

Adaptive Sports Equipment:

Strategic Configuration to Enhance Performance for the Seated Athlete



Kendra Betz, MSPT, ATP

Move United Education Conference | April 2026

Your Host - Kendra Betz, MSPT, ATP – Denver, CO

- PT & RESNA credentialed Assistive Technology Professional (ATP)
- University of Pittsburgh, Department of Rehabilitation Science and Technology
 - Adjunct Clinical Faculty
 - International Seating Symposium Advisory Board
- Veterans Health Administration (VHA) - 32 + year career
 - SCI Clinical Specialist and National position with VA since 2008
 - VA national sports programs with focus on equipment and classification
 - Seating & Prosthetics Lead, National Disabled Veterans Winter Sports Clinic
- USA Para Cycling National Classifier
- Director of Community Engagement, Ride Designs



Learning Objectives

Upon completion, participants will be able to . . .



- 1) Describe two reasons that client assessment guides strategic equipment selection and configuration
- 2) Discuss the impact of range of motion limitations on sports equipment options.
- 3) Demonstrate use of two seating solutions that provide postural support to enhance performance in seated sports.

The Athlete Assessment

Guides Options and Recommendations



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Recreation or competition . . .



endless options exist.

Endless Options



Adaptive Cycling Options



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Slopeside

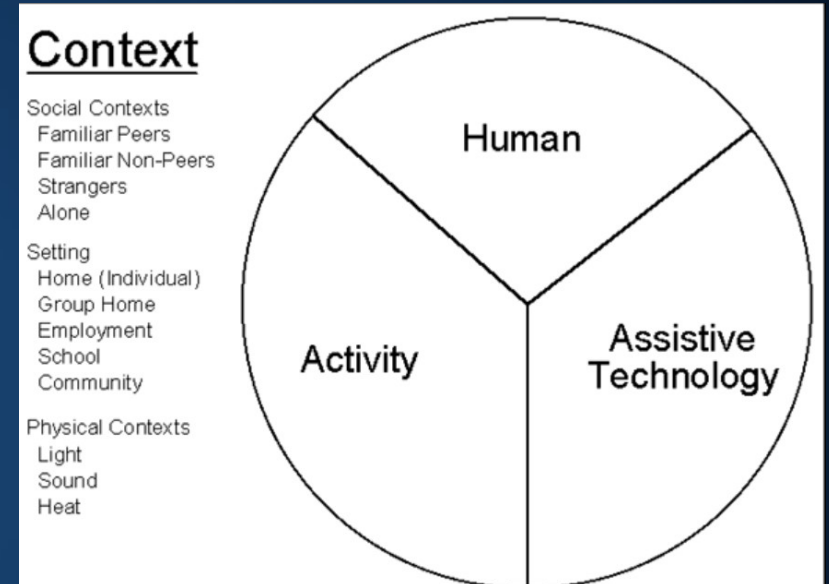


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Where to start?

- HAAT Model
 - Human
 - Activity
 - Assistive technology
 - Context
- Functional task analysis
 - i.e. the SPORT
- Hierarchy of AT
 - No tech → low tech → high tech
 - Commercially available → custom medical devices



Cook & Polgar 2022

Hierarchy of AT Applied to Sports

- No tech, low tech, high tech



Swimming
No Tech



3-Track Skiing
Low Tech



Off Road Cycling
High Tech



TETRA Ski
SUPER High Tech

Athlete Evaluation

- Comprehensive review
 - Interests and experience
 - Size, morphology
 - Range of motion
 - Strength
 - Tone (high-normal-low)*
 - Posture
 - Skin
 - Balance
 - Coordination
 - Functional skills



Activity

Favorite Sports



Seating for Sports

Provide clinical & adaptive expertise for athlete support . . .

