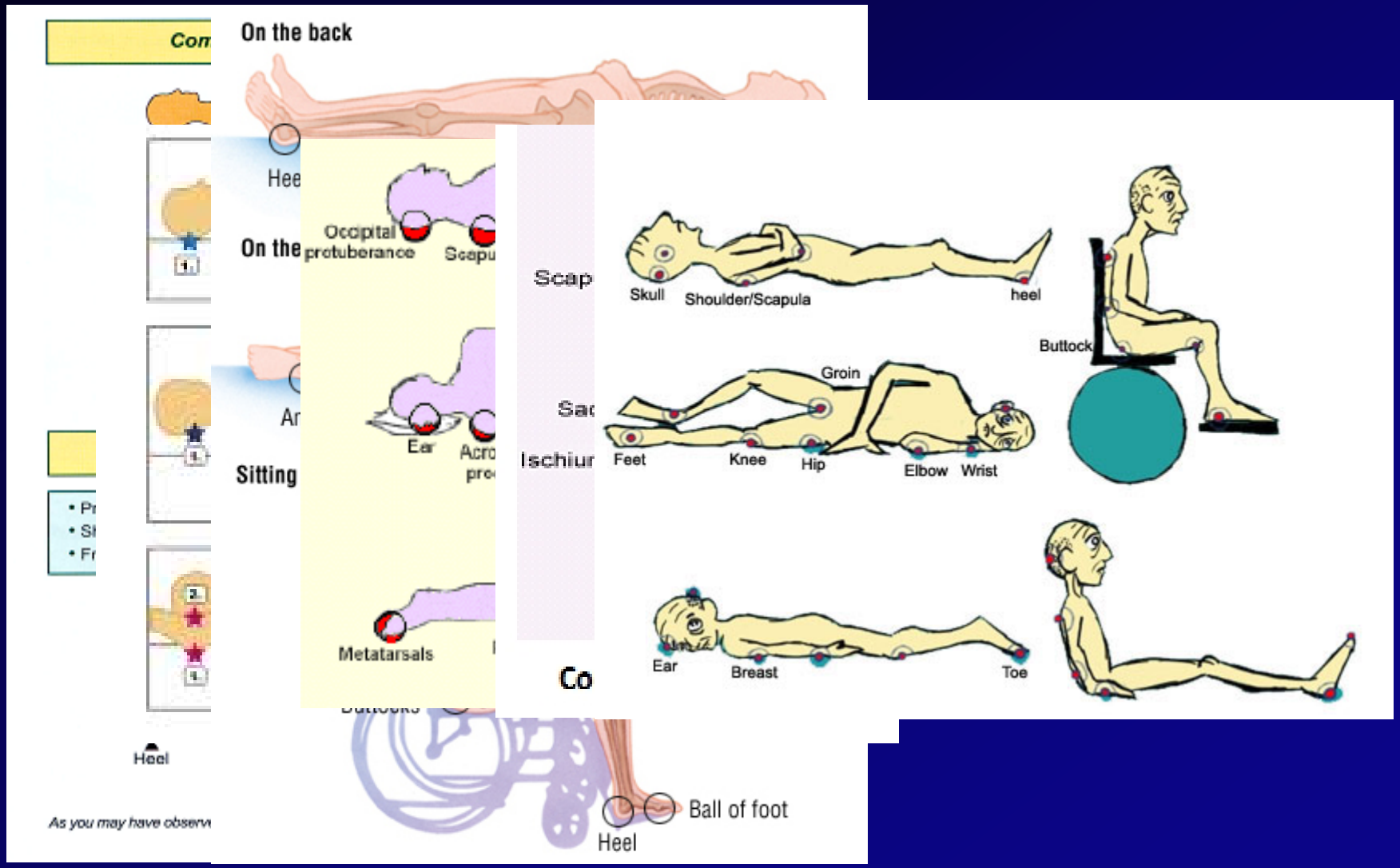
Pressure Redistribution

Identifying and addressing pressure issues

Identifying the problem



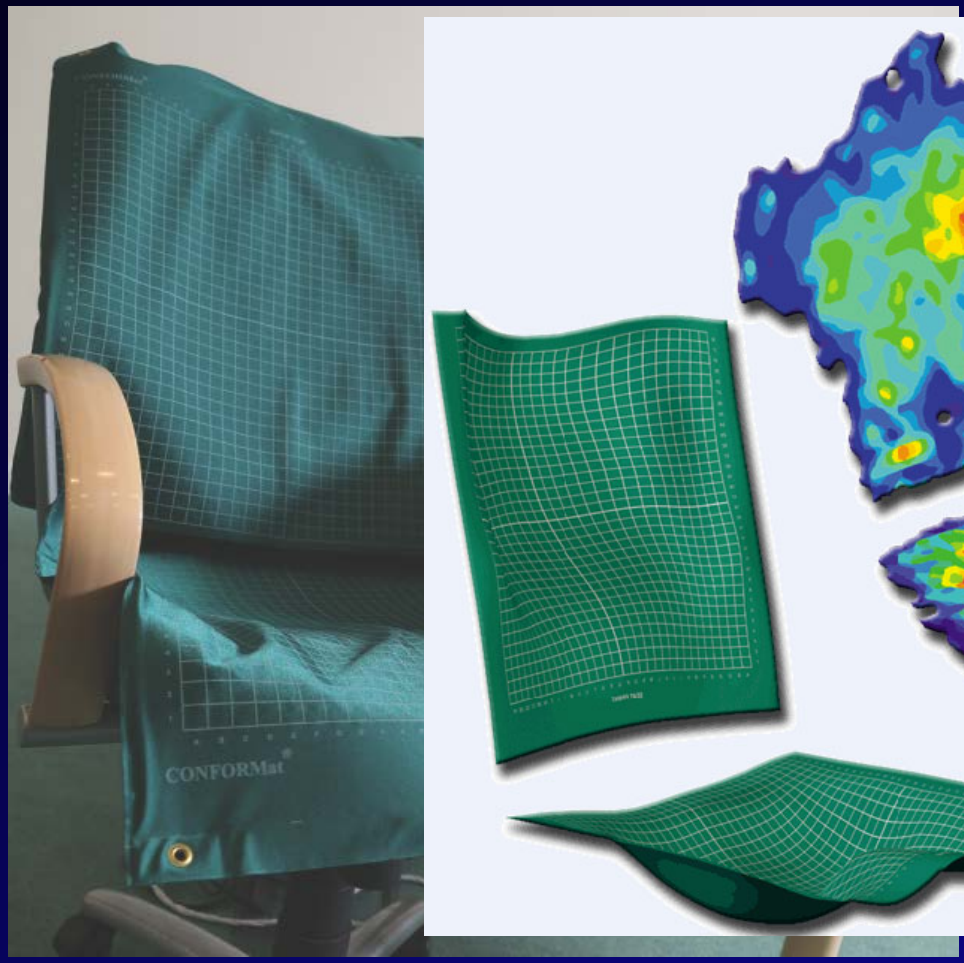
Pressure Mapping Systems

- PPS Pressure mapping systems
- Tekscan Pressure mapping systems
- BodiTrak Pressure mapping systems
- Xsensor Technology Pressure mapping systems

Pressure Mapping

- Used to identify areas of high pressure between the patient and the surface they are positioned on.
  - Sitting
  - Lying
- Specific protocols for each product.
- Some systems can measure shear forces

