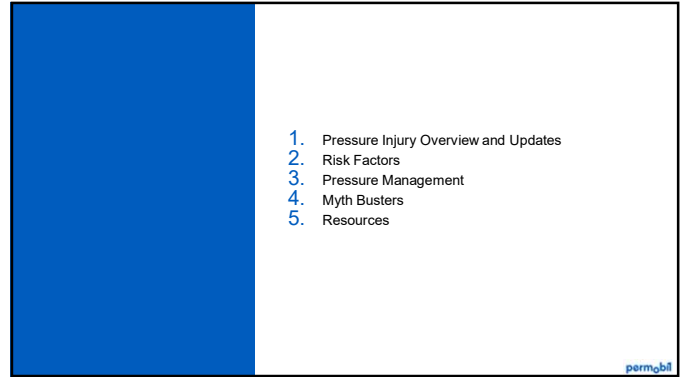




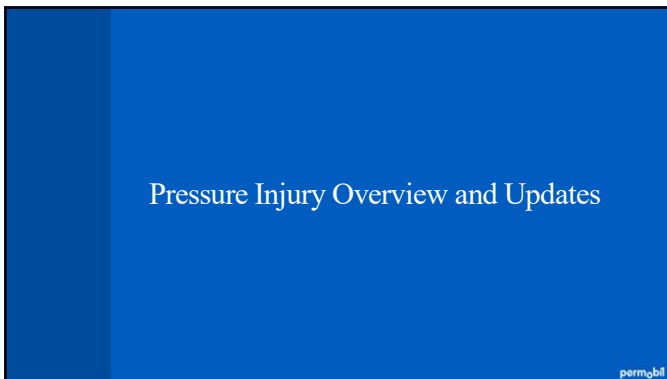
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Wheeled Mobility and Pressure Injuries:
Equipment considerations & strategies for the high-risk client



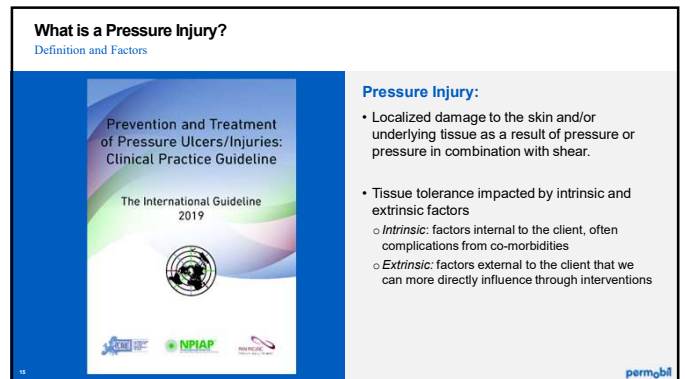
1. Pressure Injury Overview and Updates
2. Risk Factors
3. Pressure Management
4. Myth Busters
5. Resources

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Pressure Injury Overview and Updates

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What is a Pressure Injury?
Definition and Factors

Pressure Injury:

- Localized damage to the skin and/or underlying tissue as a result of pressure or pressure in combination with shear.
- Tissue tolerance impacted by intrinsic and extrinsic factors
 - *Intrinsic:* factors internal to the client, often complications from co-morbidities
 - *Extrinsic:* factors external to the client that we can more directly influence through interventions

Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline
The International Guideline 2019

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Stages of Pressure Injuries: www.NPIAP.com

Lightly pigmented skin	Darkly pigmented skin	
		<p>STAGE 1: Non-blanchable erythema of intact skin</p> <p>-Intact skin with a localized area of non-blanchable erythema, which may appear differently in darkly pigmented skin</p>
		<p>STAGE 2: Partial-thickness skin loss with exposed dermis</p> <p>-The wound bed is viable, pink or red, moist, and may also present as an intact or ruptured serum-filled blister.</p>
		<p>STAGE 3: Full-thickness skin loss</p> <p>-adipose (fat) is visible in the ulcer, and granulation tissue and epibole (rolled wound edges) are often present.</p> <p>-Slough and/or eschar may be visible.</p> <p>-Undermining and tunneling may occur. Fascia, muscle, tendon, ligament, cartilage and/or bone are not exposed.</p>