- ✓ Skin protection
- Postural stability
- Dynamic movement
- Injury prevention
- Sport performance
- Comfort



Seated for Stability

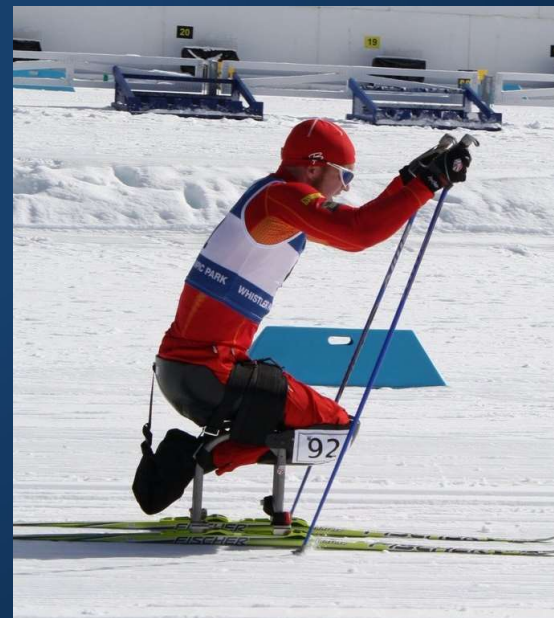


Seating for Sports *Performance & Athlete Goals*

Recreation



Competition



Sports Seating Surfaces



Sports Seating Surfaces



Why Seating for Sports?