Pressure Mapping

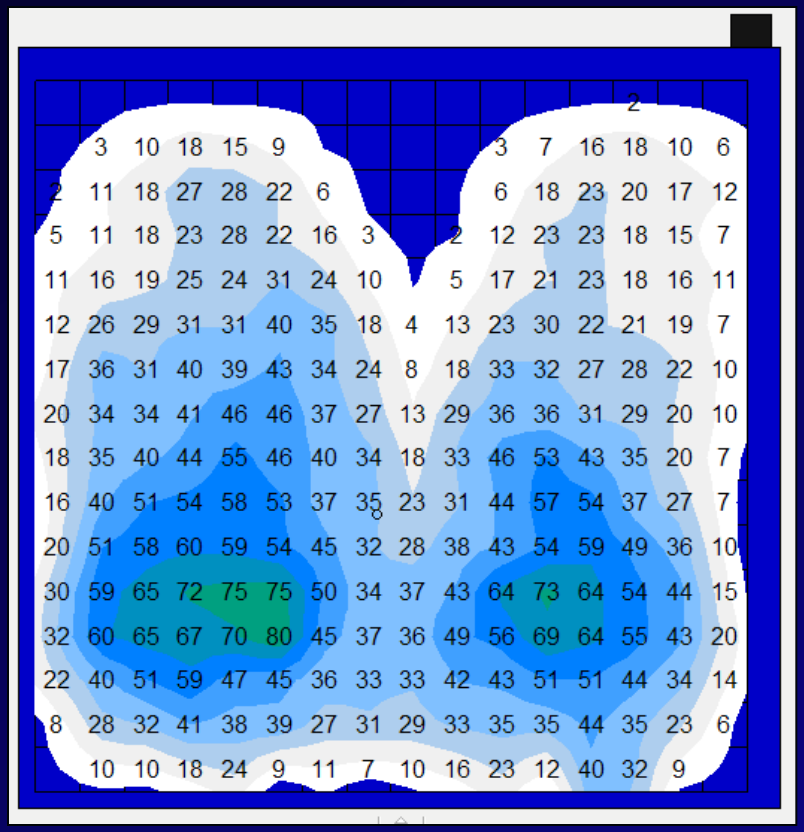


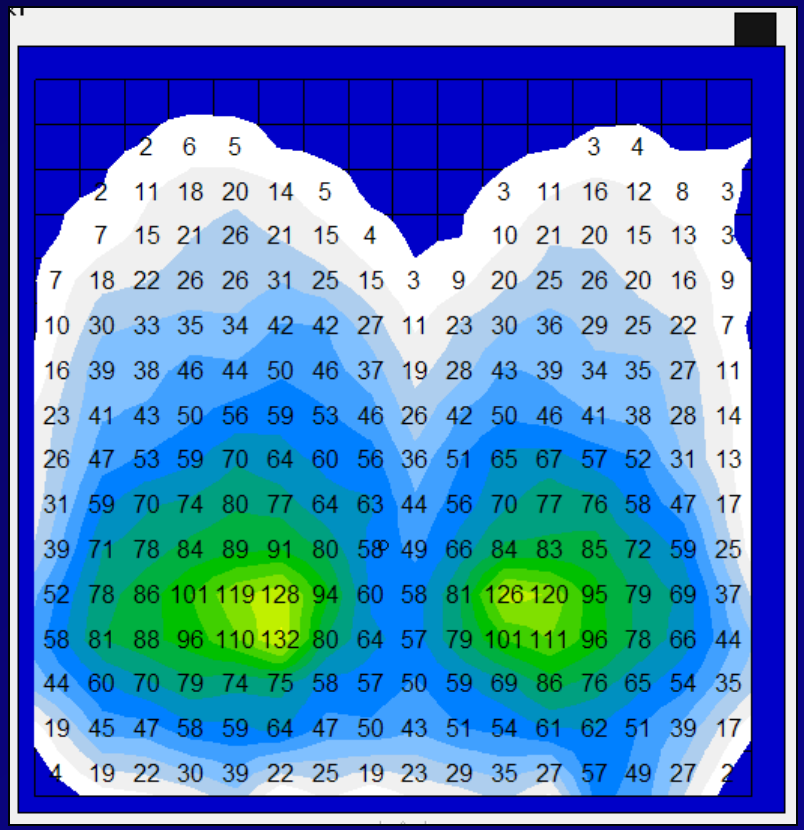
How long to wait

- Let the patient settle into the cushion
- Research indicates 6-8 minutes is a good practical time (Stinson 2002)
- Be consistent so you can make valid comparisons
- You need to be observant as it depends on the solution you choose, i.e. air vs. foam
- Some advocate up to 45 minutes. While not practical, you could use remote scanning to confirm a solution's effectiveness over time.

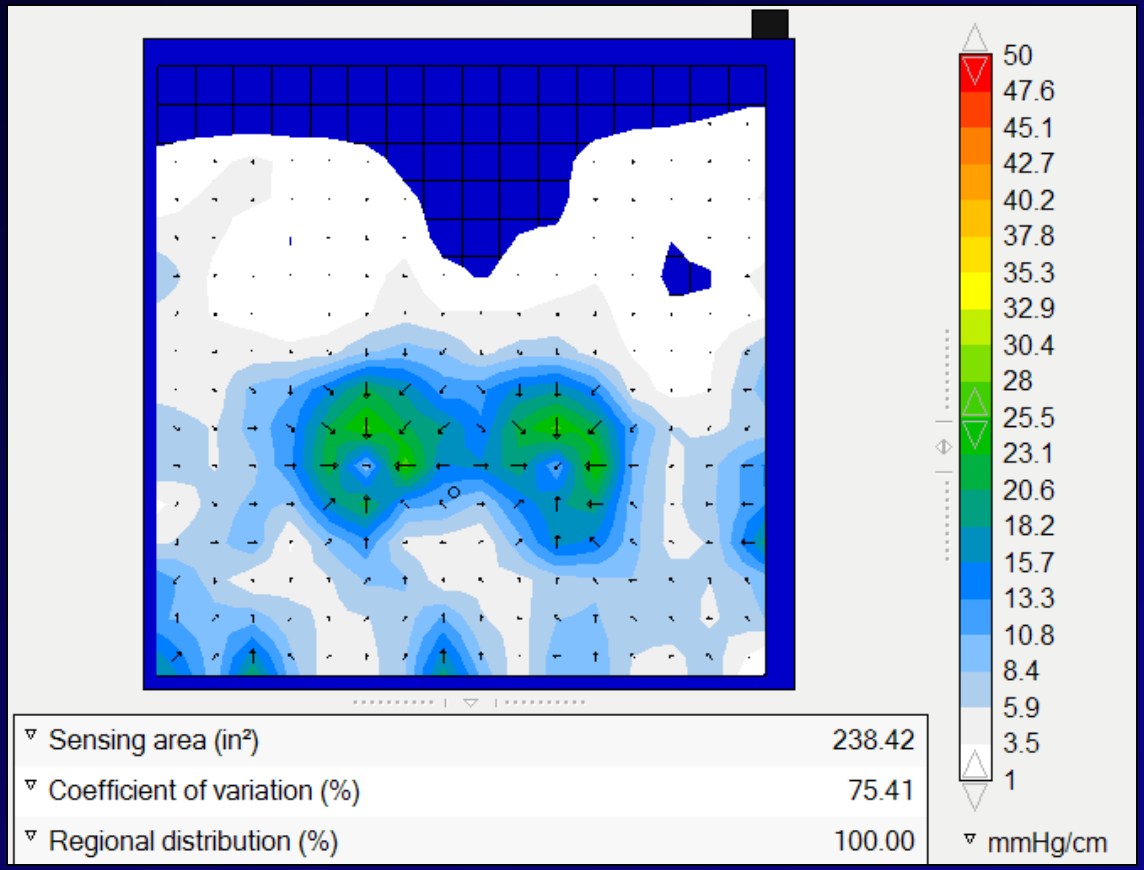
How long to wait

Foam cushion initial sitting	Foam cushion after several minutes



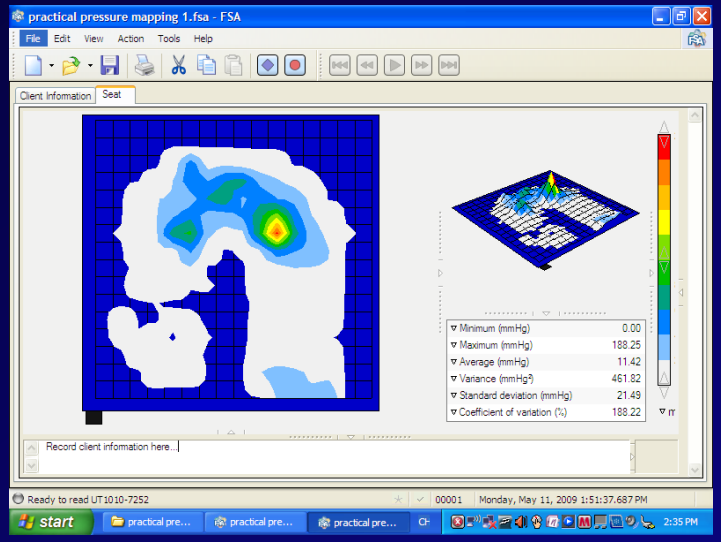


Pressure Gradient



- Gradient is the change in pressures per cm or inch
- In other words, how close the high pressures are to the low pressures
- Objective is to try to get the lowest possible (i.e. gentlest) gradient