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Stages of Pressure Injuries : www.NPIAP.com

Lightly pigmented skin	Darkly pigmented skin	
		<p>STAGE 4: Full-thickness loss of skin and tissue</p> <p>-Full-thickness skin and tissue loss with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage, or bone in the ulcer.</p> <p>-Epibole, undermining and/or tunneling often occur</p> <p>-If slough or eschar obscures the extent of tissue loss this is an <i>Unstageable</i> pressure injury</p>
		<p>Unstageable: Obscured Full-thickness skin and tissue loss</p> <p>-Full thickness skin and tissue loss in which the extent of tissue damage within the ulcer cannot be confirmed because it is obscured by slough or eschar. If slough or eschar is removed, a Stage 3 or Stage 4 PI will be revealed.</p>
		<p>Deep Tissue Pressure Injury: Persistent non-blanchable deep red, maroon, or purple discoloration</p> <p>- Intact or non-intact skin with localized area of persistent non-blanchable deep red, maroon, purple discoloration or epidermal separation revealing a dark wound bed or blood-filled blister.</p> <p>-Pain and temperature change often precede skin color changes</p> <p>-this injury results from intense and/or prolonged pressure and shear forces at the bone-muscle interface</p>

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Risk Factors

Intrinsic

<p>Multiple co-morbidities</p> <ul style="list-style-type: none"> • Diabetes • History of PI • Vascular compromise • Obesity • Oxygenation deficits • Infection 	<p>Mobility/Sensory Deficits</p> <ul style="list-style-type: none"> • Limited mobility • Impaired sensation • Bedfast, chairfast • Pain in areas of body exposed to pressure 	<p>Psychosocial</p> <ul style="list-style-type: none"> • Age • Smoking • Medications • Malnutrition
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(NPIAP, 2019)

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Risk Factors

Extrinsic

Pressure	<ul style="list-style-type: none"> • Not changing positions often enough, surface/contact area/immersion, tight or wrinkled clothing, etc. 	
Shear	<ul style="list-style-type: none"> • Less pressure needed to cause skin breakdown when shearing forces are occurring • May not be visible on the skin's surface (deep) 	
Friction	<ul style="list-style-type: none"> • Not a primary cause of pressure injuries – but rather surface injuries • Can exacerbate existing skin breakdown – contributing factor • Can lead to shear stress and deeper issues 	
Skin Microclimate	<ul style="list-style-type: none"> • Microclimate (Heat and humidity) • Incontinence • Wound drainage 	

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Medical Device Related Pressure Injury (MDRPI)

Definition: Medical device related pressure injuries result from the use of devices designed and applied for diagnostic or therapeutic purposes. The resultant pressure injury generally conforms to the pattern or shape of the device. The injury should be staged using the staging system (NPIAP, 2016)

Is Not a stage; Is a classification

(NPIAP, 2019) permobil

Primary Risk Factor: Impaired Mobility

The greatest risk for pressure ulcers is in people with impaired mobility or sensation who are generally bed- or wheelchair-bound

(Menck, J. S., & Phillips, T. J., 2019)

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Pressure Injury Risk Factors in Persons with Mobility-Related Impairment

Groups with the highest prevalence

(Sprigle, S. et al., 2020)

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Pressure Injury Risk Factors in Persons with Mobility-Related Impairment

Table 3. PRESSURE ULCER GROUP LOCATIONS AND STAGES


Location	%
Buttock	26
Sacrum	45
Back/buttock/hip—contiguous	11
Heels	16
Other	2
Stage	%
Stage 2	35
Stage 3	25
Stage 4	26
Unstageable	15

(Sprigle, S. et al., 2020)

