes and clothing. For detailed sizing, product options, and installation information, visit www.bodypoint.com. Additional guidance for mounting can also be found in the product instructions and at youtube.com/user/BodypointInc.

Harness and Strap Placement

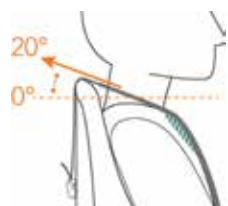
As part of choosing an appropriate position for the anterior trunk support, consider the direction and angle used to pull the mounting straps from the body toward the mounting point on the wheelchair seating system or frame. These factors can impact the effectiveness for the user as well as comfort. Always check for skin redness and proper fit after initial installation and then periodically afterwards. If any redness persists, consider adjustments to the harness position, strap position, and/or tightness.

Top Strap Height

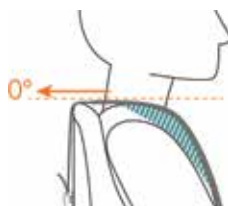
With a four-point harness, the height at which the top straps are pulled back has a notable effect on the distribution and degree of force on the user's body. Often this is controlled by the height of the back support relative to the user's shoulders. Individual needs vary, but pulling the top straps straight back at shoulder level or at a slightly downward angle is often a good starting point. This maximizes the area of envelopment, as illustrated below.

To change the height of the top straps, it may be necessary to adjust the back support or use Strap Guides (see below).

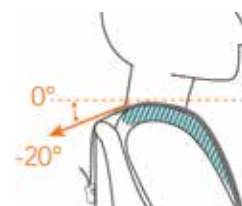
When installing the harness, make sure the padded section at the top wraps just over the top of the user's shoulders. Avoid letting plain webbing press against the shoulder.



When the top straps are pulled at an upward angle, above shoulder level, shoulder envelopment is reduced.



When the straps are pulled straight back, at shoulder level, shoulder envelopment is increased. The distance to the contact point on the chair is also a little shorter, which may reduce lateral shifting of the top straps.



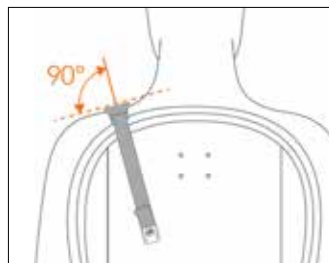
When the straps are pulled at a slightly downward angle, up to 20° below shoulder level, shoulder envelopment is maximized. Mounting lower than 20° below the shoulder is not recommended because of the potential increase in downward force.

Top Strap - Lateral Placement



Laterally, the harness should be mounted so that the pad is on the outer third of the clavicle at most times. Mounting too far inwards may cause the pad to rub the user's neck. If mounted too wide, the pads may interfere with the shoulder joint, limiting arm movement, and the straps may tend to fall off the user's shoulders.

Top Strap - Mounting Angle



Matching the mounting angle to the natural slope of the shoulders will help equalize tension in the edges of the pad for better pressure distribution.

Strap Guides



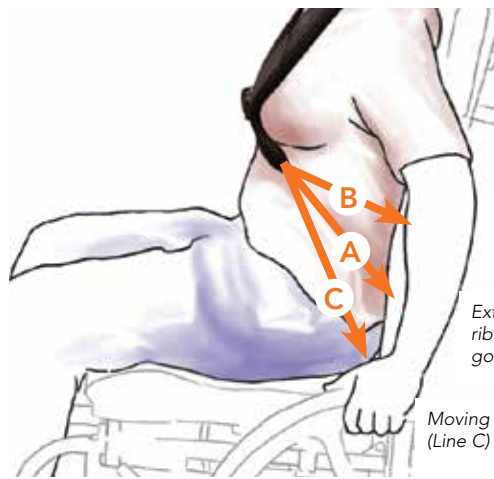
To achieve the desired top strap position and angles with four-point harnesses, consider using Strap Guides. Particularly helpful on low or contoured backs, Strap Guides allow mounting points and strap positions that may not be feasible with the seating system alone. Straps are held securely in place by the narrow slot at the top of the Strap Guides.

Note: For detailed sizing, product options, and installation information, visit www.bodypoint.com. Additional guidance for mounting can be found in the product instructions and at youtube.com/user/BodypointInc.

Lower Strap Position

Just as with the top straps, the position and angle of the lower straps on a four-point harness also affects pressure distribution and effectiveness for positioning the user. Choose the best angle to meet the user's needs, considering both positioning goals and optimal placement of force on the body.

The drawing at right shows a Standard PivotFit™. The effects of different strap positions may vary depending on the shape of the harness used and whether it is a dynamic (stretch) or static style.



Moving the lower straps upward (Line B) toward the mid-thoracic region increases harness contact at the lower ribs.

Extending the lower straps out from the lower ribs at approximately a 45° angle (Line A) is a good starting point for many users.

Moving the lower straps down toward the trochanter (Line C) decreases contact with the lower ribs.

