

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.

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 guidelines¹



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

² Gregoretti, C., Confalonieri, M., Navalesi, P., Squadrone, V., Frigerio, V., Frigerio, P., Beltrame, F., Carbone, G., Conti, G., Gamna, F., Nava, S., Calderini, E., Skrobik, Y., Antonelli, M. Evaluation of patient skin breakdown and comfort with a new face mask for non-invasive ventilation: a multi-center study. Intensive Care Medicine 2002; 28:278-284

How are pressure injuries impacting your facility?

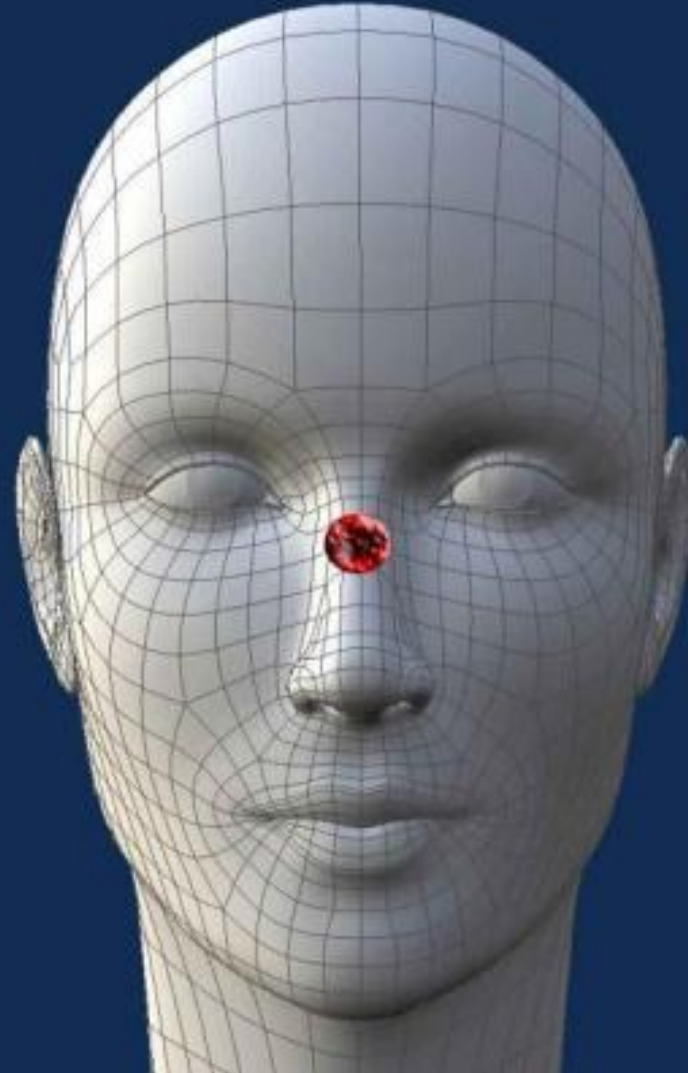
- Difficult to manage
- Costly
- A cause for litigation

