Emerging Therapies

Laura E Edsberg PhD

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Microclimate

• Local temperature and moisture at body/support surface interface

• Role in pressure ulcer etiology
Impact of Moisture

- Perspiration
- Drainage
- Incontinence

• Moisture increases friction and shear
  - Increased tissue deformation
  - Maceration

Impact of Position on Microclimate

Skin temperature
  - Alterations in superficial blood flow
  - Changes in positioning
  - Contact with skin
    • Sleep positions

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Blood Flow Changes

• Blood flow over bony prominences
  – Most impacted in superficial skin

• 30° lateral position over trochanter
  – Decreased significantly compared to supine
  – Expected 90° lateral position to have largest decrease
  • Greater interface pressure


Superficial Changes to Blood Flow

• Significant differences between subjects in both depth and location
• Same patients did not have decrease in all positions
• Blood flow response to any situation is unique
• Not easy to predict

Impact of Age on Microclimate

- Elderly reduced ability to dissipate heat
- Blood vessel changes
- Increased temperature and skin moisture

Role of Microclimate - Temperature

- As temperature rises
  - Increased metabolic demand
  - Ischemia risk
  - Increased moisture
  - Tissue properties
Strategies to Alter Microclimate

- Patient skin interface
  - Support surface
  - Linen

Support Surface Selection

- Additional features to consider
  - Ability to control moisture
  - Ability to control temperature
  - Strength of evidence (SOE)
  - Strength of recommendation (SOR)

SOE = C, SOR = 👍
Specialized Support Surfaces

• Low air loss
  – Aid management by allowing air to flow through surface

• No evidence for optimal levels of skin temperature and moisture
  – Clinical judgment

Support Surface Cover Selection

Moisture and temperature
  – In contact with the skin
  – Selection to control microclimate

  – Vapor permeable surface cover
    • Draw moisture and heat away from interface

SOE = C, SOR = 🏅
Strategies to Control Microclimate

• Do not apply heat directly on skin
  – Water bottles
  – Heating pads
  – Built-in bed warmers

• Increase metabolic rate
  – Induce sweating
  – Decrease tissue tolerance

SOE = C, SOR =

Significance of Temperature

Reactive Hyperemia
  – Increased significantly at higher temperatures (32-36° C)
Strategies to Control Microclimate

• Fabrics and textiles

Current Bedding

• Hospital, nursing home, hotel, or at home
  – Usually sleeping on poly/cotton or 100% cotton bedding

• Health care linens have changed very little in the last half century

• Typically cotton fabrics and have no special properties
Can Linens Impact Patient Microclimate?

• Basis of modern sports apparel

Synthetic Silk-Like Fabrics

• Rather than cotton or cotton-blend
• Reduced shear and friction
  – Friction for cotton bed linens increases significantly when wet.

SOE = B, SOR = 😊
Synthetic Silk-Like Fabrics

- Smooth not slippery

Moisture Control

- Silk-like fabrics maximize moisture wicking and drying of bed linens
- Water loss from fabric is facilitated through rapid wicking and evaporation
Temperature Control

• Wicking and evaporation
  – Removes heat from the body
  – Reduces perspiration

Impact on Pressure Ulcers

• Reduced incidence of hospital acquired pressure ulcers
• Reduced deterioration of pressure ulcers
• 4 Studies – RCT, non-blinded CT, Cohort, retrospective record analysis

SOE = B, SOR =
Prophylactic Dressings

- Apply to bony prominences for prevention of pressure ulcers
  - Reduction of friction and shear at anatomically at risk areas

SOE = B, SOR =

Characteristics of Dressings

- Material
  - Polyurethane foam
  - Film
  - Hydrocolloid

- Dressing layers
Characteristics of Dressings

• Adhesive types
  – Silicone
  – Elastic

• Size of dressing

Factors to Consider
When Selecting

• Ease of removal/application
• Ability to assess skin
• Location where it will be applied
  – Damaged, displaced
• Correct size

SOE = C, SOR = 👍
Impact on Microclimate

• Trap moisture
  – Humidity
  – Dressing transpiration properties

• Increase temperature at skin surface

SOE = C, SOR =

When to Use Sacral Dressing

Is the patient expected to have 1 or more of the following?

