Saving Face
Strategies to reduce skin breakdown during noninvasive ventilation (NIV) for patient care

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Objectives

• Define the key factors that can lead to mask-related NIV complications
• Define ways to manage and reduce the potential of skin breakdown during NIV
• Provide ways to improve patient care by reducing the potential of skin breakdown
• Discuss best practices for initial patient assessment and documentation
• Offer strategies for providing better patient comfort
NIV is the standard of care

“It is no exaggeration to say that NIV has revolutionized the treatment of acute respiratory failure.”¹

¹ Scott K. Epstein, MD. Respiratory Care, January 2009 Vol 54 No 1.
CMS classified Stage III and IV pressure ulcers as a preventable Hospital Acquired Condition (HAC)²

These are no longer reimbursed by current insurance guidelines¹

¹ Epstein, Scott K., M.D. Noninvasive ventilation to shorten the duration of mechanical ventilation; Respiratory Care. January, 2009, Vol. 54 No. 1
How are pressure injuries impacting your facility?

- Difficult to manage
- Costly
- A cause for litigation

Requires a multidisciplinary approach, from Administration to the bedside clinician.
What is a pressure injury?

A 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.
Mask rotation practices

By rotating mask designs, the pressure points are redistributed to help reduce the potential for skin breakdown.
Polling question

What CMS classified pressure injuries are no longer reimbursed by current insurance guideline?

A  Stage 1
B  Stage 2
C  Stage 3
D  Stage 3 & 4
Mask Complications

Identifying Patient Risk Factors

Patient Assessment

Wound Reduction
Incidence of skin breakdown

• Skin breakdown “… even after only a few hours of ventilation, is a frequent complication, ranging from 2-23%”¹
• “In one study, where patients were continuously ventilated with a face mask for more than 48 hours, this percentage reached 70%”²

¹ Epstein, Scott K., M.D. Noninvasive ventilation to shorten the duration of mechanical ventilation; Respiratory Care, January, 2009, Vol. 54 No. 1
² Armour-Burton, T., Field, W., Outlaw, L., Deleon, E.: The Healthy Skin Project: Changing Nursing Practice to Prevent and Treat. Critical Care Nurse, Vol 33, No. 3, June 2013
Incidence of skin breakdown

- Localized areas of tissue necrosis
- Develop when soft tissue is compressed between a bony prominence surface for an extended period of time

1 Epstein, Scott K., M.D. Noninvasive ventilation to shorten the duration of mechanical ventilation; Respiratory Care, January, 2009, Vol. 54 No. 1
What causes a pressure injury?

The primary causes are:\(^3\):

- Shearing forces:
  - Cause stretching, kinking, and tearing in the subcutaneous tissues
  - Lead to deeper tissue necrosis
- Excessive compressive pressure (CP)
  - CP should be < diastolic BP
  - CP should be < capillary BP (32-45 mmHg)

Risk increases with:\(^3\):

- Duration of pressure exposure
- Pressure over bony prominences

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\(^{1}\) DeFloor, T. The risk of pressure sores: a conceptual scheme; *Jour of Clin Nursing* 1999;8:206-216.
Skin anatomy and physiology

- Epidermis
  - The outer layer of skin sheds every 21 days
- Dermis
  - The middle layer of skin contains nerve endings, blood vessels, oil glands, sweat glands
  - collagen and elastin
- Hypodermis
  - The subcutaneous layer of skin; fat and connective tissue that houses larger blood vessels and nerves

4 National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.
Pressure injury - Stage 1

- Intact skin with non-blanchable redness
- A change in the skin temperature (warm or coolness)
- Tissue consistency has a firm or boggy feel
- Possible patient sensation pain or itching

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\(^4\) National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.
Pressure injury - Stage 2

- Partial thickness loss of skin involving epidermis and/or dermis
- Presents as an intact or open serum filled blister or shallow crater

4 National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.
Pressure injury - Stage 3

- Full thickness tissue loss involving damage to or necrosis of subcutaneous tissue
- May extend down to, but not through, underlying fascia
- Presents as a deep crater which may include undermining or tunneling

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Pressure injury - Stage 4

- Full thickness tissue loss with extensive destruction
- Exposed bone, muscle or tendon
- Some slough or eschar may be present

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4 National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.
Pressure injury - Stage 4

What are the signs of a Stage 1 pressure sore?

