What better time for...

(alphabet) soup than after lunch?

LMcNichol, 2016

New nomenclature is never introduced without a great deal of thought

- In clinical practice, conundrums are identified every day
- Clinicians are treating those problems, studying them and some are even writing about them
- Until we name them and all call them the same thing, we cannot understand the scope of the problem
- People who need the information cannot find it because they may look for information using a different term

LMcNichol, 2016

Medical Adhesive Related Skin Injury (MARI)

Background/Disclosure

- The consensus conference described in the first part of this presentation was a 2-day roundtable discussion held December 10-11, 2012 in St. Paul, Minnesota and was made possible by an unrestricted educational grant from 3M, St. Paul, Minnesota.
- The three-member Task Force investigating this problem were gerontological CNS, L. McNichol, neonatal CNS, C. Lund and dermatologist, Dr. T. Rosen.
- The manuscript referred to in this presentation was published in the J Wound Ostomy and Continence Nurs. 2013 July/August; 40(4):365-380

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Why Are We Talking About This?

- "Isn’t this just something that happens?"
- "Some people have fragile skin and we need to use adhesives—it can’t be helped."
- "It’s no one’s fault..."
Today’s Focus: Patient Experience

- Part of a patient’s evaluation of their care experience pertains to management of (and protection from) pain
- A “matter-of-fact” attitude regarding injury is generally not understood/appreciated
- Most consumers are fearful of injury/error while in our care

Today’s Focus: Cost of Care

- Skin injury results in increased cost of care
- Average cost associated with injuries has not been explored, so we do not know to what extent these injuries impact cost of care
- Failure to standardize care for these injuries makes the cost of care a challenge to track

Today’s Focus: Culture of Patient Safety

Patient centered outcomes translate to adverse events trending downward, e.g.: Falls
Pressure ulcers
Catheter-associated UTIs
Surgical site infections
etc.

A Future Category: Skin Injury?

If proper technique for application and/or removal of adhesive products is not used, tissue trauma can occur, impacting patient safety, quality of life and increasing healthcare costs

Consensus Conference

- Three colleagues formed a Task Force and convened to study the problem in July 2012.
- This group conducted extensive literature review.
- They determined that a consensus panel on this topic was needed.
- A facilitator was identified.
- Twenty interdisciplinary key opinion leaders with specialized expertise were invited to participate in a consensus conference.
- Twenty-five (25) guideline statements were written.

Outcomes of Consensus Conference: 2 Definitions

- Definition of Medical Adhesives (abbreviated from US Food and Drug Administration’s Definition):
  “A medical adhesive is a product used to approximate wound edges or to affix an external device (e.g., tape, dressing, catheter, electrode, pouch, or patch) to the skin.”
- Definition of a Medical Adhesive-Related Skin Injury (MARSI):
  “A medical adhesive-related skin injury is an occurrence in which erythema and/or other manifestation of cutaneous abnormality (including, but not limited to, vesicle, bulla, erosion, or tear) persists 30 minutes or more after removal of the adhesive.”

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Two Concepts Embraced

1. Medical Adhesive Mechanics
   - Pressure sensitive: firm pressure "activates" the adhesive
   - Over time, adhesive warms and flows into "fill in" the gaps between the adhesive and the irregularities of the skin surface, increasing the strength of the bond

2. Time is of the Essence
   - The length of time for maximum adhesion differs.
   - Softer adhesives such as silicone have a lower surface tension and fill in the gaps quickly, maintaining the same level of adherence over time.
   - Other adhesives, such as acrylics, act more slowly and their adherence increases over time.

25 Consensus Statements

1. Assessment (4 statements)
2. Prevention (18 statements)
   - General
   - Selection
   - Application/Removal
   - Electrodes
   - Infection Prevention
3. Treatment (2 statements)
4. Future Research (1 statement)

Understanding MARSI
Five Presentations

Mechanical Injury: Skin Tears

- Wounds caused by shear, friction and/or blunt force resulting in separation of skin layers, can be partial or full thickness.
Mechanical Injury: Skin Tears

- Skin tears result when the skin-to-adhesive attachment is stronger than the skin cell-to-skin cell interaction.
- Epidermal layers separate or the epidermis separates completely from the dermis.


Mechanical Injury: Skin Tears

- Critical concern in the elderly and in those with compromised skin.
- Adhesive tape is cited as the 3rd most common cause of skin tears following hospital bed injuries and those injuries sustained during patient transfers.
- In the International 2010 Skin Tear survey, dressing removal was cited as one of the top causes of skin tears.