• A surgical procedure lasting longer than 3 hours
  – Inpatient or outpatient surgical procedures
• More than 2 trips to the OR
• Multiple procedures (ex. CT, MRI, IR)
• Has a diagnosis of: Shock, SIRS, Hypovolemia, Trauma, Multisystem Organ Failure

L. McNichol, MSN, RN, GNP, CWOCN
Patient has 3 or More of the Following: (Both surgical patients and non-surgical patients)

- Weeping Edema/Anasarca
- Traction
- Anticoagulation Therapy
- Morbid Obesity
- Malnutrition (Albumin <2.5; Prealbumin <20)
- NPO > 3 days
- Age >65 years old
- Diabetes Mellitus
- Orders for Bed-Rest
- Liver Failure
- Sedation/Paralytics > 48 hours
- Mechanical Ventilation >48 hours
- Quadriplegia or Spinal Cord Injury
- Restraints
- Past History of Sacral Pressure Ulcer
- CVVHD
- Urinary or fecal incontinence not controlled by a catheter, pouch, or bowel management system

With Dressing Use, Continue To

- Use all other preventative measures
- Assess skin at each dressing change or at least daily and confirm if should continue use
  - Borders easy to lift and assess

SOE = C, SOR = 🍑
Dressing Use

• Replace dressing if it becomes damaged, loosened, or excessively moist

SOE = C, SOR = ☝️

Electrical Stimulation of Muscles

• Use at anatomical locations at risk in SCI Patients
  – Reduced risk of pressure ulcer development

• Based on indirect evidence and expert opinion

SOE = C, SOR = ☝️
Electrical Stimulation for Muscles

- Intermittent tetanic muscle contractions
- May decrease muscle atrophy
  - Improve blood flow
  - Tissue oxygenation
  - Increase muscle mass
- Redistribute loading on tissues
- Change stiffness of tissues

Details of the Protocols

- Gluteal and hamstring muscles
  - SCI
  - Seated
  - Special shorts with integrated electrodes

- Biphasic pulsed current
  - 50 pps – induce tetanic contraction
  - Amplitude 70-115mA
Details

• 2 sessions – A or B
  – 3 hours each
  – 3 minutes stimulation/17 minutes rest

• Protocol A
  – 1 second on/1 seconds off for 3 minutes

• Protocol B
  – 1 second on/4 seconds off for 3 minutes

Janssen T, 2010

Findings of the research

• Peak and mean pressure under tubers measured throughout

• Peak pressure decreased significantly

• Pressure gradient decreased during 3 hour stim period
  – Improved pressure redistribution
  – Janssen T, 2010
Outcomes

- No differences in maximal pressure reduction between hours 1, 2, 3
  - 17 min rest between 3 min stim adequate for muscle rest
  - Intervention A led to muscle fatigue

E-Stim Protocol

- 2 sessions
  - 1 hour each
  - 3 minutes stimulation/17 minutes rest
    • 1 second on/4 seconds off for 3 minutes

- 1st hour – gluteal muscles stimulated
- 2nd hour – gluteal and hamstring stimulated

• Smit C, 2012
Findings of the research

- Significant interface pressure relief
  - Both gluteal and gluteal/hamstring
- Gluteal/hamstring significantly more mean pressure relief than gluteal alone
- Pressure gradient decreased only after gluteal/hamstring

Use of Electrical Stimulation

- Temporary decrease in peak sitting pressure under tuber area
- Improved pressure redistribution
- Difference between mean pressure under tuber areas and surrounding areas
  - Gradient
  - Indication of shear forces?
Use of Electrical Stimulation

- Gluteal/Hamstring
- 1-3 hours/day
- 50pps
  - 3 minutes of stimulation
    - 1 second on/4 second off
  - 17 minutes of rest

Exciting New Prevention Strategies

- Support surfaces
  - Role in microclimate management
  - Features for pressure redistribution

- Prophylactic dressings
  - Implement a decision tree for utilization
Emerging Prevention Strategies

• **Linens and textiles**
  – Involve decision makers
  – Housekeeping

• **Electrical stimulation**
  – Physical therapy
  – Integrate into daily routine

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Thank You
QUESTIONS?