A  Exposed bone
B  Intact skin with non-blanchable redness
C  Full thickness tissue loss involving damage to or necrosis of subcutaneous
D  All of the above

\[4\text{ National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.}\]
Risk factors for hospital-acquired pressure ulcers\(^5\) (HAPU)

- Age
- Trauma from friction and shearing forces
- Poor nutrition
- Low blood pressure (low perfusion)
- Extended use of NIV

Considerations for mask selection

Did you know?
Up to 37.5% of NIV failures are related to the mask intolerance and discomfort\textsuperscript{6}

Clinical considerations

Clinicians remove and reposition masks many times per day for
  – Oral care
  – Medication administration
  – Hydration
  – Therapy break

Mask design considerations

- Estimated length of use
- Compatibility with NIV device
- Mask safety features
  - Quick release clips
  - Anti-asphyxia valves
- Facial features
  - Skin condition
  - Facial abnormalities
- Elbow / Ventilator compatibility
  - EE
  - SE

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Patient considerations

- Mouth breather
- Claustrophobic
- Level of consciousness
- Cooperation
- Facial structure
- Elbow style
- Size matters

Choosing the right mask for your patient

- Mask types
- Headgear selection
- Soft, self-sealing cushions
- Anti-asphyxia features
Polling question

What percent of NIV failures are due to the mask?

A 90%
B 40.5%
C 37.5%
D 100%
Initial assessment

<table>
<thead>
<tr>
<th>Sensory perception</th>
<th>Friction and shear</th>
</tr>
</thead>
<tbody>
<tr>
<td>ability to respond meaningfully to pressure-related discomfort</td>
<td></td>
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</tbody>
</table>

- All patients should be assessed for skin integrity upon admission
- Assessment of risk factors for HAPU should also be determined on admission and prior to NIV initiation
- Assess the patient using the Braden scale
- Relative risk should determine monitoring frequency and prevention strategy
Polling question

Is your hospital using some type of skin assessment protocol?
Patient assessment

MD Order for BiPAP

Huddle with nursing

Skin Breakdown Risk Factors

Should ANY of the following criteria apply the patient is at HIGH RISK:
- Vasopressors
- Chronic steroid therapy
- Fragile or edematous skin on face

A patient who has any FOUR of the following criteria should be considered HIGH RISK:
- Malnutrition
- Dehydration
- DNR
- Neurological Impairment
- 60yo
- Dialysis
- Restraints
- Braden Scale 18
- DM
- Anatomical factors (Bony prominences)
- Current skin breakdown elsewhere on body
- COPD

Apply Alternative BiPAP Masks
- Total Face Mask
- Gel Face Mask
- Alternate between Total + full Masks Q4.

Yes

High risk

No

Initiate BiPAP bundle

Perform & Document Skin Integrity Risk Assessment

Initiate Standard Face Mask

1. Perform Subsequent Skin Assessment/document (Q2).
2. Perform Appropriate Mask Sizing + documented
3. Perform Exhalation Port Test.
4. Apply Facility Approved protective foam dressing.
5. Perform / Assess Mask Leak

Leak? >10 but <25
Proceed and monitor as indicated

Leak? <10
Adjust mask and loosen if necessary

Fail? Notify Supervisor and remove from service.

Pass? Go to step 3

(Protocol granted with permission)
Best practices

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Visit www.thinkniv.com
• In literature

Noninvasive ventilation masks are associated with pressure injuries under the mask

Sampling

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In literature\(^8\)

Results

- 20% of patients in the oro-nasal masks developed a pressure injury
- 2% of patients in the full-face masks developed a pressure injury
- Comfort scores significantly lower in the Full-face mask group

Conclusion:

Full-Face mask resulted in significantly fewer pressure injuries and was more comfortable for patients.

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• NIV advantages over invasive

Application
• Avoid Intubation
  – Patient discomfort
  – Upper airway trauma

Ventilator acquired pneumonia (VAP)\(^9\)
  – Intubation is associated with GI bleeding
  – Less chance of barotrauma

• Decreases work of breathing
  – Improves alveolar ventilation
  – Improves gas exchange
  – Counterbalances intrinsic PEEP

• Improve patient-ventilator synchrony

Epstein, Scott K., M.D. Noninvasive ventilation to shorten the duration of mechanical ventilation; Respiratory Care, January, 2009, Vol. 54 No. 1
• NIV advantages over invasive

Oral patency
• Preserves efficiency of cough and secretion clearance
• Allow speech, allowing the patient to communicate
• Preserves ability to swallow
• Reduces need for NG tube
Summary - Helping reduce the potential for pressure injuries

• Assess the patient
• Select the proper mask(s) design
• Rotate designs to redistribute pressure points
• Manage mask leak no less than 7 L/min
• Perform skin care and early interventions
• Conduct continuing education