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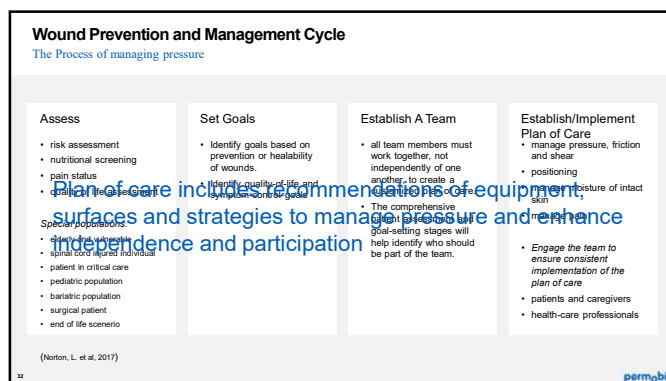
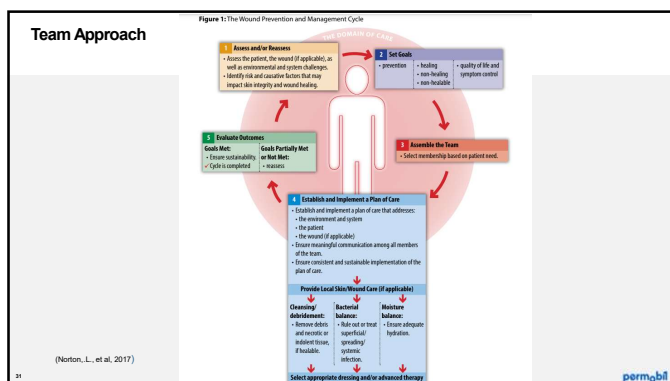
Jennifer
Risk Factors and Pressure Injury Development

- Limited mobility
- Impaired (absent) sensation
- Wheelchair dependent
- Nutrition
- Smoking
- Substance use
- Postural deformity
- Limited pressure redistributing cushion qualities



Pressure Management

1. Process
2. Theories of Pressure Redistribution
3. Strategies/Interventions for Pressure Management
4. Selection Considerations for Support Surfaces



Support Surfaces

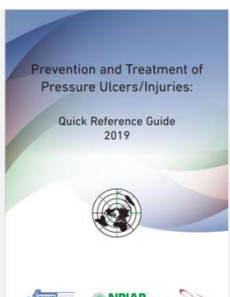
What is a Support Surface?

Definition: Specialized devices for pressure redistribution designed for management of tissue loads, microclimate, and/or other therapeutic functions.

Types: specialty seat cushions, back supports, mattresses

Goals:

- Pressure management
- Stability
- Positioning
- Comfort/pain management
- Safety
- Functional Activities

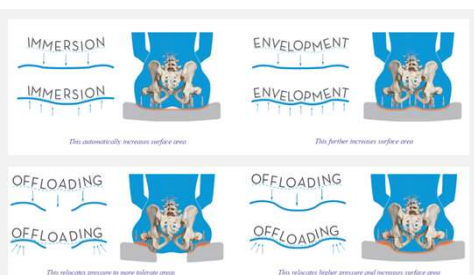


Prevention and Treatment of Pressure Ulcers/Injuries: Quick Reference Guide 2019

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Pressure Management

Methods of Redistribution



IMMERSION
This automatically increases surface area

ENVELOPMENT
This further increases surface area

OFFLOADING
This relocates pressure to more tolerant areas

OFFLOADING
This relocates higher pressure and increases surface area

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Pressure Management

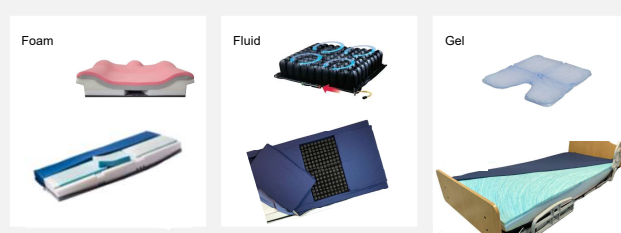
Methods of Redistribution- Bed Support Surfaces