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

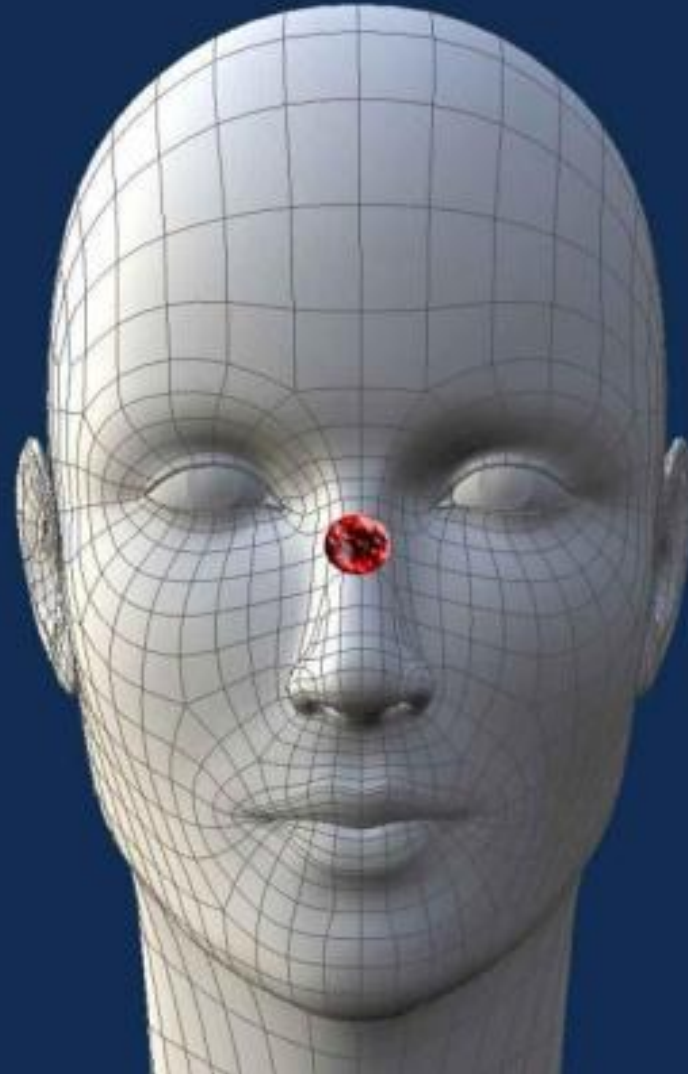
Identifying Patient Risk Factors

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

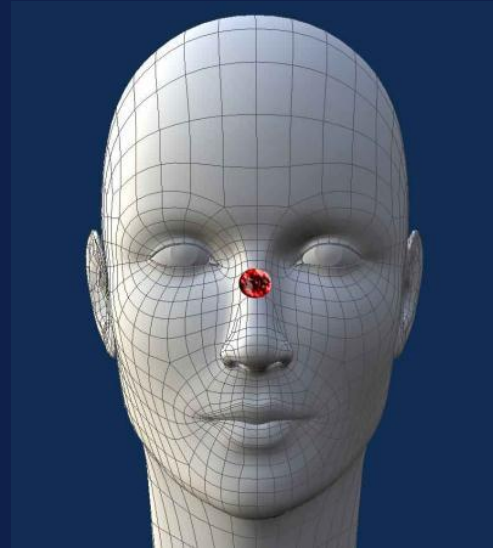


¹ Epstein, Scott K., M.D. Noninvasive ventilation to shorten the duration of mechanical ventilation; Respiratory Care, January, 2009, Vol. 54 No. 1

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



Most common on
bridge of nose¹



Extreme cases involve
surrounding areas, like over the
nose but also on the chin

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

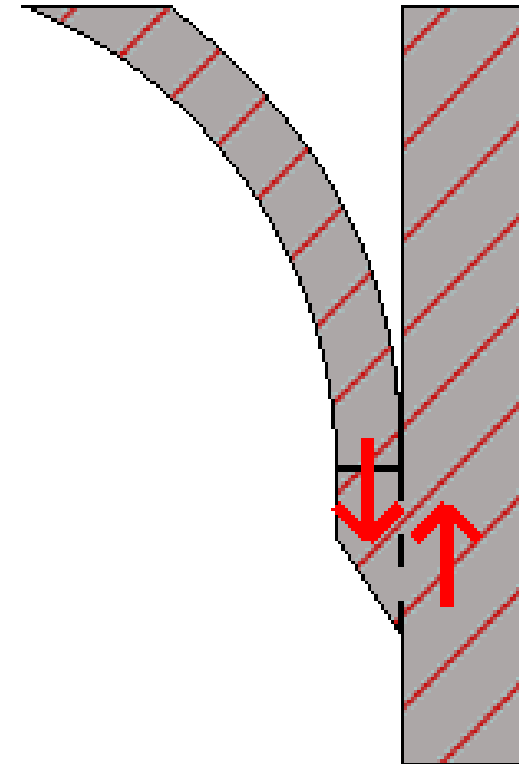
What causes a pressure injury?