Learn About the Patient



- Gather any background information you deem pertinent
- Record in the client information tab
  - Don't rewrite the patient file
  - But do include the most pertinent information on what is relevant to what you are doing:
    - Learn about their lifestyle and goals
    - Lifestyle can trump good seating
    - Equipment and cushions used for future reference

Six Steps to Completing a Good Pressure Mapping Evaluation

1. Introduce pressure mapping to the client
2. *Capture how they are currently doing*
3. *Demonstrate the client's challenges*
4. *Document usual/least costly solutions*
5. *Provide as necessary an appropriate alternative*
6. Communicate Findings effectively

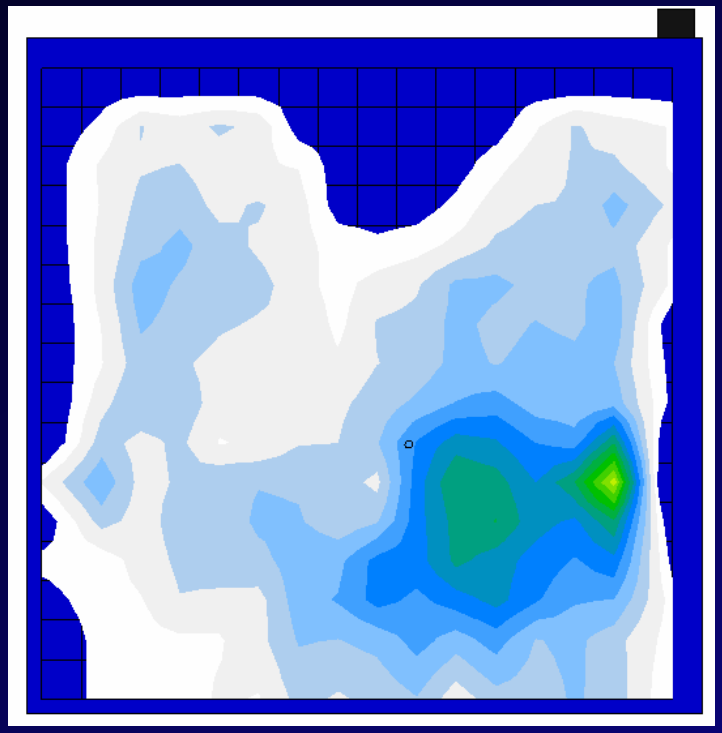
1) Introduce Pressure Mapping

- Explain the process
  - *To remove any apprehensions*
  - *Involve client and/or caregivers in the process*
  - *Allow them to interact with the technology*
    - They won't be able to while you do the assessment or they will confuse your work
    - *Make sure you use your hands to limit hammocking*

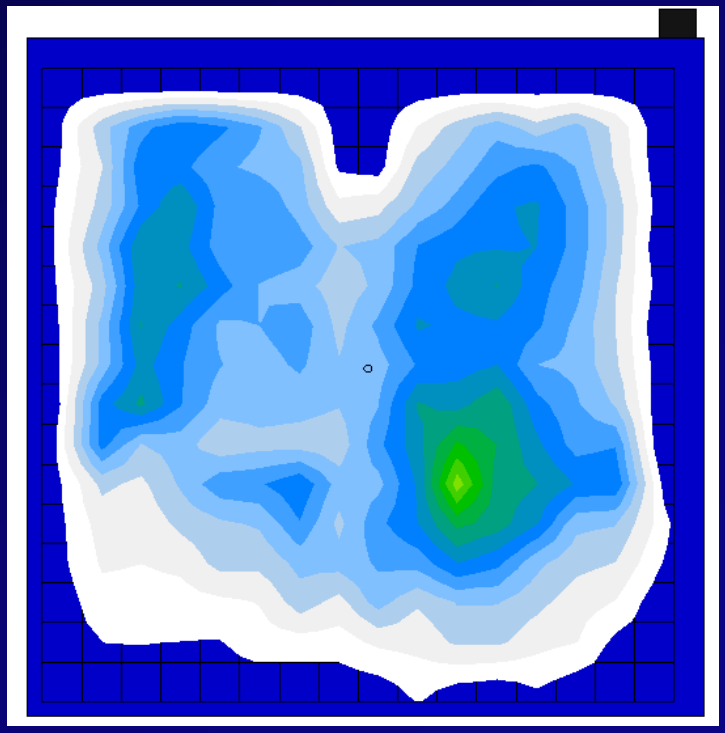
1) Introduce Pressure Mapping (Cont'd.)

- Place FSA mat:
  - As close to the skin as possible
  - On top of cushion patient normally sits on
  - With consistent orientation (so there is no confusion later)
  - Square on the seat
- Confirm with your hands that the sensing mat is not *hammocked*
- Make sure the client is in a " normal" or neutral position you can replicate with other surfaces

1) Introduce Pressure Mapping (Cont'd.)



FSA mat placed too far right and back, so missing information

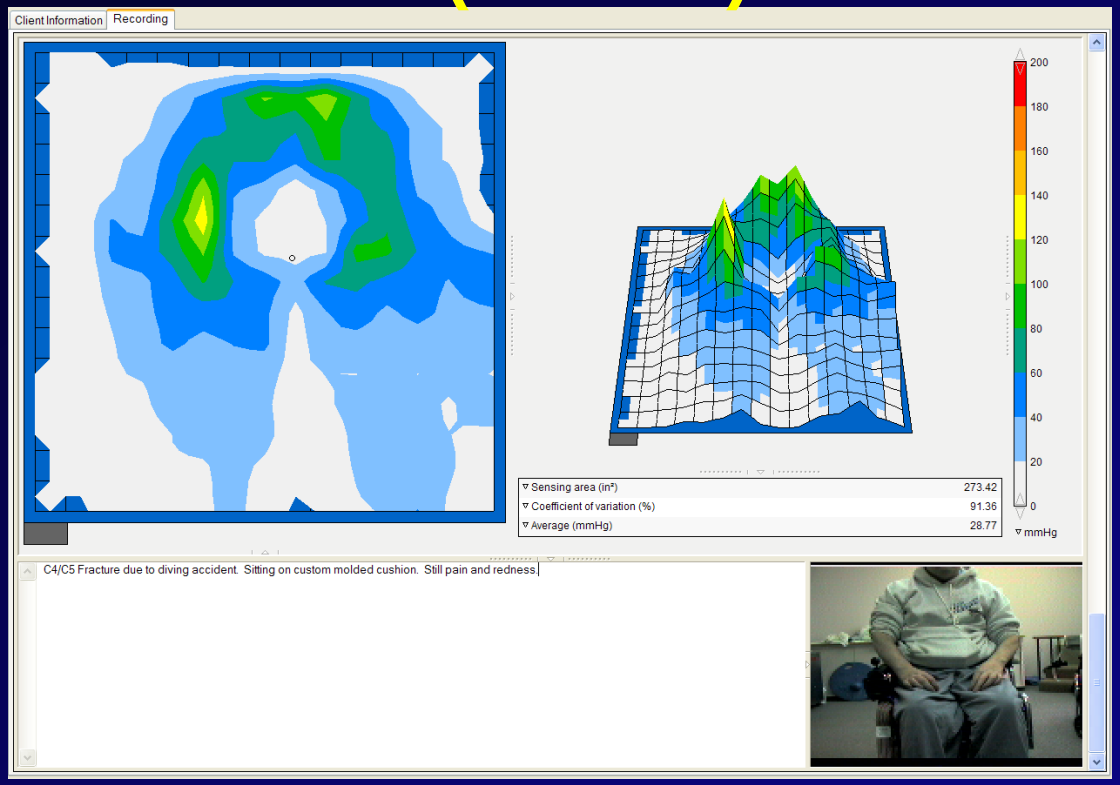


Well placed FSA pressure mat

2) Capture Client in Their Existing Seating (Cont'd.)