Photos are coming



Known skin challenges



Sled Hockey seat



Back cane on Quad Rugby Chair

Subtle Posture & Skin Challenges



Known Challenges



Internal Fixation



Heterotopic Ossification



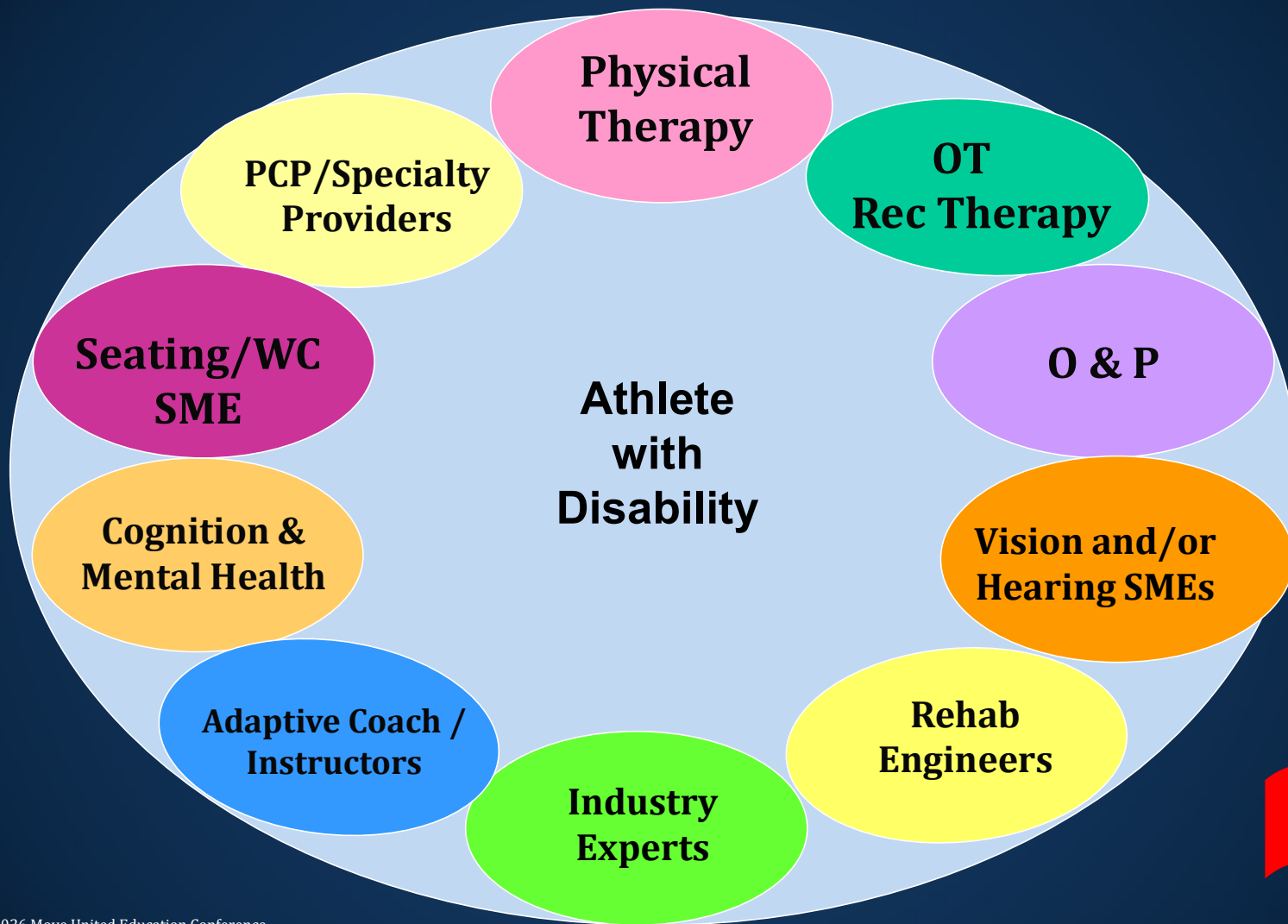
Ride custom seat in everyday wheelchair

Xray images credit to J. Laferrier, PhD, DPT, ATP

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How Do We Figure This Out?

Collaboration is Essential . . .



Evaluate Seated Posture



Terminology Review

- Neutral Posture

Common deviations:

- Obliquity
- Scoliosis
- Posterior pelvic tilt
- Anterior pelvic tilt
- Windswept deformity

Posture Evaluation

Four Positions

- In everyday chair
- Sitting on firm mat
- Supine on firm mat
- In sports equipment

Three Planes

- Frontal
 - from front or back
- Sagittal
 - from the side
- Transverse
 - from above/below

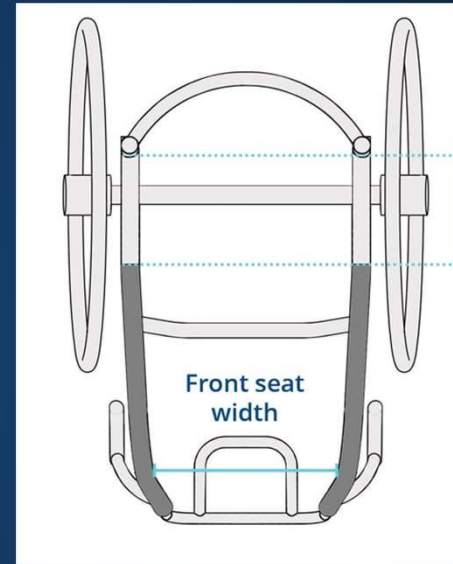
Three Planes



Frontal
Plane



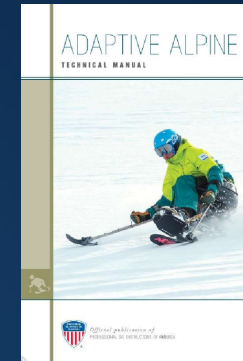
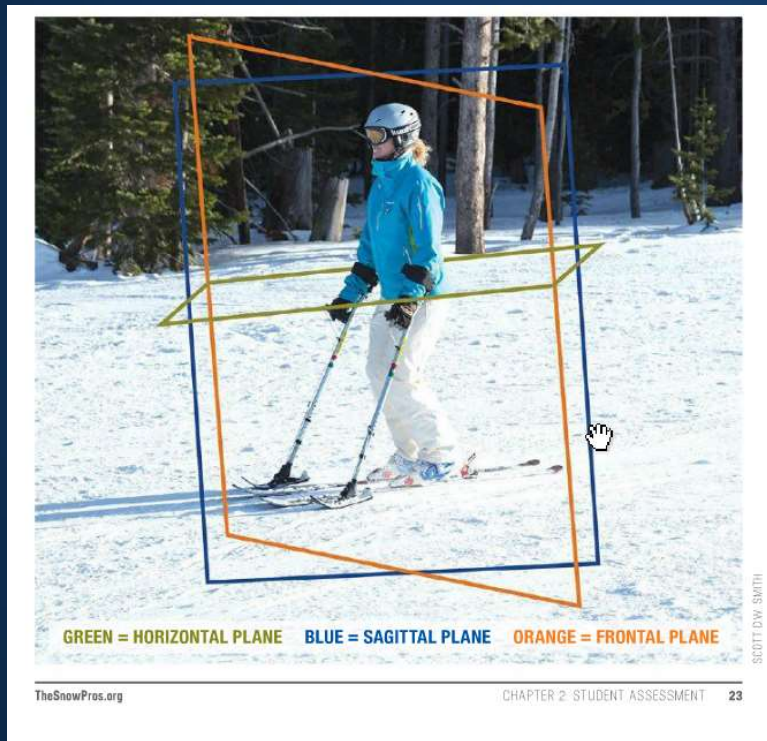
Sagittal
Plane