The primary causes are³:

- 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 with³:

- Duration of pressure exposure
- Pressure over bony prominences

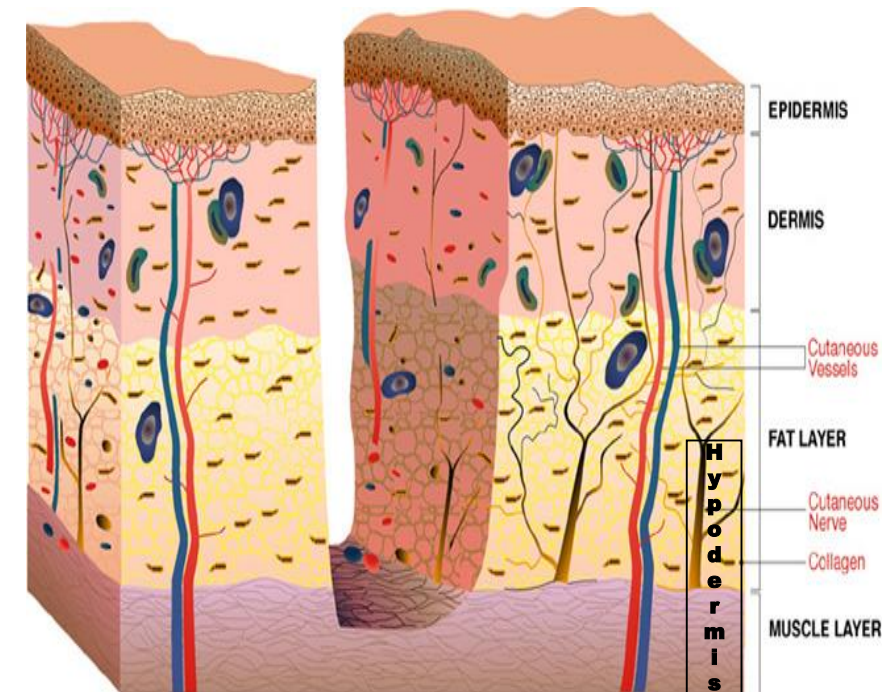


Shearing forces

³DeFoor, T. The risk of pressure sores: a conceptual scheme; *Jour of Clin Nursing* 1999;8:206-216.

Skin anatomy and physiology⁴

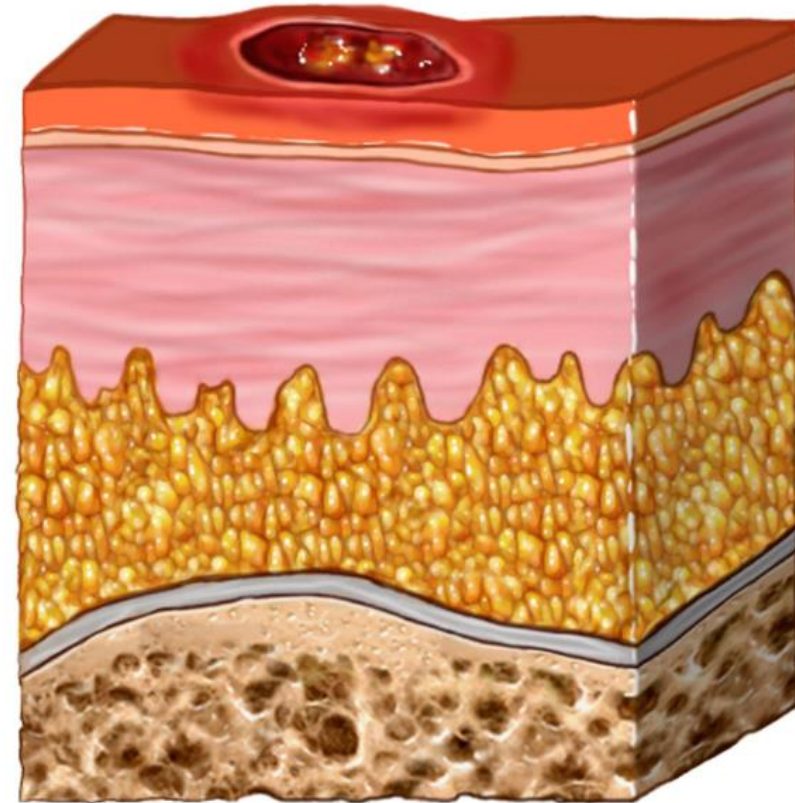
- Epidermis
 - The outer layer of skin sheds every 21 days
- Dermis
 - The middle layer of skin contains nerve endings, blood vessels, oil glands, sweat glands
 - collagen and elastin
- Hypodermis
 - The subcutaneous layer of skin; fat and connective tissue that houses larger blood vessels and nerves