Pennsylvania Patient Safety Authority, 2006

Mechanical Injury: Epidermal Stripping

- Adhesive removal results in detachment of superficial cell layers.
- Repeated application and removal results in changes in skin barrier function, initiating the wound healing response and inflammation.
- Most prevalent at the extremes of life, but can occur at any age.
- Pediatric prevalence of skin stripping is between 8-17%.


Mechanical Injuries: Tension Injuries/ Blisters

- Injury separation of the epidermis from the dermis caused by shear force as a result of dissection of skin under an unyielding adhesive tape or dressing, inappropriate strapping of tape or dressing during application, or when a joint or other area of movement is covered with an unyielding tape.

Mechanical Injury: Tension Injury/Blister

- Rigid tape backing can lead to injury if there is skin movement.
- Tension injuries are best documented in the orthopedic population (incidence of 6-41% following hip or knee surgery), but the phenomena exists in the post-operative ostomy population as well.


Maceration

- Changes in the skin resulting from moisture being trapped against the skin for a prolonged period; skin appears wrinkled and white/gray in color; softening of the skin results in increased permeability and susceptibility to damage from friction and irritants.

Folliculitis

- Inflammatory reaction in hair follicle caused by shaving or entrapment of bacteria; appears as small inflamed elevations of skin surrounding the hair follicle; may be non-suppurative (papules) or contain pus (pustules).

Adhesives may occlude the skin and removing tape inappropriately (too rapidly, at too high an angle) can result in injury and inflammation of the hair follicle.

Photo courtesy of T. Conner-Kerr


Irritant Contact Dermatitis

- Medical adhesive products are a common cause of non-allergic, irritant contact dermatitis.
- Such reactions are more likely to occur with extended exposure and reflect the shape of the irritant.
- Some increase in incidence is noted when skin sealants do not dry prior to adhesive application.

Allergic Dermatitis

- A cell-mediated immunologic response to a component of the adhesive with reaction extending beyond the area of exposure.
- The incidence of true allergic dermatitis is not known; suspected allergic dermatitis should be considered for referral and/or appropriate investigation (such as patch or scratch tests).


**Future Research**

Specialty practices can now prioritize the existing Consensus Statements and make them relevant to their practice.

Expand scientific knowledge of adhesive performance and use
- mechanisms of injury
- prediction
- prevention
- assessment
- documentation
- treatment

**Medical Device Related Pressure Ulcers (MDRPU)**

**NPUAP Staging System***

- Stage I Pressure Ulcer
- Stage II Pressure Ulcer
- Stage III Pressure Ulcer
- Stage IV Pressure Ulcer
- Unstageable Pressure Ulcer
- Suspected Deep Tissue Injury (sDTI)

*NPUAP is holding a staging consensus conference April 8-9, Chicago, IL. Stay tuned for changes!

**Pressure Ulcer**

**Definition:**
A pressure ulcer is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear. A number of contributing or confounding factors are also associated with pressure ulcers; the significance of these factors is yet to be elucidated. (2007)

**Two Special Situations for Your Consideration**

Two special situations require additional consideration:
- Pressure ulcers on mucosal surfaces
- Pressure ulcers caused by medical devices

**NPUAP Position**

- “The position of the NPUAP is that pressure ulcers on mucosal surfaces are not to be staged using the pressure ulcer staging system. It is understood that these ulcers may indeed be due to pressure, however anatomically analogous tissue comparisons cannot be made.”

- Further, it is NPUAP’s position that mucosal pressure ulcers not be classified as partial or full thickness, because the clinical assessment of the tissue does not allow the distinction. Therefore, the position of NPUAP is that pressure ulcers on mucous membranes be labeled as mucosal pressure ulcers without a stage identified.” (www.npup.org)
Medical Device Related Pressure Ulcers (MDRPU)

Definition
- Localized injury to the skin or underlying tissue as a result of sustained pressure from a device (Black, 2010)
- Tissue injury usually mimics the shape of the device
- Injuries tend to progress rapidly due to the lack of adipose tissue
- Risk may increase as a result of impaired sensation, moisture under the device, poor perfusion, altered tissue tolerance, poor nutritional status and edema

Snapshot
- The phenomenon was first described in the literature over 40 years ago; “Bedsore of the ear”
- Considered to be more difficult to prevent/treat because the device cannot always be removed
- Edema may change the amount of pressure exerted onto tissue
- Some medical devices are rigid or elastic and others may be secured with tight dressings
- Often there is only one size of device offered, or staff is unfamiliar or unwilling to obtain a different size, resulting in inappropriately sized device being used
- "9 additional" stages of pressure ulcers are on the decline; MDRPU appears to be increasing in prevalence

MDRPU
- According to guidance from the NPUAP, tissue damage caused by the pressure of medical devices should be classified as pressure ulcers.