- Active/Reactive**
 - A powered support surface, with the capability to change its load distribution properties, with or without applied load.
 - A powered or non-powered support surface with the capability to change its load distribution properties only in response to applied load.
- Low Air Loss**
 - A feature of a support surface that uses a flow of air to assist in managing the heat and humidity (microclimate) of the skin.
- Alternating Pressure**
 - A feature of a support surface that provides pressure redistribution via cyclic changes in loading and unloading as characterized by frequency, duration, amplitude, and rate of change parameters.
- Pulsation**
 - A feature of a support surface that provides repeating higher and lower pressures resulting in cyclic changes in stiffness of the surface, typically with shorter duration inflation/deflation, higher frequency and lower amplitude than alternating pressure

35 (NPIAP, 2019) permobil

Materials and Design Characteristics

Foam, fluids and gel



Foam

Fluid

Gel

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Strategies/Interventions to Manage Pressure

Weight Distribution <ul style="list-style-type: none"> Dynamic Functional <small>(Houghton et al., 2013)</small>	Wheelchair Configuration <ul style="list-style-type: none"> Angles tapered features (seat, legrest taper) ergo seat, incorporation of seating components <small>(Lange, Minkie, 2018)</small>	Seat Functions <ul style="list-style-type: none"> Tilt recline elevating leg rests Order of use and angles of use <small>(Dicianno et al., 2015)</small>	Standing <ul style="list-style-type: none"> Static vs dynamic. Frequency and duration and incorporation into daily routine <small>(Noijens et al., 2022)</small>
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Weight Redistribution

Active, dynamic, functional

Wheelchair configuration

"Fit the Wheelchair Like a Prosthetic"

Seat functions: Sequence-of-use training

Power or manual wheelchairs

↓ Tilt
 Legs
 Recline
 ↑

(The Consortium for Spinal Cord Medicine, 2014)
(Kruetz, 2017)

Standing

Static and Dynamic Standing

- Cardiovascular
- Respiratory
- Bowel and bladder function
- Bone health
- Range of motion, spasticity, contractures
- Pressure injury risk reduction
- Functional benefits
- Psychosocial benefits

Jennifer →

(Noojien et al. 2021)

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How to Choose A Support Surface

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Support Surfaces

NPIAP Summary

Support Surface Summary NPIAP, 2019

Important element in PI prevention and treatment because they can prevent damaging tissue deformation and provide an environment that enhances perfusion at the tissue level. **Surfaces alone neither prevent nor heal pressure injuries**

GPS 7.1: Select a support surface that meets the individual's need for pressure redistribution based on the following factors:

- Level of immobility and inactivity
- Need to influence microclimate control and shear reduction
- Size and weight of individual
- Number, severity and location of existing pressure injuries
- Risk for developing new pressure injuries

(NPIAP, 2019)

Standardized Testing of Products

HOW DO I CHOOSE A Wheelchair Cushion THAT IS RIGHT FOR ME?

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Potential Pressure Injury Risk Sites

Wheelchair and Bed

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Assessment of the Client

Things to Consider when choosing a support surface

<p>What level of skin/tissue protection is needed?</p> <ul style="list-style-type: none"> Consider cushion material science Consider other surfaces Consider Wheelchair set up Consider Seat Functions Consider other strategies <ul style="list-style-type: none"> Repositioning, nutrition, transfers 	<p>What level of positioning is needed?</p> <ul style="list-style-type: none"> Determine reducible vs. non reducible deformities Consider seating/positioning components Consider wheelchair/bed set up Consider seat functions Consider therapeutic interventions 	<p>What level of stability for function is needed?</p> <ul style="list-style-type: none"> Consider repositioning strategies Consider various activities <ul style="list-style-type: none"> Transfers Self propulsion Power seat function use ADLs & MRADLs
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Don't forget about dynamic movement in sitting and lying

How to Minimize Risks During Movement

2019 NPIAP CPG:

5.1 Reposition all individuals with or at risk of pressure injuries on an individualized schedule, unless contraindicated.