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

Pressure injury - Stage 1⁴

- 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

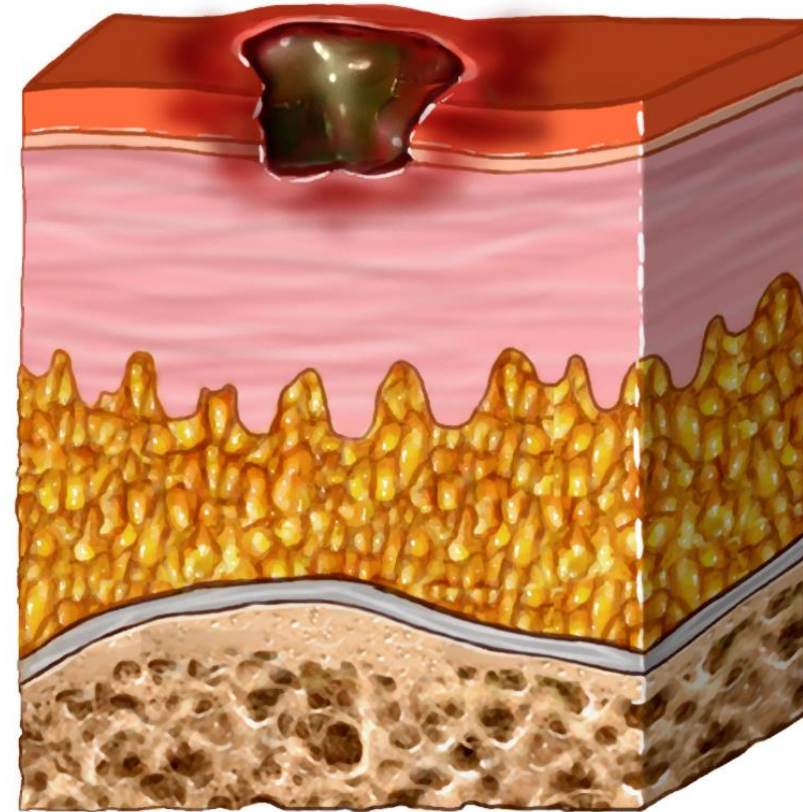


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⁴ National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.

Pressure injury - Stage 2⁴

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

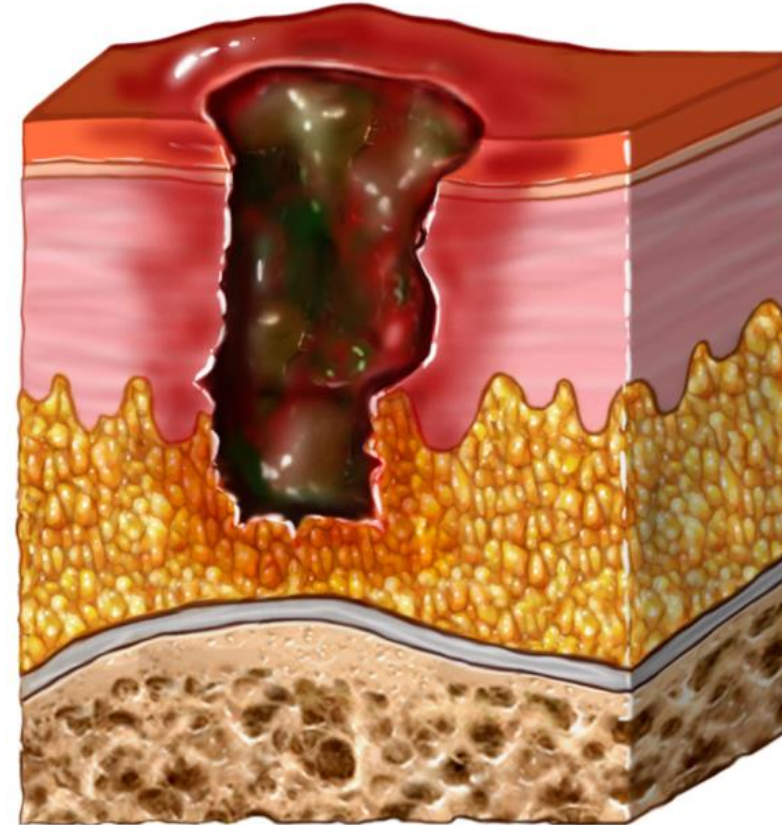


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⁴ National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.