Transverse
Plane

[Images from: Manual Wheelchair Guide \(permobil.com\)](http://permobil.com)

Three Planes



See Page 23

Athlete Evaluation



Posture alignment

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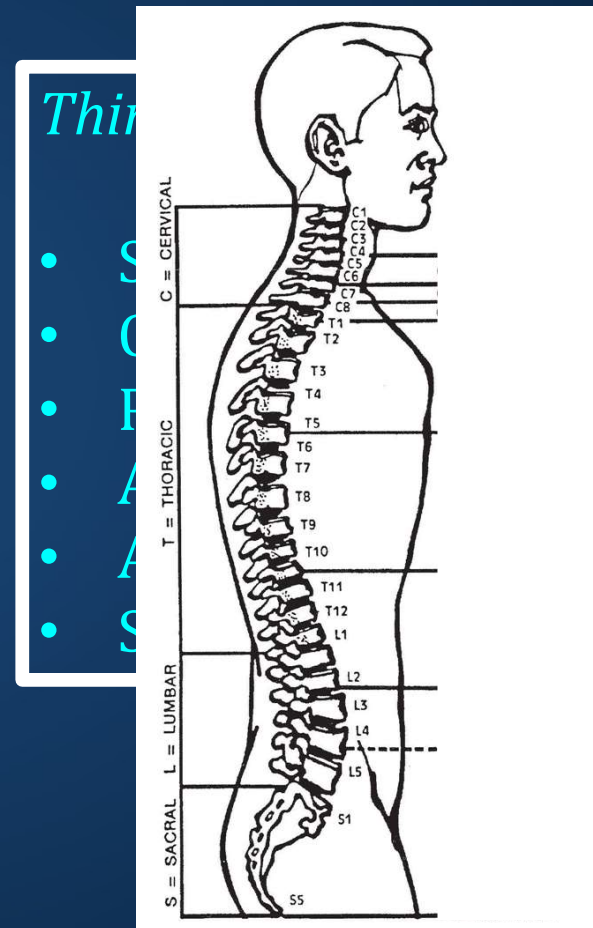
Balance



Range/flexibility

What Are We Looking For?

- Postural Alignment
 - Deviations from “neutral”
 - Fixed or Flexible?
- Range of motion (ROM)
 - Restriction or excess
- Skin Challenges
 - Ask about all surfaces & bony prominences