5.6 Reposition the individual to relieve or redistribute pressure using manual handling techniques and equipment that reduce friction and shear.

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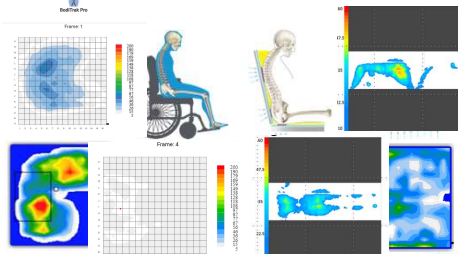
Objective data to support equipment recommendations

Pressure Mapping

Tips for Success

- ALWAYS take/use a baseline to compare interventions
- Map one intervention at a time
- Use to assist in proper w/c configuration/product selection
- Confirm optimal pressure redistribution with a specific intervention/product

"Use pressure mapping results in conjunction with clinical findings and the individual's preference to select appropriate support surfaces and to optimize the type and duration of position changes." (Houghton, 2013)



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Selecting Support Surfaces

Clinical Practice Guideline Recommendations

The OTC recommends the following for an at risk client:
Note: OTC is a copyrighted product published by the 2019 NPIAP Clinical Practice Guideline

Select a **support surface** that meets the individual's need for pressure redistribution based on the following factors:

- Level of immobility and inactivity
- Need to influence microclimate and shear reduction
- Size and weight of the individual
- Number, severity, and location of existing pressure injuries
- Risk for developing new pressure injuries

For individuals with a pressure injury, consider changing to a **clinically support surface** when the individual:

- Cannot be positioned off the existing pressure injury
- Has pressure injuries on two or more turning surfaces that limit repositioning options
- Has a pressure injury that fails to heal at the pressure injury debridement despite appropriate comprehensive care
- Is at high risk for additional pressure injury
- Has undergone flap or graft surgery
- Is incontinent
- "Bottoms out" on current support surface

Select a **seal and sitting system support surface** that meets the individual's need for pressure redistribution with consideration to:

- Effects of posture and deformity on pressure distribution
- Body size and configuration
- Mobility and lifestyle needs

For individuals with obesity, select a **support surface** with enhanced pressure redistribution, shear reduction and microclimate features. GRS-7.3

Use a pressure redistribution cushion for preventing pressure injuries in people at high risk who are seated in a chair/ wheelchair for prolonged periods, particularly if the individual is unable to perform pressure relieving maneuvers. 7.12

Use a bariatric pressure redistribution cushion designed for individuals with obesity on seated surfaces. 7.14

For individuals with or at risk for a pressure injury, consider using a pressure redistribution **support surface** during transit. GRS-7.15



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Pressure Injury Risk on Other Surfaces

Four images show a person sitting on different surfaces: a metal chair, a car seat, a wheelchair, and a white plastic chair. A fifth image shows a kayak on a grassy area.

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Trauma –vs- Pressure

Transfer Technique Re-Assessment Needed?

Two images show healthcare professionals assisting a patient with a wheelchair. One image shows a patient being transferred from a bed to a wheelchair, and the other shows a patient being transferred from a wheelchair to a bed.

Potential Causes

- Chronic poor technique for sliding board placement?
- Repeatedly hitting buttock tissues on rear wheel during MWC transfers?
- Frequent "popping" onto sitting surfaces at the end of a transfer
- Did trauma from an isolated fall cause the wound?

