Saving Face with Non-Invasive Ventilation (NIV)

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Learning Outcome

• Describe how to minimize skin breakdown and pressure points, prevent skin breakdown, and assess skin during NIV.
NIV is the standard of care

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

1 Scott K. Epstein, MD. *Respiratory Care, January 2009 Vol 54 No 1.*
NIV advantages over invasive ventilation

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
• Improves patient-ventilator synchrony

*Respiratory Care, Feb 2009 54(2):198-211
\(^9\)Respiratory Care, July 2005; 50(7):924-931.
NIV advantages over invasive ventilation

Oral patency
- Preserves efficiency of cough and secretion clearance
- Allows speech, enabling the patient to communicate
- Preserves ability to swallow
- Reduces need for NG tube
Centers for Medicare & Medicaid Services

CMS classified Stage III and IV pressure ulcers as a preventable Hospital Acquired Condition (HAC).²

These are no longer reimbursed by current insurance guidelines.¹

¹ Scott K. Epstein, MD. Respiratory Care, January 2009 Vol 54 No 1.
How are pressure ulcers 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 ulcer?

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.
Polling question

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

A  Stage 1
B  Stage 2
C  Stage 3
D  Stage 3 & 4
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 Scott K. Epstein, MD. Respiratory Care, January 2009 Vol 54 No 1.
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 Scott K. Epstein, MD. *Respiratory Care, January 2009 Vol 54 No 1.*
What causes a pressure ulcer?

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

\(^3\) 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, and sweat glands.
  - Collagen and elastin
- **Hypodermis**
  - The subcutaneous layer of skin; fat and connective tissue that houses larger blood vessels and nerves

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Pressure ulcer - 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](http://www.npuap.org)
Pressure ulcer - Stage 2

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

D  All of the above

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4 National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.
Mask rotation practices

By rotating mask designs, the pressure points are redistributed to help reduce the potential for skin breakdown.
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 50% of NIV failures are related to the mask.⁶

⁶ Nava et al. Interfaces and humidification for noninvasive ventilation; Respir Care 2009; 54:71-82.
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

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-asphyxial features
Initial assessment

- 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
Assessment and documentation

- **Complete** a risk assessment before starting NIV
- **Assess** all potential areas for redness that could be impacted by respiratory devices
- **Assess** redness or open wounds; report findings to the primary registered nurse
- **Document** a wound or red area on the respiratory flow sheet or the treatment plan
- **Document** “off-loading” and/or implementation of protective devices and procedures
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**
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**Perform & Document Skin Integrity Risk Assessment**

**Initiate BiPAP bundle**

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**
Adjust mask and loosen if necessary

**Pass? Go to step 3**

**Fail? Notify Supervisor and remove from service.**

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

**Initiate Standard Face Mask**
Patient assessment

Skin Integrity Risk Assessment
1. Check for redness, tearing, discoloration, breakdown, etc.
   a. If present notify RN/Wound care.
2. Document Findings and Individual notified.

Subsequent Skin Assessments
1. Remove or lift protective foam dressing.
2. Check for redness, tearing, discoloration, breakdown, etc.
   a. If present notify RN/Wound care.
3. Document findings and individual notified.

(Protocol granted with permission)
Best practices

Saving Face
Strategies to reduce skin breakdown during NIV for patient care

Visit www.thinkniv.com
In literature

Noninvasive ventilation masks are associated with pressure ulcers under the mask

Sampling
• 5 ICUs (111 ICU beds)
• Recruited 200 patients with NIV orders
  – First 100 patients received Oro-nasal mask
  – Second 100 patients received Full-face mask

Education
• Therapists and nurses practiced application and proper adjustments of the masks on a mannequin.

Patient assessed
• Skin integrity
• Comfort level

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

Conclusion:
Full-face mask resulted in significantly fewer pressure ulcers and was more comfortable for patients.

Figure 2 Location of pressure ulcers.

In literature\textsuperscript{8}

Summary - Helping reduce the potential for pressure ulcers

• Assess the patient.
• Select the proper mask(s) design.
• Mask rotation to redistribute pressure points.
• Manage mask leak (7-25 L/min).
• Perform skin care and early interventions.
• Conduct continuing education.