Pelvis

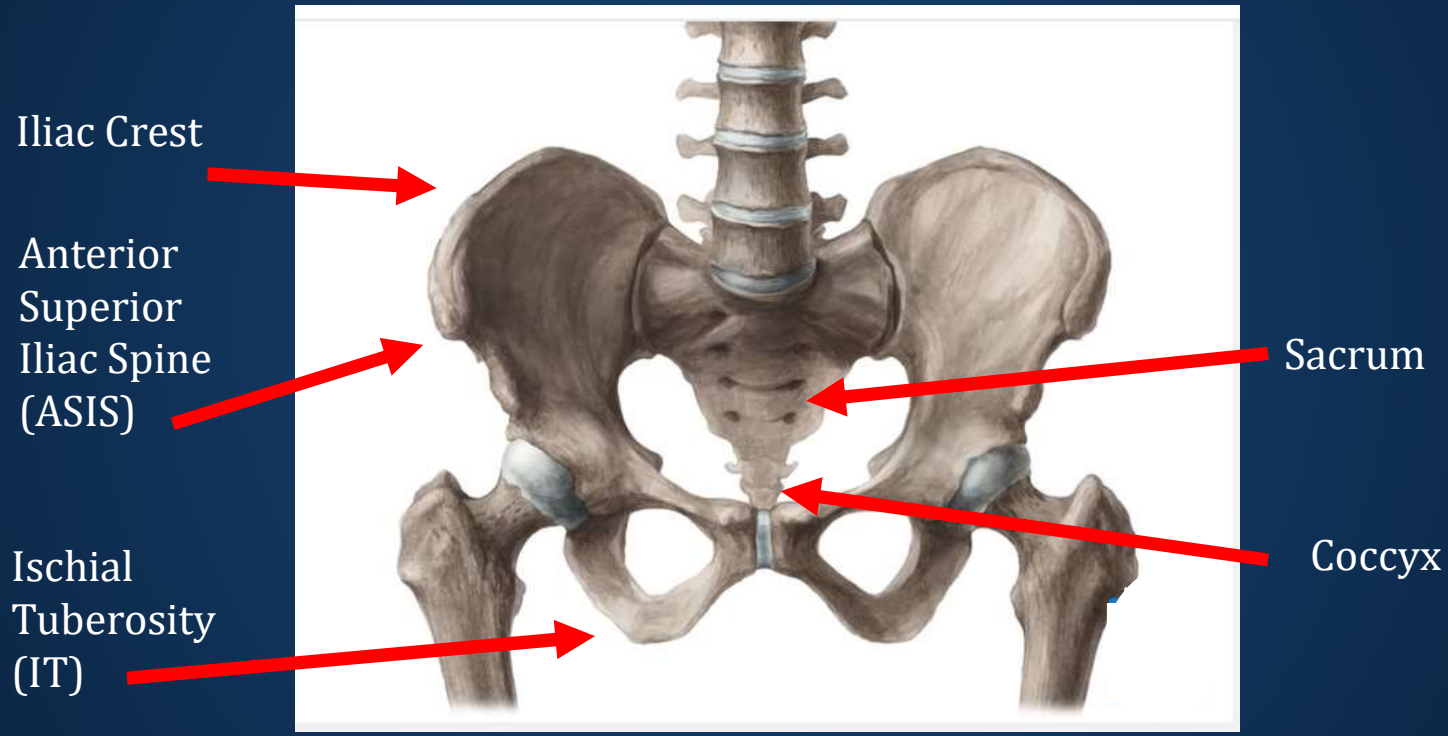
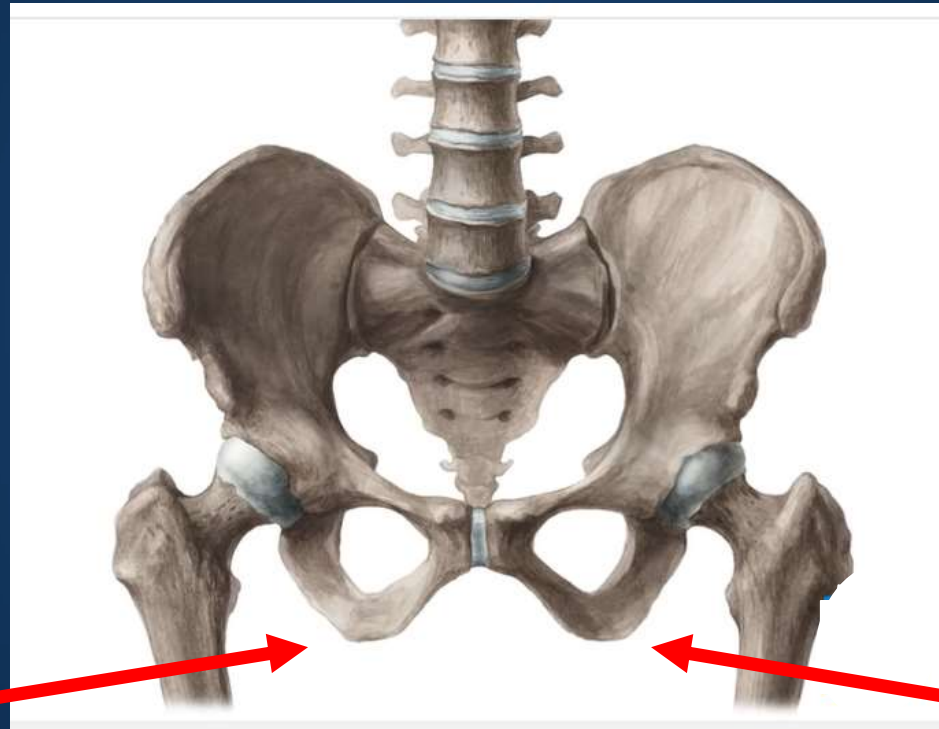


