

Postural Supports: Seat Cushions, Back Supports, & Other Interventions

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Outline

- **Classification**
- **Pressure Ulcer Etiology**
- **Material Properties**
- **Types of positioning devices**
- **Clinical and functional indications**
- **Pressure Mapping**

Pressure Ulcer Risk Factors

Extrinsic Factors

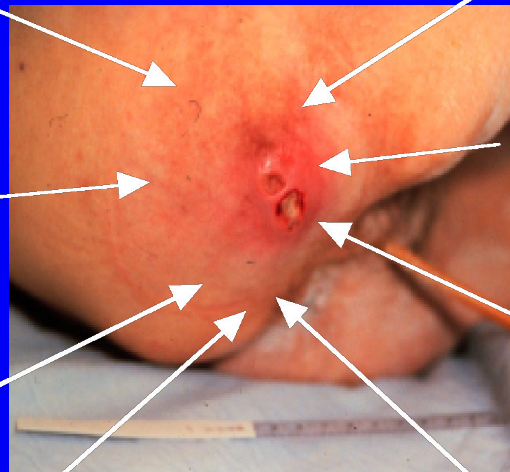
Excessive
Pressure

Friction
and Shear
Forces

Heat

Moisture

**Pressure
Ulcer**



Intrinsic Factors

Immobility

Sensory
Loss

Age

Poor Nutrition

Seat Cushion Requirements

- **Provides Function**
 - transfers
- **Comfortable**
- **Low Weight**
- **Easy to Use**
- **Stability**
- **Pressure Relieving**
 - Immersion

Materials Properties

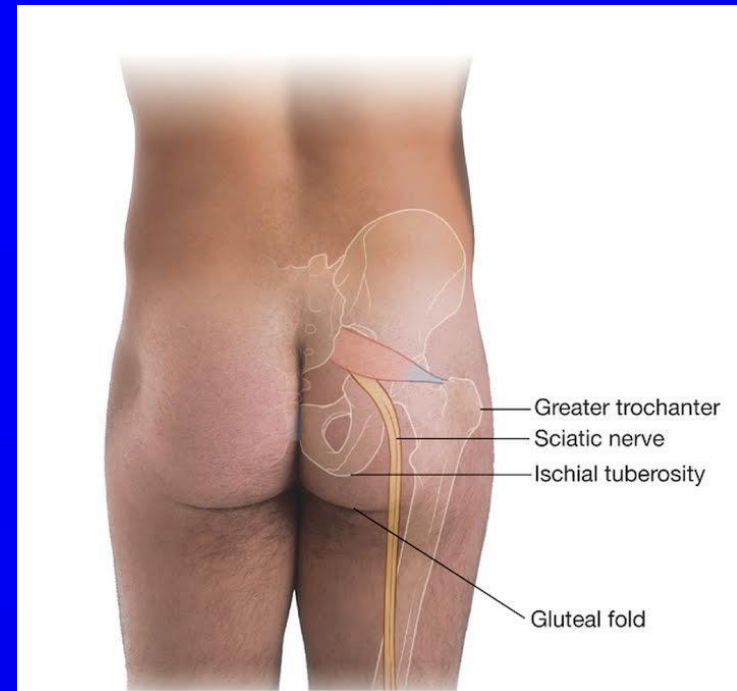
- **Density (kg/m^3)**
- **Stiffness - indentation load displacement (ILD)**
- **Thermal Characteristics (insulator or conductor)**
- **Friction (shear forces)**

Cushion Properties Influence

- **Pressure distribution**
- **Stability**
- **Interface temperature**
- **Reliability**
- **Immersion**

Immersion

- Immersion allows redistribution of pressure near bony prominences



Spectrum of Cushions

- **solid base**
- **flat foam**
- **generic contoured foam**
- **cut-out foam**
- **viscous fluid (gel, H₂O, powder)**
- **solid gel**
- **air floatation**

Others

- **dynamic systems with alternating air**
- **Custom molding/contouring**
- **Plastic honeycomb**

Sling Seat and Back

- Most common
- Very short-term use
- Stretchable material
- Does not provide support; causes deformities later
- Foldable wheelchair