Pressure injury - Stage 3⁴

- 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

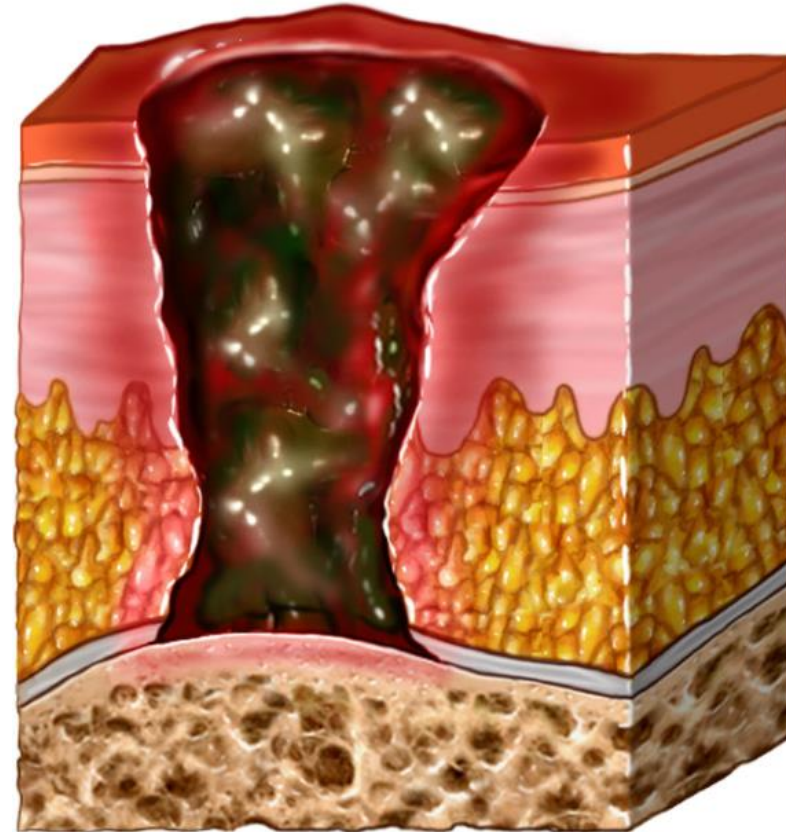


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⁴ National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.

Pressure injury - Stage 4⁴

- 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 4⁴

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 National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org.

Risk factors for hospital-acquired pressure ulcers⁵ (HAPU)