Image from : <https://www.youtube.com/watch?v=yK-8ZwLFarc> (Tutorial Recommended)

Can You Find Your ITs? 😊



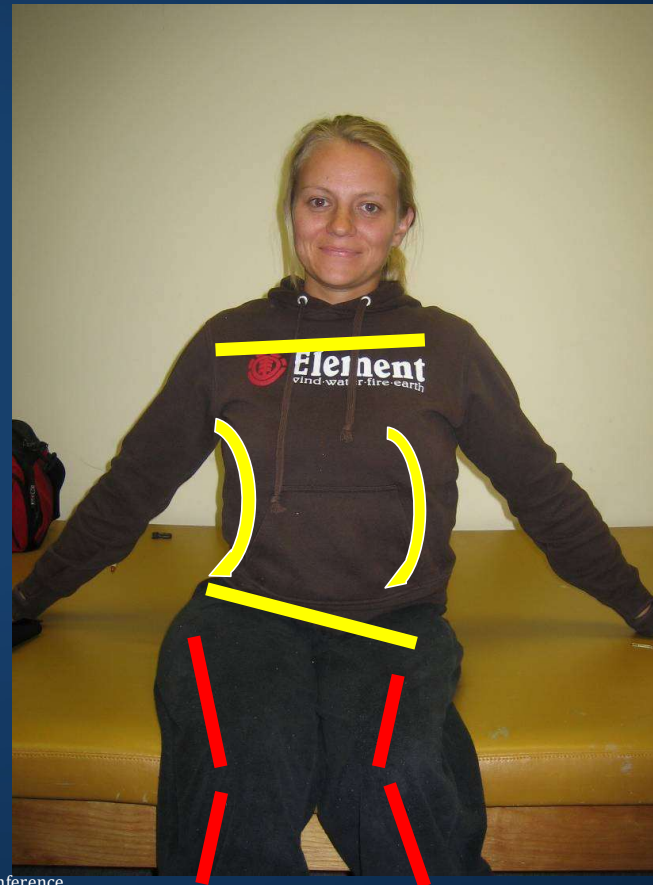
Ischial
Tuberosity
(IT)

Ischial
Tuberosity
(IT)

Image from : <https://www.youtube.com/watch?v=yK-8ZwLFarc> (Tutorial Recommended)

Postural Evaluation

- Frontal plane
 - from front or back
(anterior or posterior)
- Observe
 - Pelvic obliquity
 - Shoulder height
 - Leg position



Amputation & Pelvic Obliquity



Postural Evaluation

- Sagittal plane
 - from the side (lateral)
- Observe
 - Pelvic position
 - Trunk
 - Shoulders
 - Head