Captain's Style Seat and Back

Indications

- Sensation
- Weight shift
- Reposition
- Postural symmetry
- Transfer



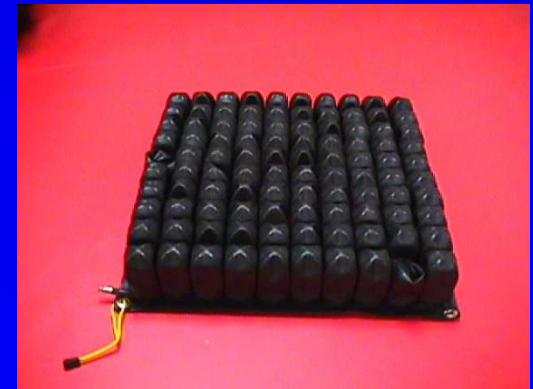
Caution:

Poor sensation; unable to shift body weight and reposition ; unable to transfer

Cushions Types

Performance-based characterizations

- E2601/2 — General-use seat cushion
- E2603/4 — Skin-protection seat cushion
- E2605/6 — Positioning seat cushion
- E2607/8 — Combination skin protection and positioning cushion
- E2609 — Custom-fabricated seat cushion
- K0108 — Miscellaneous



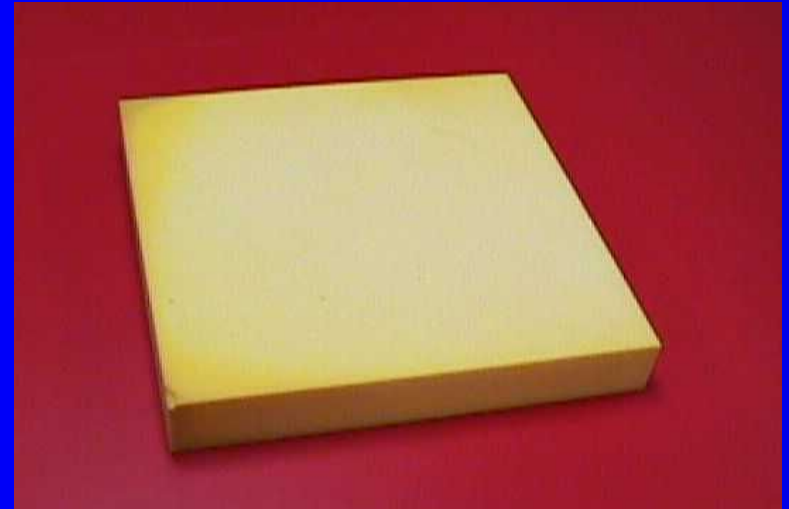
Solid Seat Insert

- good stability
- Used beneath cushions; provides support
- no pressure distribution
 - No immersion
- conductor of heat
- Reliable



Flat Foam

- good stability and dynamic
- poor pressure
 - Little immersion
- concerns with long-term resilience
- Limited life expectancy
- somewhat reliable
- Shear
- Low cost



Generically Contoured Foam (General Use Cushion)

- **Insulator** (depending on cover)
- **pressure distribution is sensitive to the fit (immersion)**
- **foam density and stiffness must be considered**
- **Low cost**



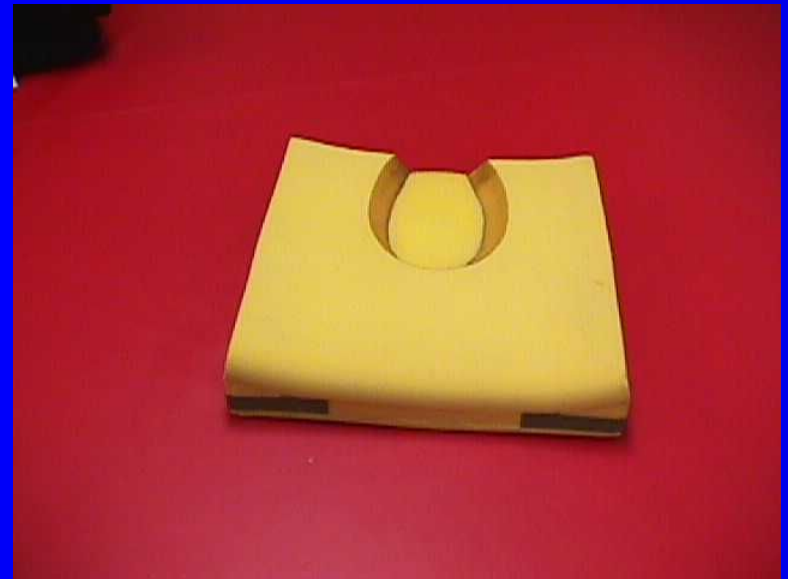
Generically Contoured Foam Cushions

- good dynamic properties (damping)
- high shear
- light weight



Cut-Out Foam Cushion

- **Redistributes pressure away from one area**
- **Concerns of pressure in other areas**
- **Need to sit in one place**