Pull Style

Bodypoint PivotFit™, Stayflex™, and Trimline harnesses come with MD (multi-directional) Pull Straps. These allow the top straps on any harness to be set up as either a front-pull or a rear-pull at the time of the fitting to meet user needs. Each shoulder can also be set up and adjusted independently. Different pull styles have different attributes and mounting requirements, as described below. A choice of Flat-Mount™ or Cinch-Mount™ end-fittings are included with each harness.

Front-Pull



Front-pull attachment allows the caregiver to stand in front of the user to better see their position and support them manually if needed while adjusting the straps. Mounting position can be high on the backrest, using minimal space and reducing lateral movement.

Rear-Pull

Rear-pull configuration is ideal when you want the buckle and tightening straps out of reach for the user, or when it is easier to position the user from behind before tightening the top straps. Typical mounting is on the mid-to-lower back of the chair with Cinch-Mount™ or Flat-Mount™ end-fittings. Integrated side-release buckles facilitate temporary removal of the harness.



Typical rear-pull configuration, attached with Flat-Mount end-fitting



Rear-pull attached with Cam Buckles; side-release buckles removed

Alternately, plain straps can be attached to the back of the chair with Cam Buckles (sold separately). Since this configuration eliminates the side-release buckle, less space is required on the back of the chair for mounting and straps can be attached near the top of the back support. This is helpful for smaller seating systems or thinner back rests, common with pediatric users. A higher mounting point also minimizes lateral movement.



Final Adjustment

Adjust strap length through end-fittings at the time of mounting, then fine-tune adjustment with the user in the chair. It may be helpful to position the user's shoulder with one hand while using the other hand to tighten the top strap. Fit should generally be snug to ensure proper support, but be careful not to over-tighten.

Use the adjustment straps to keep the shoulder harness tightened during fitting and daily use to ensure the desired level of support and correct pad placement. If the harness is too loose, many users will "hang" into the harness, rather than be positioned against the back support.

Check skin for redness after initial installation and periodically afterwards. If the user develops any persistent redness from the shoulder harness, this may be due to incorrect fitting or not adequately tightening the harness. A poor fit can lead to increased shear or decreased pressure distribution under the harness.

Bodypoint Four-Point Anterior Trunk Support Products

Bodypoint four-point MD Series anterior trunk supports feature MD (multi-directional) Pull Straps that allow any harness to be easily configured as a front or rear-pull at the time of the fitting. Visit bodypoint.com for sizes, part numbers, and additional product information.



Stayflex™ MD Series Chest Support

Provides firm trunk control with extra freedom of movement in the shoulders. Carefully selected materials optimally balance stretch and resistance, while patented, dual-zone stretch construction eliminates upwards shift at the neckline when leaning forward to minimize risk. Works well for users with lordosis and others needing strong sternal support. Swivel buckles on lower straps designed for easy removal.

Options include center zipper and choice of Standard and Narrow widths. Narrow width style is especially well-suited to the female form. Available in a range of sizes to fit pediatric and adult users.



PivotFit™ MD Series Shoulder Harness

The unique shape of this shoulder harness distributes pressure across a 25% greater surface area than a traditional H-style. Pad shape is contoured to the shoulders and ribcage for a supportive, comfortable fit. A center swivel buckle equalizes tension between the two sides to accommodate asymmetry, while the low-placed sternum strap reduces risk of unintended airway restriction and improves adjustability.

Available in two styles: the Standard (non-stretch) style works well for kyphosis, spinal curvature or trunk rotation; the Dynamic style stretches to allow more torso movement and is ideal for helping manage spastic tone. Wide range of sizes available, from adult XL to XXS, appropriate for young children.



Trimline MD Series Shoulder Harness

Two separate, adjustable padded straps provide focused shoulder retraction while comfortably accommodating asymmetry. Keeps the chest area clear for maximum freedom of movement and to completely eliminate risk of unintended airway restriction.

Bodypoint Two-Point Anterior Trunk Support Products



Chest Belt

A low-profile anterior support option for users with limited hand function or those who prefer chest support without a buckle. Flexible molded end-tab with thumb loop is easy to grab, and extra-fine hook-and-loop material holds securely but is smooth to the touch. Can be used with or without Slip-on Pads (sold separately).

Mounts to back support or wheelchair frame, and can be used on almost any wheelchair. One size fits all.



Monoflex™

For users who need strong but comfortable abdominal or chest support. High-strength elastic padding provides just the right amount of stretch for comfort, while stabilizing even those with strong spastic tone. Double-tapered shape distributes pressure across the midsection while maintaining free arm movement. Improves breath control and speech when used on upper abdomen.

Can be mounted on almost any wheelchair, including those with low or flexible back systems where a four-point harness is difficult to mount. Available in Two-Piece Center Release (pictured) and One-Piece Underarm Release styles, and in sizes to fit both children and adults.

This edition of the Anterior Trunk Support Usage Guide was developed in collaboration with Bart Van der Heyden, PT, www.super-seating.com.



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