Prevention is critical:
- Properly apply medical devices (e.g., splints, oxygen tubing)
- Remove any “removable” device for regular and periodic skin assessments
- Support tubes (e.g., catheters, endotracheal tubes) to prevent pressure injuries

How big is the problem?

Studies
- Davis (1995)
  - Cervical collars in place
  - 5 days: 23% ulcer incidence
  - Over 5 days: 44% incidence with nearly half presenting with full thickness wounds
- Oximetry probes
  - 5% (most common in patients on vasopressors)

How Big is the Problem?

Studies (continued)
- Black (2010)
  - 407 patients in ICU, step down and general care
  - Secondary analysis of 3 years of quarterly incidence
  - Overall PrU rate was 5.3%
  - 83 patients had 113 PrUs
  - 34.5% were MDRPU
  - Depth of injury: 35% Stage I
  - 32% Stage II
  - 3% Stage III
  - 24% Unstageable
  - 6% sDTI
  - Patients with MDRPU were 2.4 times more likely to develop a PrU

How Big is the Problem?

Studies (continued)
- Apold and Rydrych (2012)
  - 74% of MDRPU were not identified until they were noted to be a Stage III, IV or Unstageable ulcer
  - 63% of cases had no documentation of:
    - Skin inspection
    - Device removal every shift
    - Pressure relief
Apold and Rydrych (2012)

<table>
<thead>
<tr>
<th>Location</th>
<th>Device</th>
<th>Non Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head/face/neck</td>
<td>70.3%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Other multiple</td>
<td>21.9%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Heel/ankle/foot</td>
<td>20.3%</td>
<td>16.9%</td>
</tr>
<tr>
<td>Coccyx/buttocks</td>
<td>7.8%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Sacrum</td>
<td>1.4%</td>
<td>16.9%</td>
</tr>
</tbody>
</table>

Specific Medical Devices

Oxygen delivery devices
- Issues:
  - Facial contours
  - Some urgency to placement
  - Requires an airtight seal
- Examples: Trach collar/ties or straps
  - BiPap/CPAP
  - Nasal cannula
  - Endotracheal (ET) tubes

General Care Devices
- Incidence as high as 27%
- Examples: NG tubes
  - Urinary catheters
  - Indwelling external
  - Fecal management devices
  - Bed trash
  - Retention sutures, sutures
  - Bedpans
  - Orthopedic devices
  - IV tubing

Medical Devices
- Graduated compression stockings
  - Incidence as high as 21%
  - Ulcers present on pretibial area, toes, calf, posterior knee

Special Considerations

- Pediatrics: MDRPU is the leading cause of pressure ulceration in children
- Bariatrics: Many medical devices are not designed for patients of size
  - Skin folds may obscure medical devices

Prevention of MDRPU: The Evidence

Consider use of a prophylactic dressings for preventing MDRPU
- Strength of Evidence = B
- Strength of Recommendation = (Probably do it)
- Supported by 5 moderate quality level 3 and 4 studies
- Use of Hydrocolloid, Soft silicone foam, transparent film and silicone gel sheeting has been shown to be moderately effective when combined with other measures such as routine release of devices

What is the role of the healthcare provider?
Interventions to Prevent MDRPU

- Choose the correct size of medical device(s)
- Cushion and protect the skin with dressings in high-risk areas (e.g., nasal bridge)
- Inspect the skin in contact with device at least daily (if not medically contraindicated)
- Avoid placement of device(s) over sites of prior or existing pressure ulcer
- Educate staff on correct use of devices and prevention of skin breakdown
- Be aware of edema under device(s) and potential for skin breakdown
- Keep skin beneath medical devices clean and dry
- Confirm that devices are not placed directly under an individual

Procedures and Documentation

- Ensure that procedures include component for release of devices and skin inspection/beneath them
- Documentation of these two steps is essential
- Document alterations in skin integrity according to agency protocol
- Notify MD
- Stage damage according to NPUAP Staging System
- Treat using wound care principles

Setting-specific Posters for Education Regarding MDRPU

Available for free download at www.npuap.org

- Critical Care
- Long Term Care
- Pediatrics
- All

In Summary

MARSI and MDRPU

- New nomenclature worth learning and incorporating into your clinical conversations and procedures
- By adopting these terms it allows us to use consistent verbiage so that we can continue to collect data and report our findings

References


Thank you for your attention.