Viscous Fluid

- **Examples: H₂O, powder**
- **good weight distribution**
- **low shear**
- **More Immersion**
- **poor resilience = may bottoms out**
- **poor dynamic properties**
- **good thermal properties (neutral)**
- **can be heavy**

Jay2 Viscous Fluid and Foam Base (Skin Protection and Positioning)

- **Combines stability of solid base & Viscous Fluid**
- **Good support**
- **Good stability**
- **Locks pelvis in The middle**



Otto Bock Cloud

(Skin Protection and Positioning)

- **Foam balls**
- **chambers**
volume of
viscous fluid
- **more dynamic**
properties



Solid Gel Cushions

- heavy
- thermally neutral
- low shear
- good weight distribution

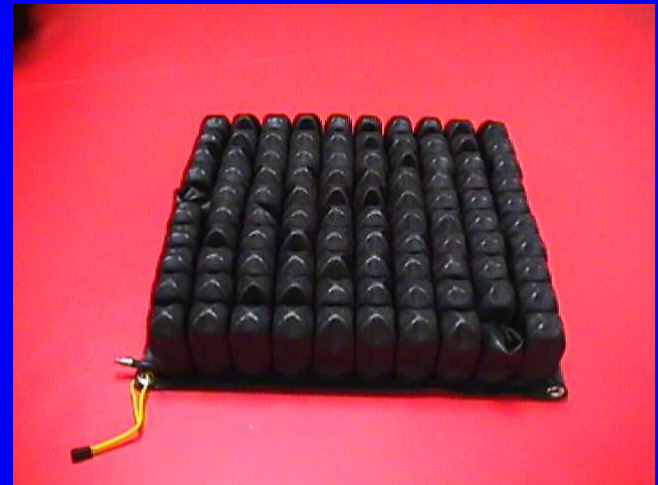


Air Filled Cushions

- **low weight**
- **good immersion**
- **good dynamic properties**
- **absorbs impact & Vibration**
- **reliability may be a problem**
- **sensitive to initial inflation**
- **Instability issues**

ROHO Air Cushion

- interconnected flexible air chambers
- equalizes pressure
- insulates heat



Plastic Honeycomb Cushion

- **properties similar to precontoured foam**
 - **pressure distribution sensitive to fit**
- **good dynamic properties**
- **very light weight**
- **ventilation qualities**
- **moisture benefits:**
 - **Punch of holes**
 - **Allows air to flow through**