- Now that they have sat for a while in their existing cushion
- Scan, store and describe
  - Keep your comments related to the specific scan stored
  - General information should be in client information tab
  - Confirm what you see with your hands! Don't trust all you see on the screen. Confirm it!
  - Make notes with the thought in mind that you need to understand them 3-6 months down the road
  - Make sure you turn the client away from the screen so they can no longer interact with the pressure mapping system.
- This will help answer the question: Why do we need to make changes or spend money?

2) Capture Client in Their Existing Seating (Cont'd.)



- 45 year old SCI client – 25 year post injury C5 Quadriplegia
- Long standing history of right side Stage I ulcer (has been worse)
- Now problems with left side Stage I ulcer and NOT problems on right side
- Cannot stay up longer than 4 hours

2) Capture Client in Their Existing Seating (Cont'd.)

- Capture current complaint:
  - Unable to be up for longer than 4 hours due to redness in both Ischial Tuberosities, with left being the worst
  - Secondary is concern over the tail bone pressure which occurs with current position and/or recline
- Goal of assessment/intervention: able to be up 6 hours min, but preferably 8 hours each day.

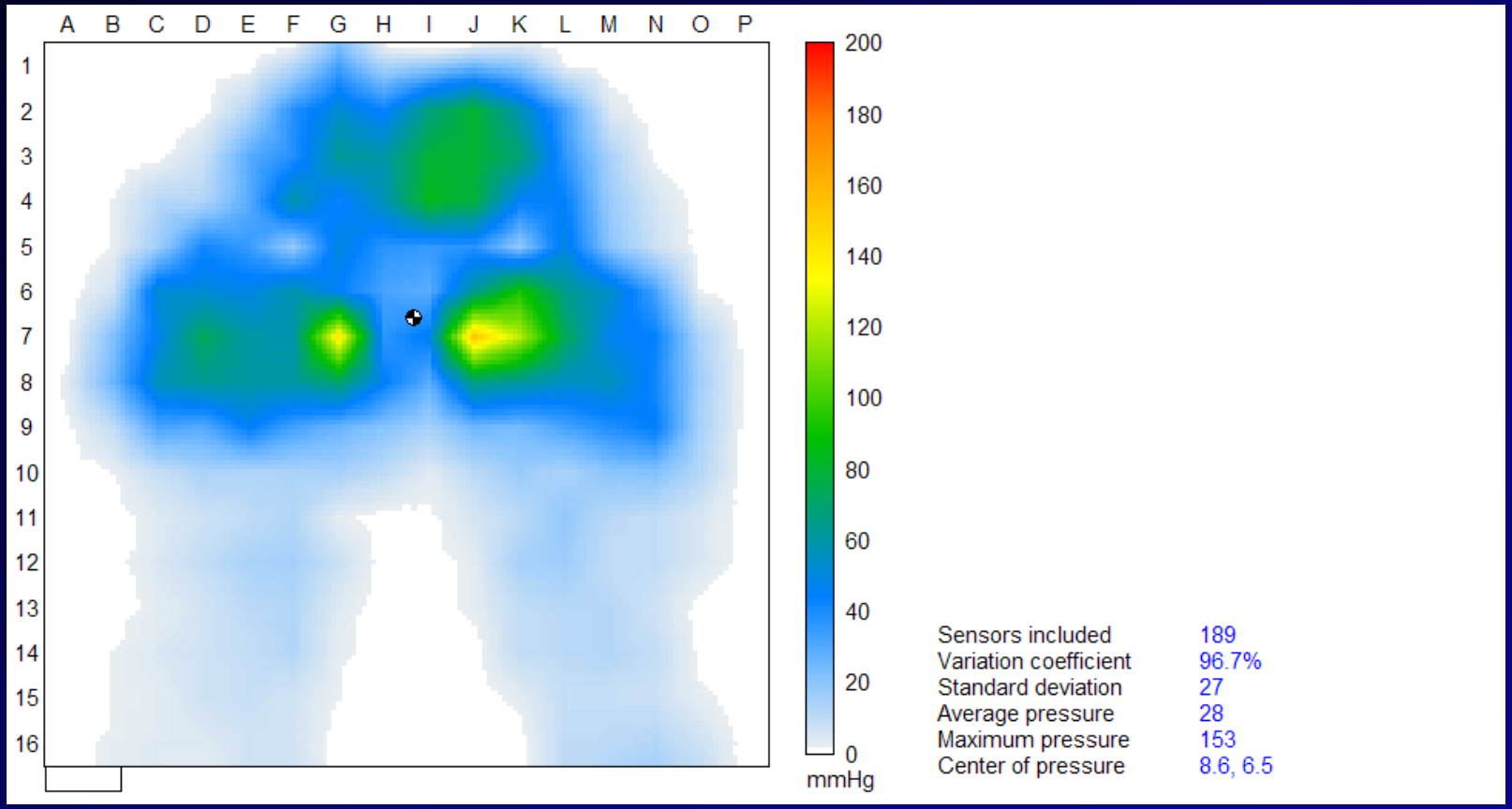
3) Demonstrate the Client's Challenges (Cont'd.)

- If possible have the client sit upright on a firmer surface like a mat table or a foam cushion
- Scan, store and describe where the boney prominences are
- Confirming with hands and noting coordinates on screen
- This will help answer the questions:
  - What is the client's boney architecture like?
  - Is it all there? Flexible? How rotated is the pelvis, etc.?
  - Why won't a simple solution be sufficient?

4) Document the Most Commonly Used/Least Costly Solutions(Cont'd.)

- You can use VIEW/COMPARISON from the drop down menu to compare your solutions
- Scan, Store and describe what you did
- This will help answer the questions of:
  - How well did the usual solution perform?
  - How well did the least / most costly solution perform for your client?

4) Document the Most Commonly Used/Least Costly Solutions(Cont'd.)