Potential Interventions

- Training for better techniques (client and caregiver)
- Power seat functions
- Parts management (ensuring ease of removal/replacement of postural supports to clear area for transfers)

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Myth Busters

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Myth #1: Patient with pressure injuries must stay in bed

NPIAP Recommendations

- **5.11:** promote seated out of bed in an appropriate chair or wheelchair for limited periods of time
- **5.12:** select a reclined seated position with the individual's legs elevated. If reclining is not appropriate or possible, ensure that the individual's feet are well-supported on the floor or on footrests
- **5.13:** tilt the seat to prevent the individual sliding forward in the wheelchair
- **5.14:** teach and encourage those who spend prolonged durations in a seated position to perform pressure relieving maneuvers

A person is shown sitting in a wheelchair with their legs elevated on a footrest.


NPIAP Good Practice Statement 5.16

"For individuals with an ischial or sacral pressure injury, evaluate the benefit of periods of bed rest in promoting healing versus the risk of new or worsening pressure injuries and the impact on lifestyle, physical and emotional health" (NPIAP, 2019)

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Myth #2: The cushion or surface can do it all

Wheelchair Seating is more than just a cushion...it's a system!



- 23 Clients with hemiplegia; assessing impact of back support shapes on asymmetrical sitting posture and pressure points
 - Degree of postural variation was smaller with clients provided pelvic and thoracic support
 - One-sided ischial asymmetrical pressure was significantly less after the movement (Uluta, A., et al 2020)
- Back support shape and seat-to-back angle both can impact pressure distribution and postural alignment (Uluta, A., et al 2020; Alkateeb, A., et al 2021)

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Myth #3: Pediatric/Bariatric patients "don't get pressure injuries"

Pediatrics and Pressure Injuries

- "Up to roughly 25% of patients in neonatal and pediatric ICUs may develop pressure ulcers, while incidence rates among noncritical hospitalized children have been reported to range from 0.33% to 6%" (Nesic, 2019)
- Medical devices are a leading cause of PIs in the younger pediatric population, accounting for 38.5% to 90% of pressure injuries (Caimore, B. et al, 2019)



Obesity and Pressure Injuries

- Morbidly obese inpatients had over three times the odds of developing a PI compared to healthy weight inpatients
- Morbidly obese inpatients who were also malnourished had eleven-fold greater odds of developing a PI compared to the morbidly obese well-nourished in weight inpatients (Ness, S. J., et al, 2018)
- For individuals with obesity, select a support surface with enhanced pressure redistribution, shear reduction and micro-climate features (NIPAP 2019)



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Myth #4: "A scar is not a risk factor for development of a new pressure injury"

Scar tissue is tough, which is the problem

Healthy tissue made up of collagen in striated, lined up fashion- allow for contraction and flexibility
Scar tissue- excessive collagen formation and poor structural formation- lack of flexibility

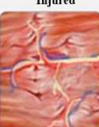
Mechanically stiffer scar tissue increases risk of DTI by generating stress concentrations within and around the scar (Levy et al, 2014)

Pre-Injury




Healthy Tissue

Injured




Strained Tissue

Healed



Scar Tissue



Jennifer's scar following flap surgery

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Common Myths to Dispel

#1: Patient with pressure injuries must stay in bed

5.11: promote seated out of bed in an appropriate chair or wheelchair for limited periods of time

5.12: select a reclined seated position with... legs elevated

5.13: tilt the seat

5.14: Teach/encourage pressure relieving maneuvers

#2: The cushion or surface can do it all

Degree of postural variation was smaller with clients provided pelvic and thoracic support (Uluta, A., et al 2020)

Head positioning closest to neutral with seat to back support angle set at 110° (Alkateeb, A., et al 2021)

#3: Pediatric/Bariatric patients "don't get pressure injuries"

Medical devices are a leading cause of PIs in the younger pediatric population (Caimore et al, 2019)

Morbidly obese had over three times the odds of development a PI compared to healthy weight (Ness et al, 2018)

Malnourished morbidly obese had eleven-fold greater odds of developing a PI versus the morbidly obese well-nourished (Ness et al., 2018)