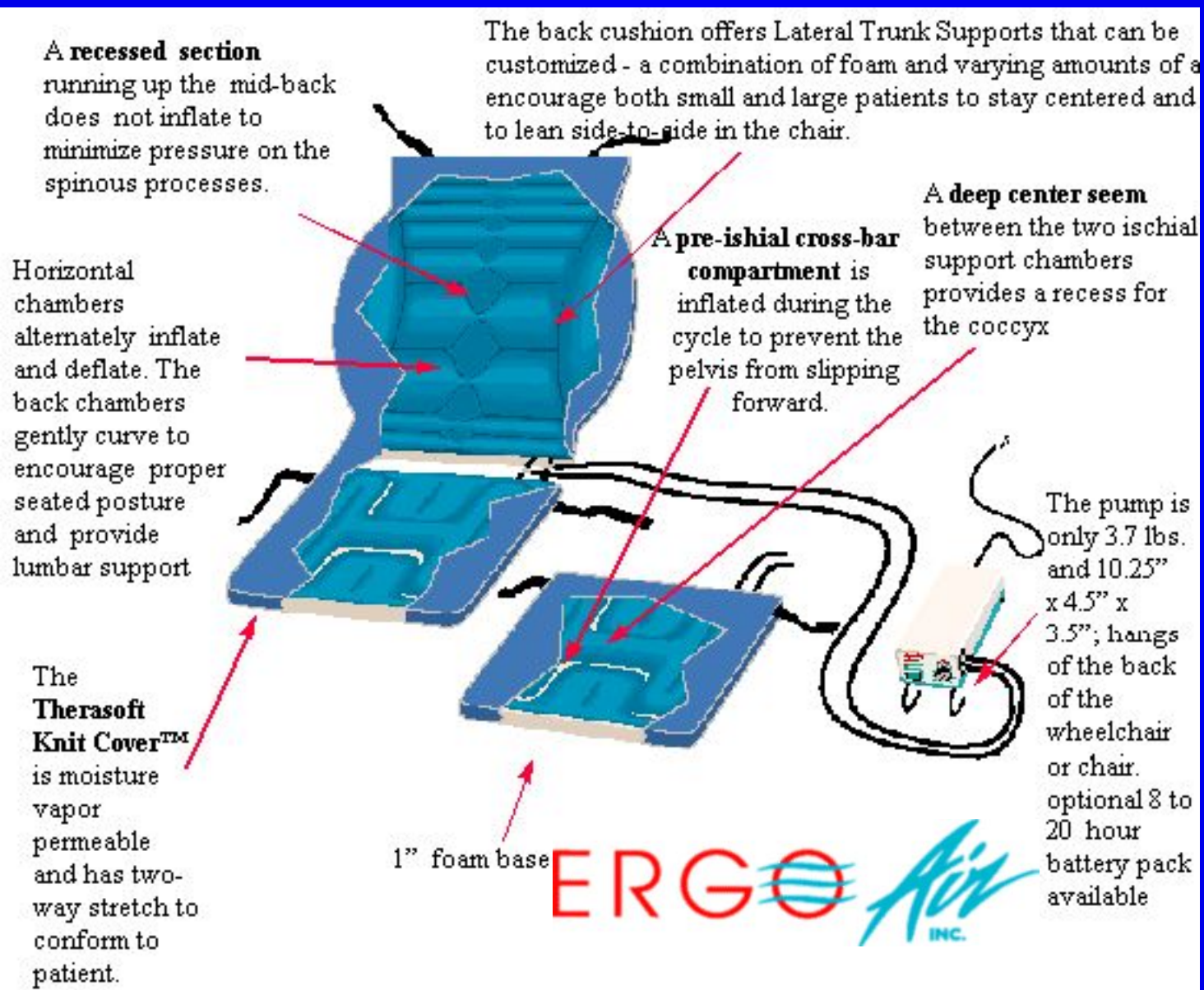
Comfort cushion



Dynamic (active) Seat Cushions

- Alternating surface shape
- questionable effect of massaging action
- complex systems
 - unknown reliability
 - expensive

Alternating Pressure (Inflate / Deflate Air)