Sagittal Plane Deviations

Posterior pelvic tilt

- Stable base
- Kyphosis / neck extension



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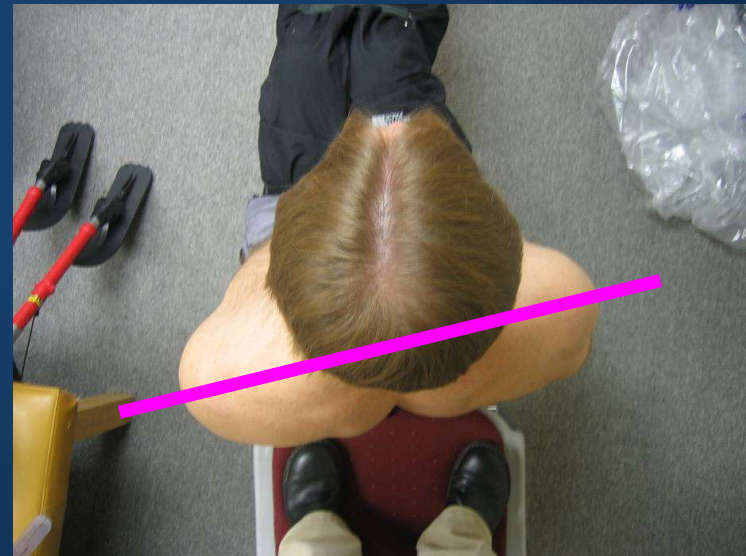
Anterior pelvic tilt

- Lumbar hyperextension
- Unstable base



Postural Evaluation

- Transverse plane (from above - bird's eye view)
- Observe trunk rotation, leg/knee position
- Scoliosis is common deviation



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Postural Evaluation

- Multi-plane deviations
- Windswept deformity



Activity

Sit Down

How Does Postural Deformity Impact Sport Performance?



Athlete Assessment: Range of Motion & Flexibility

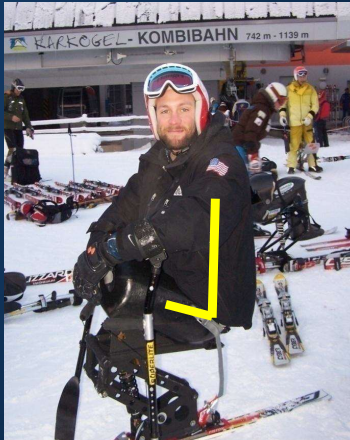
- Assess legs, trunk, arms
- No mat available? . . . improvise



ROM for Sports Equipment



Range of Motion -- Mono-Skis



Hamstring Flexibility and Sports Equipment



Image from

www.redbubble.com

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Adaptive Sports Technology Goals

1) Right Equipment, 2) Good Set-up



Seating Solutions for Sports – The Options

Options available:

- Off the shelf seating
- Custom seating
- Accessories

Key considerations

- Device selection based on client assessment
- Adjustments available
- Temporary vs. long term
- Correct posture to tolerance