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

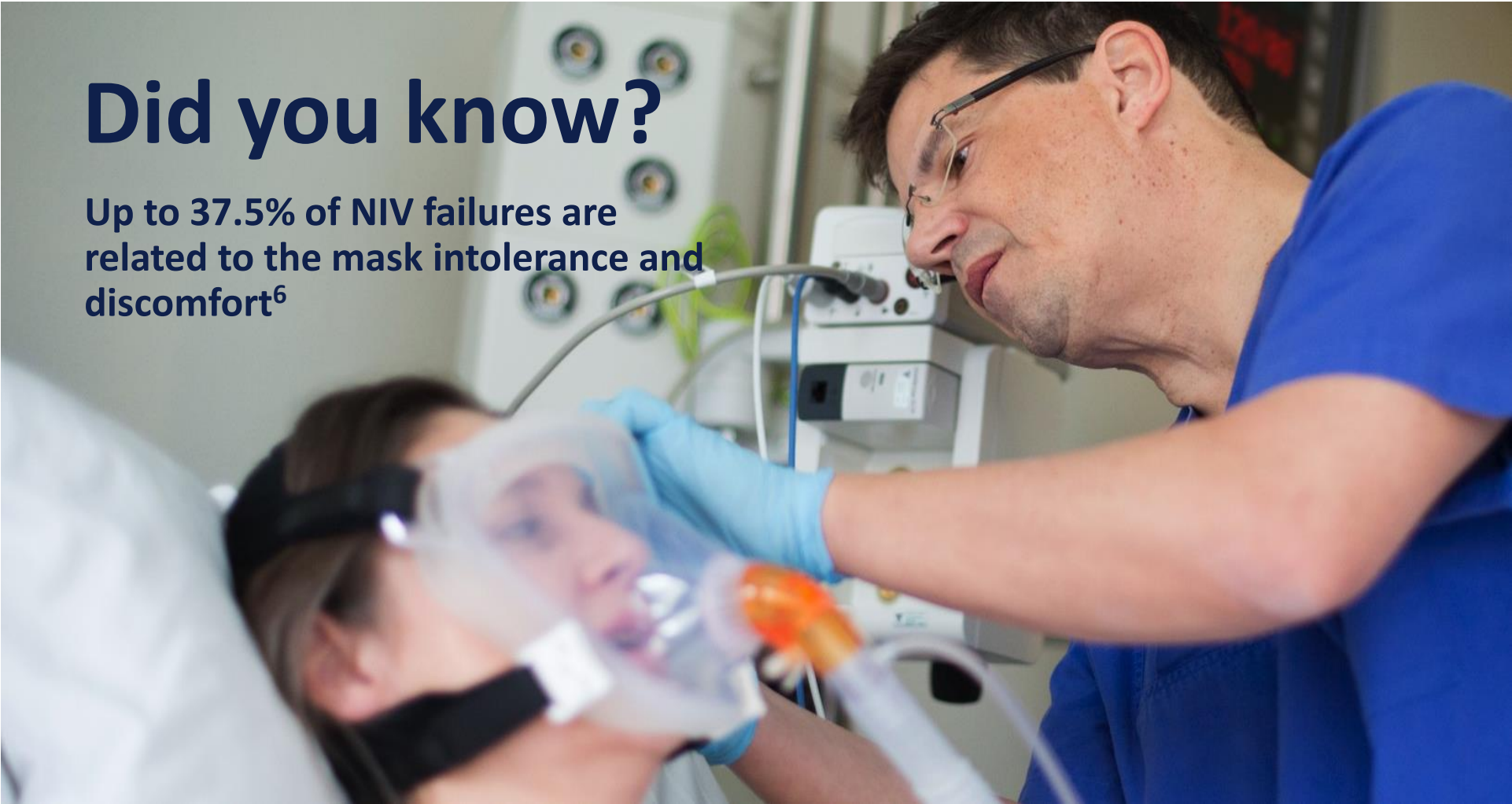


⁵ NPUAP-EPUAP-Prevention and treatment of Pressure Ulcers: Quick reference guide. Oct.16, 2014

Considerations for mask selection

Did you know?

Up to 37.5% of NIV failures are related to the mask intolerance and discomfort⁶



⁶Squardone, E., Frigerio, P., Fogliati, C., Gregoretti, C., Conti, G., Anonelli, M., Costa, R., Baiardi, P., Navalesi, P. Noninvasive vs invasive ventilation in COPD patients with severe acute respiratory failure. Intensive Care Med (2004) 30: 1303-1310.

Clinical considerations

Clinicians remove and reposition masks many times per day for⁷

- Oral care
- Medication administration
- Hydration
- Therapy break



⁷G Hilbert, D Gruson, F Vargas, R Valentino, L Portel, G Gbikpi-Benissan, JP Cardinaud. Noninvasive ventilation for acute respiratory failure. Quite low time consumption for nurses. European Respiratory Journal 2000 16: 710-716

Mask design considerations⁸

- 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



⁸Nava, S., Navalesi, P., Gregoretti, C. Interfaces and Humidification for Noninvasive Mechanical Ventilation. Resp. Care. Jan 2009. Vol 54-1

Patient considerations⁹

- 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

BRADEN SCALE – For Predicting Pressure Sore Risk

SEVERE RISK: Total score ≤ 9 HIGH RISK: Total score 10-12
 MODERATE RISK: Total score 13-14 MILD RISK: Total score 15-18

DATE OF ASSESS →

RISK FACTOR	SCORE/DESCRIPTION	1	2	3	4		
Sensory perception ability to respond meaningfully to pressure-related discomfort	1. NO IMPAIRMENT – Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.						
	2. IMPAIRED – Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.		✓				
	3. IMPAIRED – Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.			✓			
Friction and shear	1. NO APPARENT PROBLEM – Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair at all times.						
	2. PROBABLY NO APPARENT PROBLEM – Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair at all times.			✓			
	3. NO APPARENT PROBLEM – Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair at all times.				✓		
TOTAL SCORE	Total score of 12 or less represents HIGH RISK						
ASSESS	DATE	EVALUATOR SIGNATURE/TITLE		ASSESS	DATE	EVALUATOR SIGNATURE/TITLE	
1	/ /			3	/ /		
2	/ /			4	/ /		
NAME-Last		First	Middle	Attending Physician	Record No.	Room/Bed	