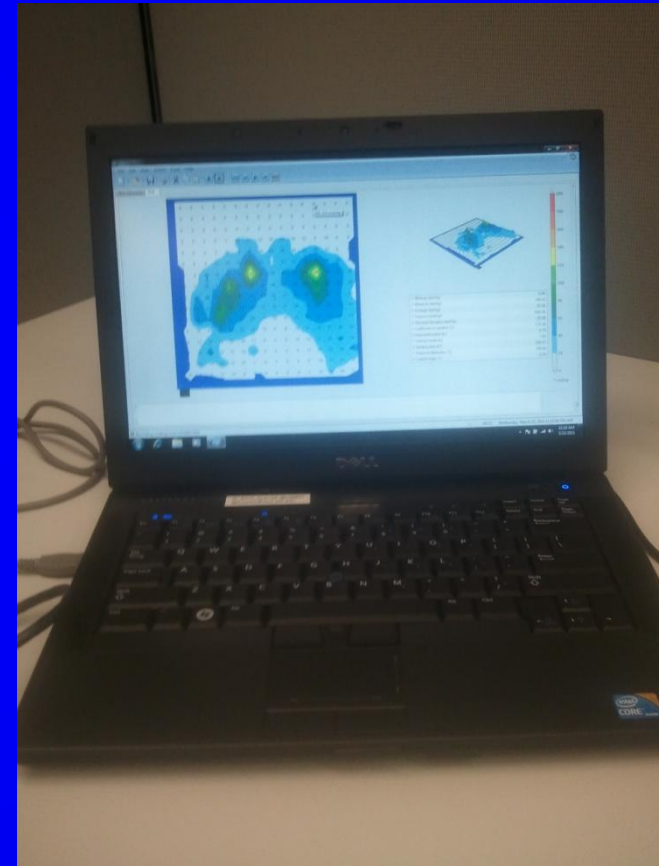
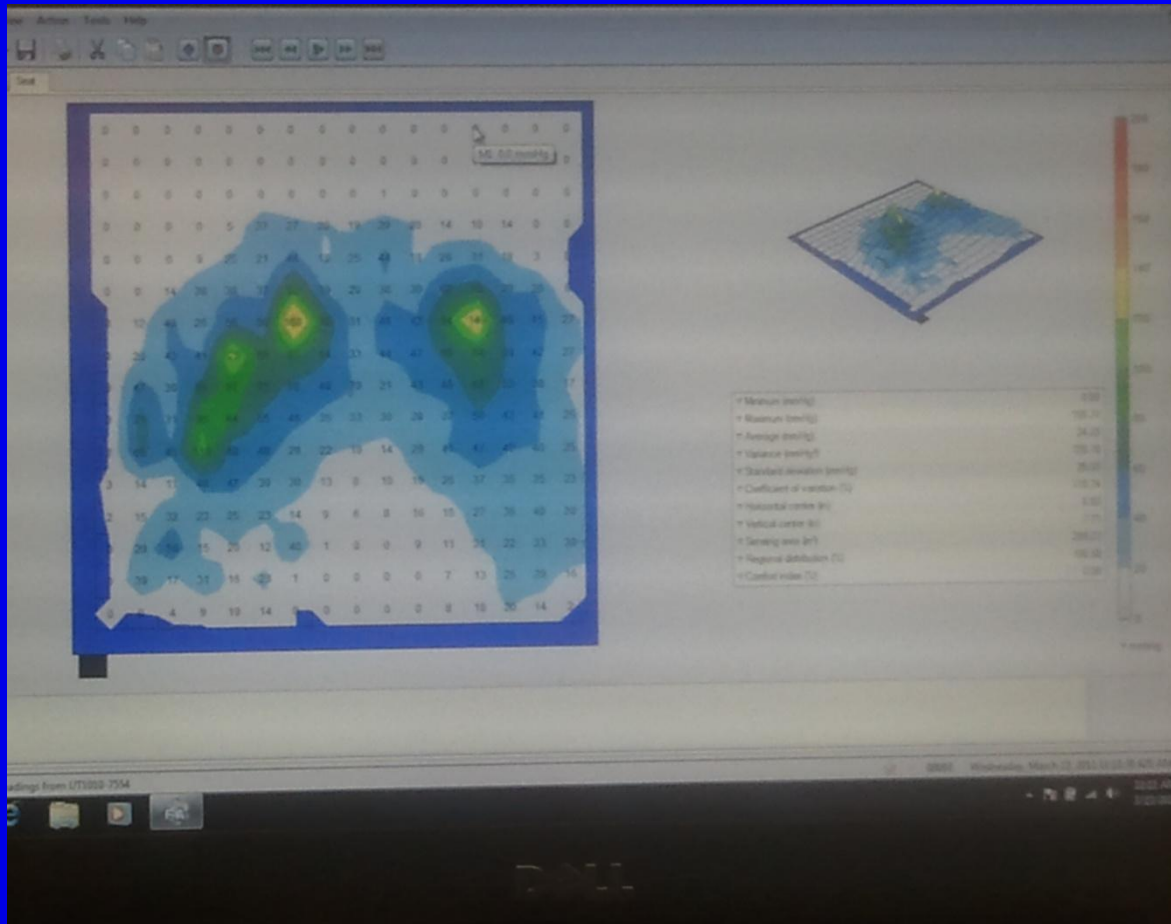
Pressure Mapping Technology

Measures interface
pressures @
the sitting surface

e.g., Force Sensing
Array (FSA) System



Cushion Bio-feedback



Summary

- **what causes pressure sores?**
- **pressure distribution Vs. stability**
- **conduct Vs. insulate heat**
- **reliability & ease of use**
- **Immersion characteristics**