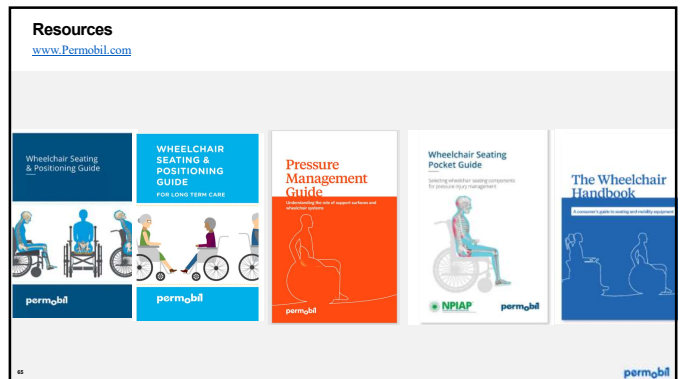
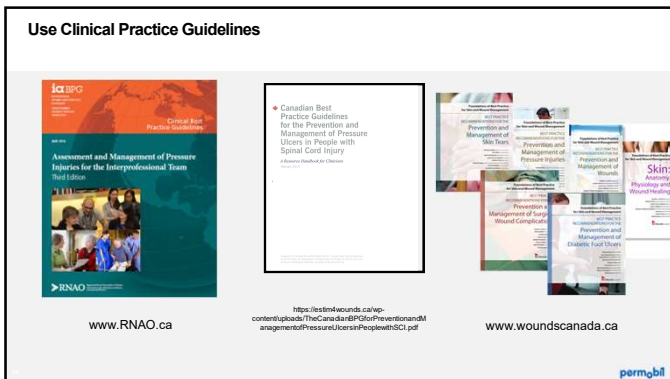
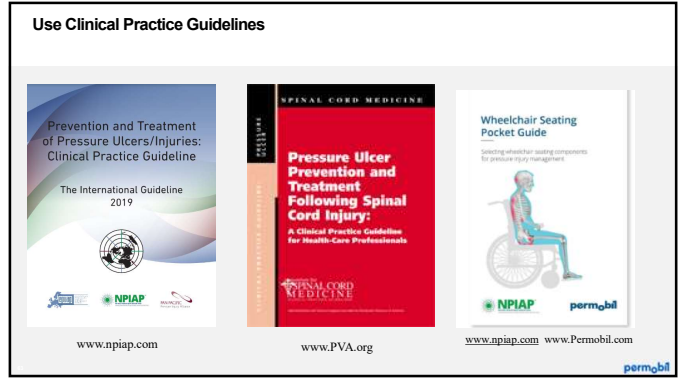
#4: "A scar is not a risk factor for development of a new pressure injury"

Mechanically stiffer scar tissue increases risk of DTI by generating stress concentrations within and around the scar (Levy et al, 2014)

With continued stress and strain where a scar is located, the tissues around and beside the scar become more at risk

Scar tissue will not stretch when stress applied; adjacent tissues exposed to the stress and strain.

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Cleaning and Disinfecting resources

How to clean a ROHO DRY FLOATATION[®] Cushion & Cover

Check your ROHO Cushion regularly for damage, signs of wear and repair needs and use the right cleaning and disinfecting products. Be sure to follow manufacturer safety guidelines for all products.

1 Cleaning the ROHO Cushion Cover

1. Remove the ROHO Cushion Cover from the wheelchair.
2. Wash the cover with mild soap and water.
3. Rinse the cover with clean water.
4. Squeeze the cover to remove excess water.
5. Hang the cover to dry.

2 Disinfecting the ROHO Cushion Cover

1. Prepare a disinfectant solution.
2. Apply the disinfectant to the cover.
3. Allow the disinfectant to sit for the required time.
4. Rinse the cover with clean water.
5. Hang the cover to dry.

3 Cleaning the ROHO Cushion

1. Remove the cushion from the wheelchair.
2. Wash the cushion with mild soap and water.
3. Rinse the cushion with clean water.
4. Squeeze the cushion to remove excess water.
5. Hang the cushion to dry.

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Questions?

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