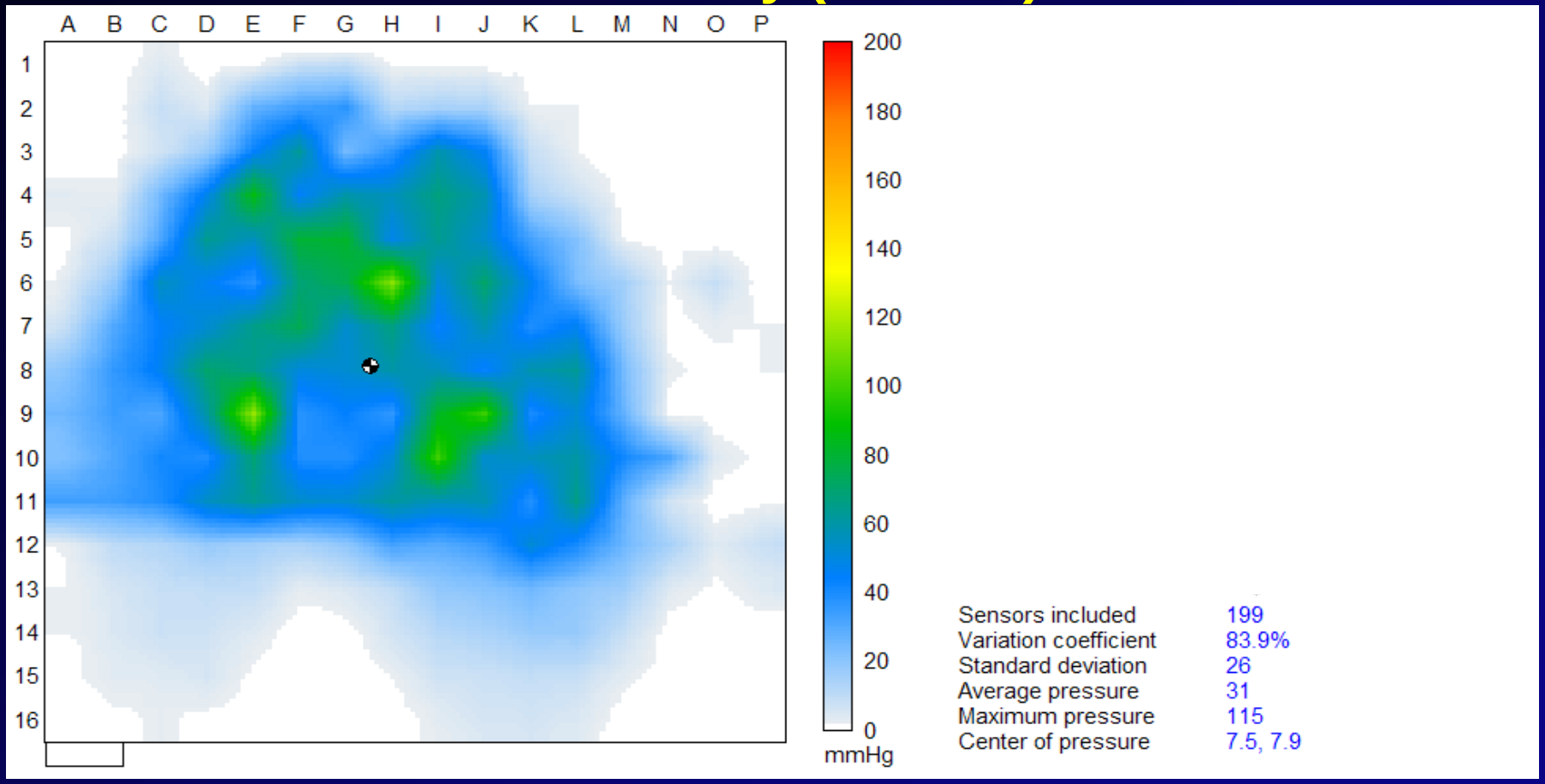


<u>The Usual Foam Cushion Solution</u>: Pressures still unacceptably high, and highly focused

5) Provide an Alternative Solution if Necessary

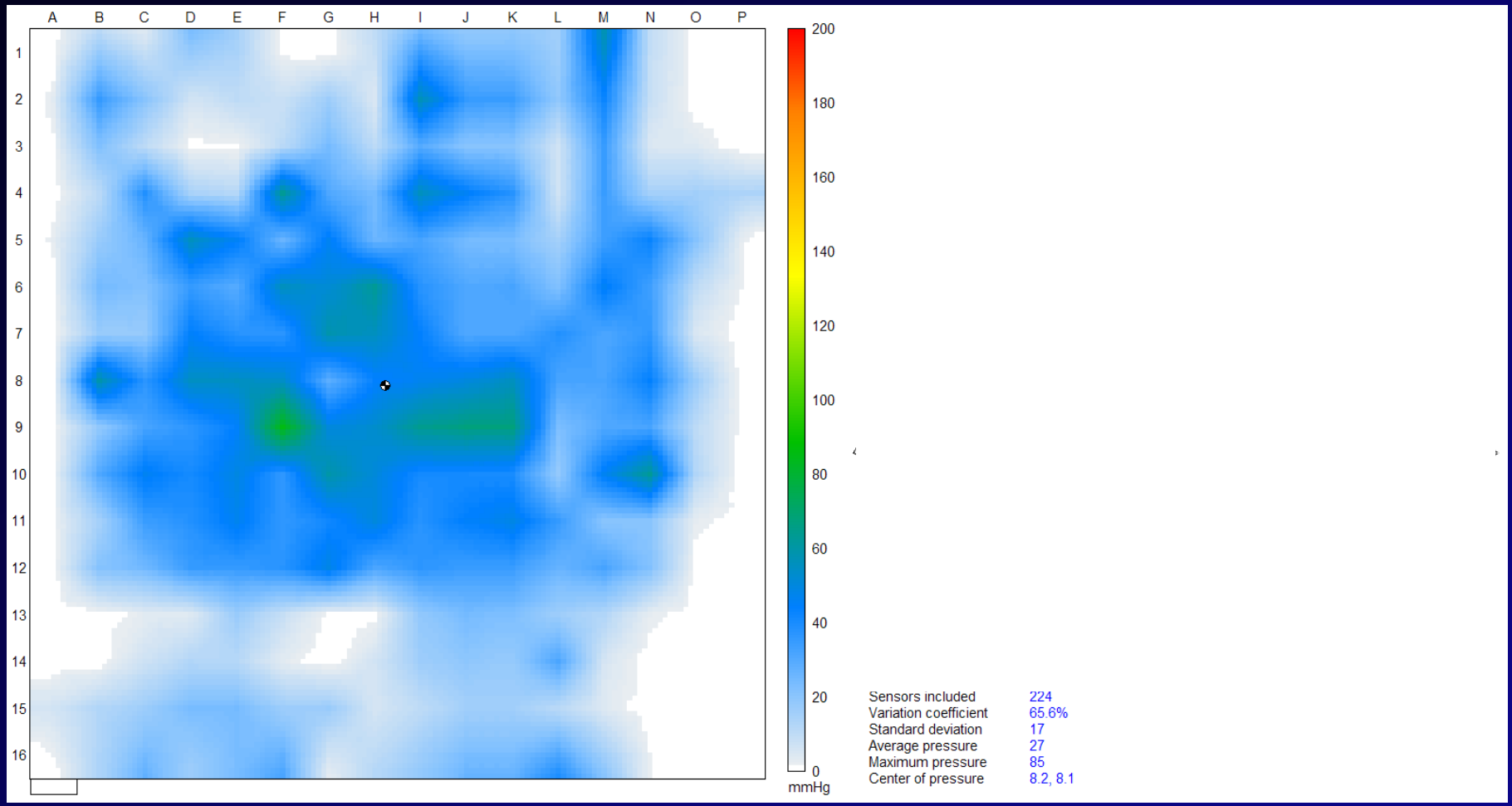
- If you're not satisfied with the "usual" solution try another
- Validate or challenge
- Again this may take recording a number of scans
- Remember to describe what you did as you scan and store
- This will help answer the question of why we are recommending a solution different than the least costly or "usual"?

5) Provide an Alternative Solution if Necessary (Cont'd.)



Alternate Solution: 8x9 Air insert in foam. Good pressure distribution not as good though as the full air cushion: up only 4 hours

5) Provide an Alternative Solution if Necessary (Cont'd.)