Clinical or Functional Requirements of Back Support

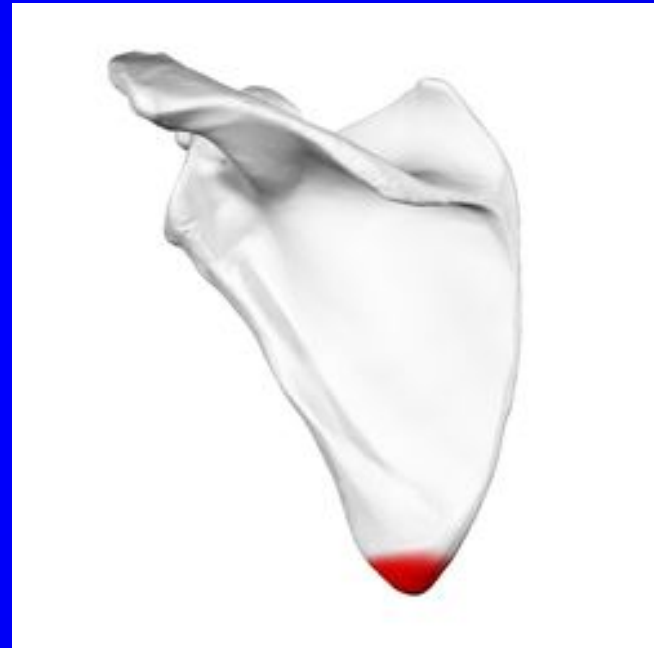
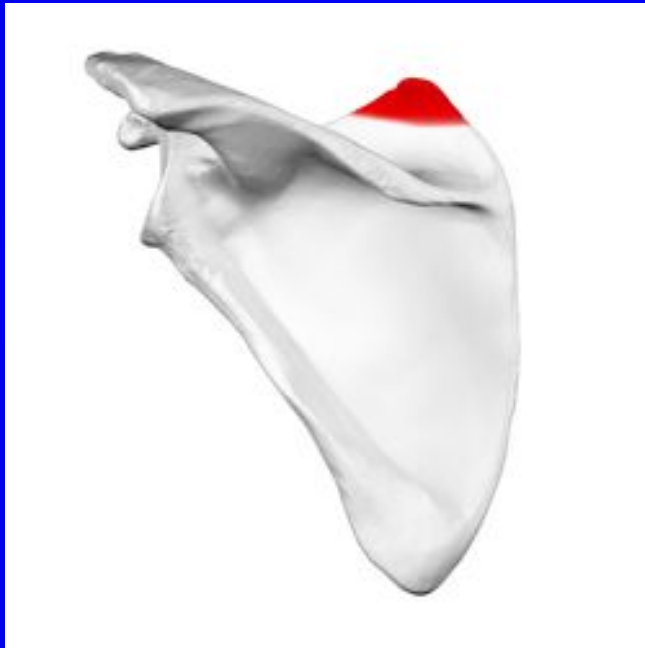
- **Improve functional and ADL skills**
 - **Transfers**
 - **Reach**
- **Comfortable**
- **Improve sitting tolerance**
- **Stability or support**

Descriptive Characteristics

- Height
- Shape
- Stiffness
- Weight
- Adjustability



Height



Low Back

- Lumbar or Sacroiliac support
- Freedom of movement
- Backward reaching
- Active users
- Requires good trunk support
- Limited support



High Back

- Provides support throughout spine
- Limited mobility
- May be needed for decreased neuromuscular function in trunk



Flat/Planar

- Not practical
- Does not accommodate shape of the spine
- Allows for some mobility



Generically Contoured

- Accommodates shape of the back
- Effectiveness sensitive to fit
- Provides some lateral support (lateral pads) depending on depth



Rigid Shell

- Provides good stability and posterior pelvic support
- Generally not adjustable
- Effectiveness sensitive to fit
- wc users with straight spine (no scoliosis)
- Relatively heavy to carry/self-propel



Contoured



- **Cut-out for shoulder movement**
- **Maximizes trunk support**
- **Increased ROM for propulsion and ADL's**

Adjustable Tension Back



- **Contours to shape of spine**
- **Adjustable**
- **Allows for change and repositioning**
- **Accommodates fixed deformities (kyphosis, posterior pelvic tilt)**
- **Foldable**

Adjustable Tension Demonstration



Custom Molded

- When no OTS backrest will support or accommodate their orthopedic changes
- Very specific to deformity
- Time consuming
- Molding quality depends on clinicians skills



Conclusion

- **A wide variety of back rest and seating options are available to meet the needs of clients.**
- **Client centered practice**
- **Evidenced-based practice**
 - Existing research should be applied.
 - Further research is warranted.

Questions