Off-the-shelf options

“Sweet Cheeks ” by Jackson Kayaks



Off-the-shelf options

"Fit-Kit" by Aspen Seating

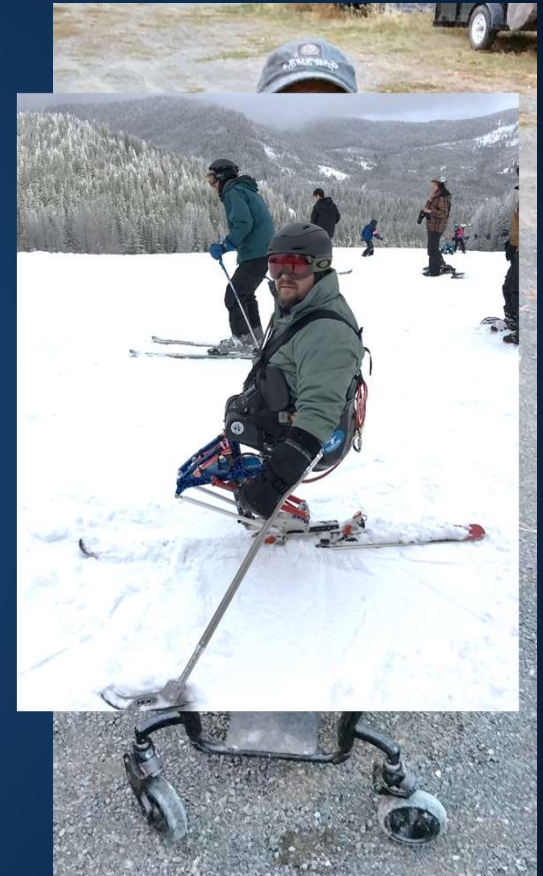


CUSTOM Options Aspen Seating



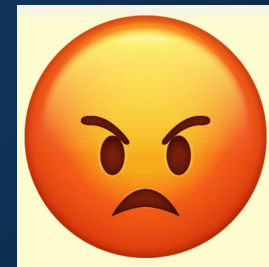
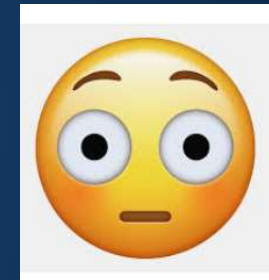
Custom Seating Considerations

- Indications & Considerations
 - Competition and/or considering racing
 - Avid / consistent participation
 - Skin challenges - current or past
 - Significant postural deformity
 - Significant range of motion limitations
 - Amputations
 - High bilateral transfemoral amputations
 - Hip disarticulation(s)



Choose Your Foam Wisely

- CLOSED CELL foam works BEST
 - Does not absorb moisture, keeps skin dry
 - Can be cleaned/disinfected
 - Can shape to support the body
 - Fill around the pelvis
 - Quiet unwanted movement
 - Connect skier to the “boot”
- OPEN CELL foam is TERRIBLE
- NEVER, EVER use carpet foam!



Choose Your Foam Wisely
Think about SHAPE . . .



Gumby



Gumby from behind

Choose Your Foam Wisely



Nylex Covered Gel-Foam Cushions

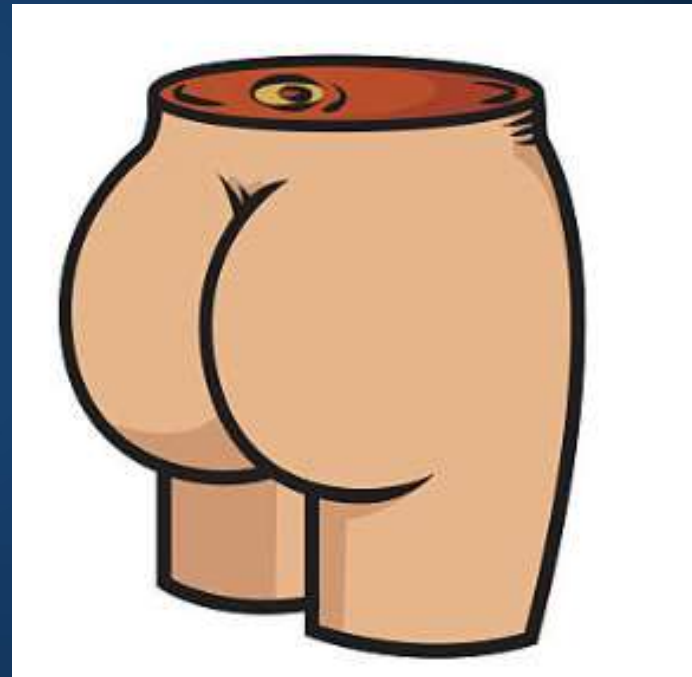
Comfort Foam Cushions

Cushions

Like the World . . .



*Butts are
NOT FLAT*





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Accessorize!





BP Elastic Mobility Strap
Two to create harness

Sailing seat
video

BP Elastic Mobility Strap

“Must Have” tools & supplies

- Cushions & Foam (closed cell)
 - Varied dimensions & densities
- Carving knife – Battery power
- M-L gauge
- Tape measure
- Inclinator/goniometer
- Abdominal supports
- Ratchet straps
- Duct tape
 - *Skin protection REQUIRED*



Electric Carving Knife



M-L Gauge

Equipment highlighted today. . .

Aspen Seating/Ride Designs (Sunrise Medical)

Body Point

Creating Ability

Jackson Kayaks

Enabling Technologies

Bass Pro Shops Cordless Fillet Knife

Give it a try!



To love what you do and feel that it matters.
How could anything be more fun?

~ Catherine Graham

Thank you!

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