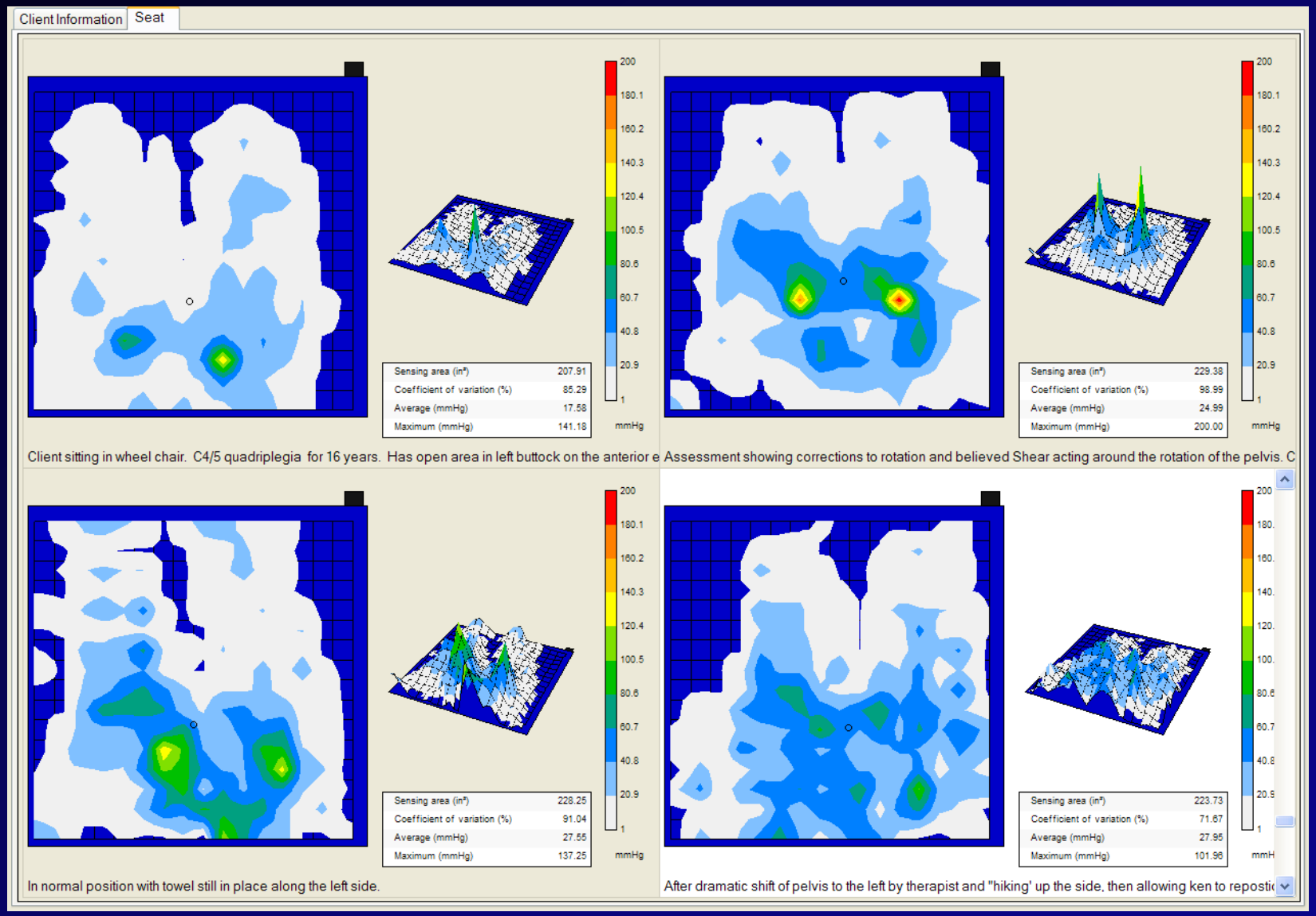


Proposed solution: On a properly adjusted air cushion. F9 is right IT: Good pressure distribution. Up 6 hours am + 4 hours evening. Meeting goal.

6) Develop a Simple Report

- Use comparison view to choose and select the frames that tell the story by selecting the frames you want:
  - Use selected frames for exporting, cutting or printing frames from your FSA file
  - The check mark in the status bar indicates the frame is selected
  - Print off the report
  - Or copy and paste it into a new or existing Word document you use

6) Develop a Simple Report (Cont'd.)



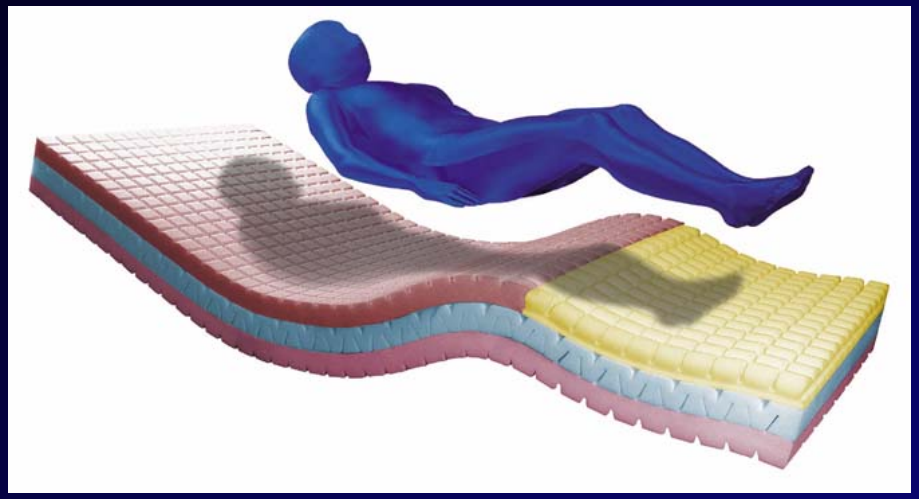
Pressure Redistribution

- Different systems for pressure redistribution
  - foam
  - gel
  - air
  - air fluidized

Pressure Redistribution

Bedding

Foam



Air

Gel

Air fluidized

Pressure Redistribution

Seating

Foam

Air

Gel

Air fluidized

NONE FOR CHAIRS

GROUP 1 SUPPORT SURFACES

- Pressure overlay, foam, air, water and gel pressure mattresses
- Covered if patient meets following criteria:

1) Completely immobile (cannot move w/o assistance) or
2) Limited mobility PLUS numbers 4-7 or
3) Any stage pressure ulcer on trunk or pelvis PLUS 4-7 or
4) Impaired nutritional status
5) Fecal or urinary incontinence
6) Altered sensory perception
7) Compromised circulatory status

GROUP II SUPPORT SURFACES

- Powered, advanced pressure reducing mattresses and overlays. Low air loss, microclimate management, air fluidized therapy
- Covered if patient meets following criteria:
  1) Multiple stage II ulcers on trunk or pelvis AND
  2) Pt has been on comprehensive PU treatment program for past month including Group I surface and ulcers are same or worsened or
  3) Large or multiple Stage III or IV PU's on trunk or pelvis OR
  4) Recent myocutaneous flap or skin graft for PU on trunk or pelvis (60 d) AND
  5) Pt has been on a group II or III surface immediately prior to discharge from hospital or SNF (within 30 days)

AVAILABLE PROTOCOLS

- **AHCPR** (Agency for Healthcare Policy and Research. Now known as **AHRQ** (Agency for Healthcare Research and Quality).
- AHCPR Clinical Practice Guideline #3: Pressure Ulcers in Adults: Prediction and Prevention. (AHCPR #92-0047: May 1992)
- AHCPR Clinical Practice Guideline #15: Treatment of pressure Ulcers. (AHCPR #95-0652, Dec 1994).
- **WOCN** Guideline for Prevention and Management of Pressure Ulcers, 2003

  (www.ahrq.gov/news/pcubcat/c_clin.htm#clin014)

  (www.wocn.org)

Craig Hospital

Background

- Craig Hospital, Inpatient Spinal Cord Injury (SCI) Rehabilitation Program (Denver, Colorado)
  - Since 1974, recognized as a **Model Spinal Cord Injury System** by the *National Institute on Disability and Rehabilitation Research.*
  - The Model System programs promote research, service provisions, and exemplary health care to meet needs of individuals with spinal cord injuries.
  - One of 14 facilities with SCI Model Systems designation.

“Skin, skin, skin…”

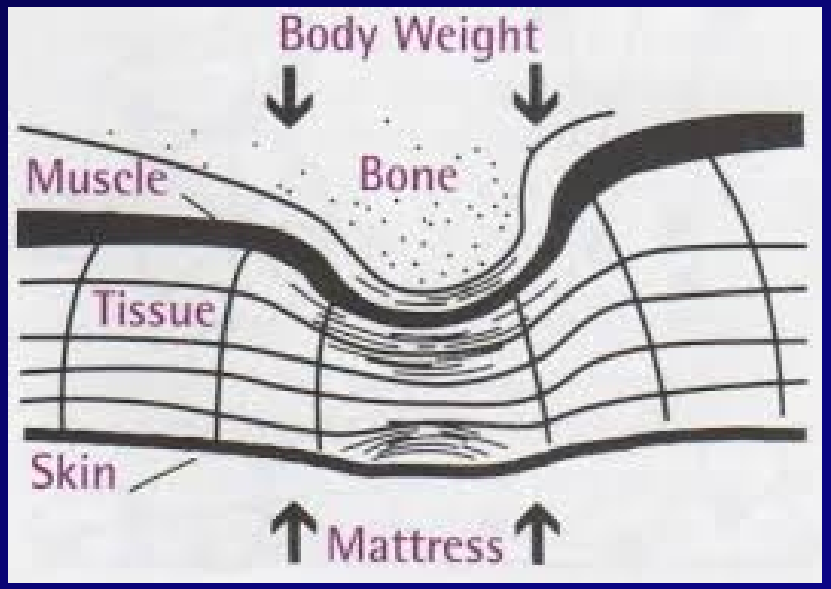
- SCI program at Craig Hospital
  - **Biggest concern** for patients transferred from acute care hospitals **are skin breakdown and Pressure ulcers (PUs).**
  - PUs have a significant impact on the duration and effectiveness of rehab.
    - Patients with PUs are placed on bedrest with an individualized pressure relief positioning program which **makes it important for them to participate fully** & receive the maximum benefit from a rehab program

Take home message:

- If the patient cannot actively reposition their own body in a chair (or sense the need to reposition or verbalize the need to reposition), **they should not be placed in a chair** unless it is a speciality chair (e.g., tilt-in-space with appropriate pressure distribution surface) that allows for **pressure relief every 15-30 minutes**

Single most important factor…

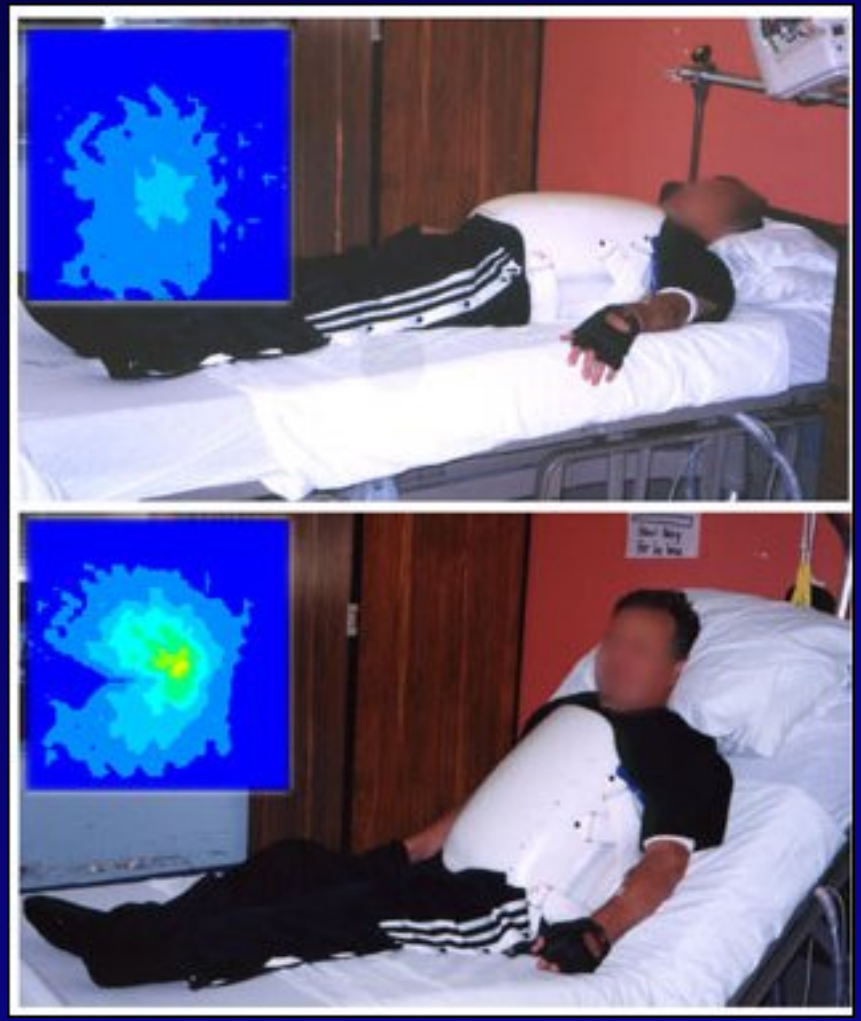
- **Bony prominences**
- Internal pressure is 3-5x greater
- By the time PUs are evident at the skin, the ulcer has worked its way completely **from bone to skin.**



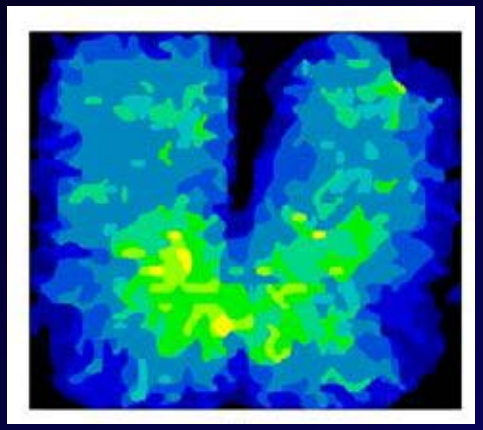
Pressure maps

- Supine in bed shows more evenly distributed pressure

- With HOB elevated >30^{o}, ↑Pressure at sacrum

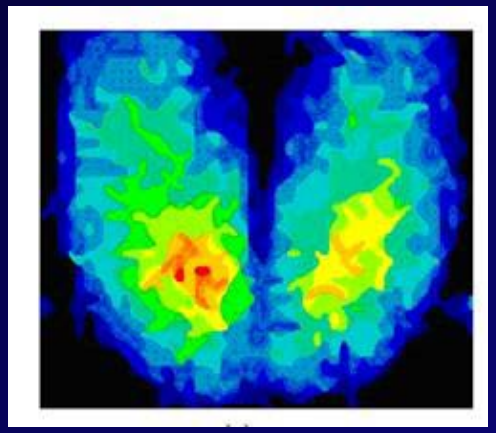


Pressure maps
Sitting upright in a chair



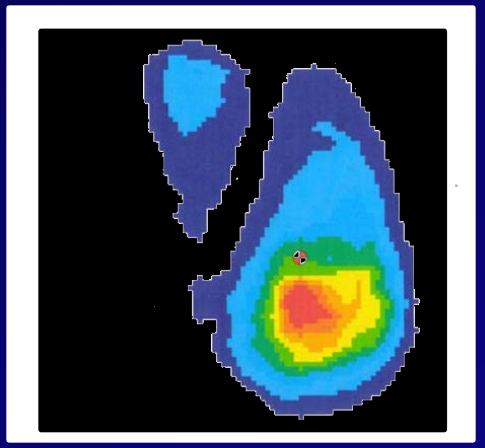
More evenly distributed pressure:

Appropriate cushion & good sitting posture



↑ Pressure at ischium:

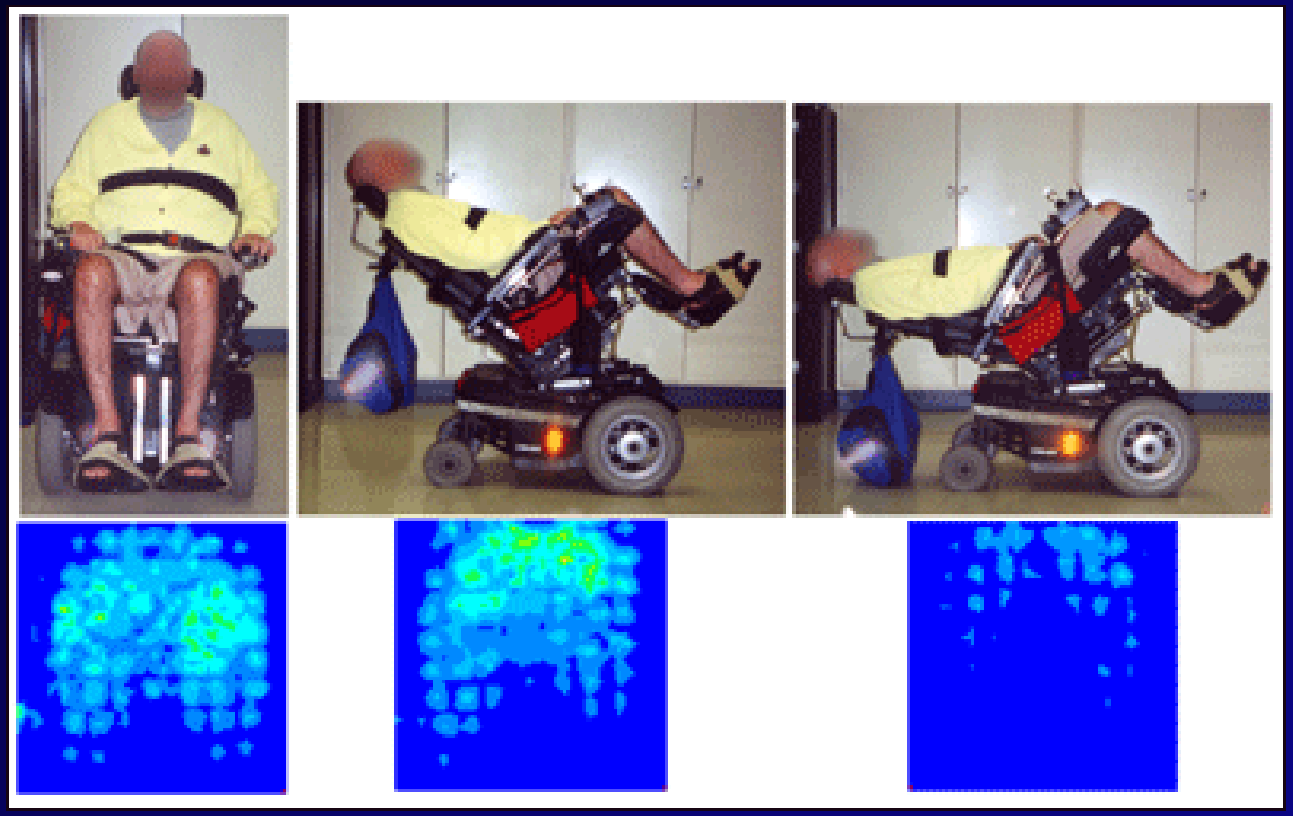
Hard surface / Inappropriate cushion
Knees above hips



Asymetrical pressure:

Poor posture

Pressure maps



Sitting upright

45 degree tilt

45 degree tilt with recline

Individuals with spinal cord injuries are at additional risk!

- In 2002, Thorfinn et al demonstrated that seating pressures were significantly higher in individuals with SCI compared with controls.

But Why?

- Patients with SCI have:
  - ↓ Vascular response to loading
  - ↓ Muscular tone
  - Muscular atrophy
  - ↓ Biofeedback systems

- Leading to:
  - Tissue hypoxia, ischemia, vascular leakage, tissue acidification, compensatory angiogenesis, thrombosis, and hyperemia

Prevention

- Recognize risk factors
- Formalize risk assessment
  - Braden scale
- Communicate risk status
- Implement appropriate prevention strategies
  - Avoid prolonged positional immobilization
  - Initiate pressure relieving interventions as patient's condition allows
    - *Refer to Pressure Ulcer Minimization, Prevention and Identification Protocol,* UNMH
- Evaluate outcomes

The Majority of PUs are preventable!

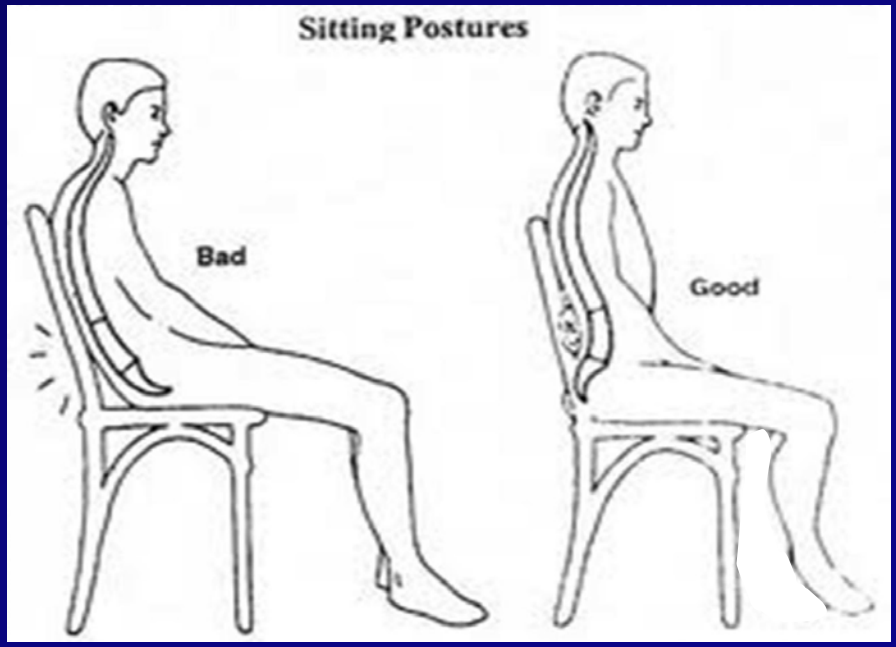
Prevention

- How much pressure relief is sufficient?
  - Only complete pressure relief by offloading bony prominences can prevent tissue ischemia
- For how long?
  - Supine in bed: Pressure relief every two hours
  - Sitting (in bed w/HOB >30° or in chair):
    - Current studies in the ass see I patient population recommend…
      - Complete pressure relief every 15-30 minutes for 2 minute periods
    - For other patient populations, no longer than one hour of sitting without pressure relief is recommended

Proper sitting posture

- Improper posture sitting in a chair can contribute to pressure ulcers.
  - Slouching or leaning
  - ↑Posterior pelvic tilt, ↑ recline
  - Knees higher or lower than hips
  - ↓Surface area under the thighs

- *What is the **proper positioning** for patients sitting in a chair?*
  - "Plumb line" posture
  - Anterior pelvic tilt
  - Knees & hips level
  - ↑Surface area under the thighs



The Broda Chair

- Pressure distribution surface from head to toe
- Separate tilt and recline functions for individualized positioning
- Adjustable foot plates and padding for proper sitting posture
- Removal arm rests facilitate transfers in and out of chair

SCI Trauma Centers

- Study comparing SCI trauma centers versus non-SCI trauma centers:
  - **50% shorter average LOS in SCI trauma centers**
  - **3x incidence of PUs in non-SCI trauma centers**

- *How are the SCI trauma centers different?*
  - Follow strict guidelines for pressure ultra prevention
  - Use pressure relieving equipment when sitting (e.g., tilt-in-space chairs with pressure redistribution surfaces)
  - Provide pressure relief every 15 minutes in sitting
  - Implement progressive sitting programs

What can we do better?

- The acute period makes an enormous difference
- A **multi-disciplinary approach** is required:
  - Adequate nutrition
  - Standardizing nursing care
  - Wound care protocols
  - Pressure-relieving devices & strategies that provide total pressure relief at frequent intervals
  - Education of patients and families

What can we do better?

- Use tilt-in-space chair
  - Addresses both pulmonary function & prevention of pressure ulcers
  - May sit for longer periods of time with pressure relief
  - Tilt to provide pressure relief every 15-30 minutes for two minute periods
- Use chair mode in bed
  - Places patient in upright seated position
  - Minimize time in seated position (30-60 minutes) at one time
- If using cardiac care…
  - Position patient and proper upright position
  - Minimize time in see the position (30-60 minutes) at one time

Perform skin checks regularly (at least once per shift and after sitting)

What can we do better?

- Shearing
  - During lateral transfers…
    - Have 4-8 people assist to use appropriate lifting equipment
    - **Lift rather than drag**
      - Including transfers or placement of equipment of diagnostic testing
  - During positioning from supine → sit…
    1. Have one-two staff members raise patient's upper body w/draw sheet into upright position…
    2. Then, have additional staff member raise back of chair/bed into upright position
    3. Reverse this method upon return to supine in chair/bed

Sitting Guidelines for SCI patient populations

- Initiate progressive sitting program for patients w/SCI
  - Pre-sitting Guideline
    - Patient to sit upright in bed for 15 minutes BID
    - Inspect skin after each sitting
    - Proceed to sitting in chair if skin redness resolves <15 minutes
  - Sitting Progression
    - Day 1-3: patient sits 15 minute BID
    - Day 4-6: ↑ sitting to 30 minute b.i.d. with **pressure relief every 15 min**
    - Day 7-9: ↑ sitting 245 min b.i.d.
    - Day 10-12: ↑ sitting to one hour b.i.d.
    - Day 13-15: ↑ sitting to 1 1/2 hour b.i.d.
    - Day 16-18: ↑ sitting to 2 hours b.i.d.
    - Day 19: Gradually ↑ sitting times as tolerated

Sitting Guidelines for non-SCI patient populations

- Initiate progressive sitting program
  - Sitting progression
    - *Progress sitting time in 30 minute increments*
    - ***Inspect skin after each sitting***

    1st time in chair : Patient sits one hour, with **pressure relief every 30 mins.**

    2nd time and chair: ↑ sitting to 1 hour and 30 minutes

    3rd time in chair: ↑ sitting to 2 hours

    4th time in chair: ↑ sitting to 2 hours and 30 minutes

    Gradually ↑ sitting times as tolerated