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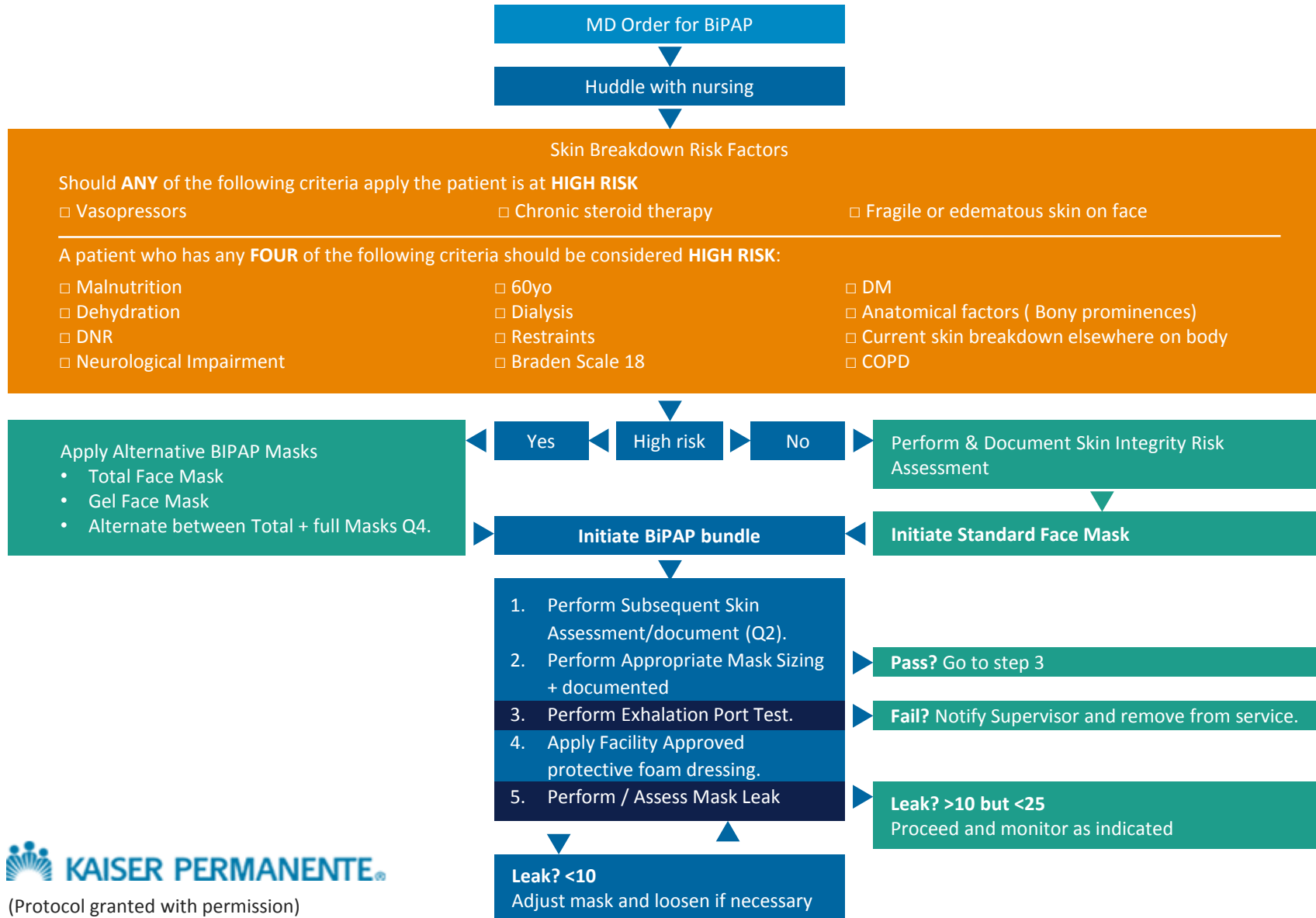
- All patients should be assessed for skin integrity upon admission
- Assessment of risk factors for HAPU should also be determined on admission and prior to NIV initiation
- Assess the patient using the Braden scale
- Relative risk should determine monitoring frequency and prevention strategy

Polling question

Is your hospital using some type of skin assessment protocol?



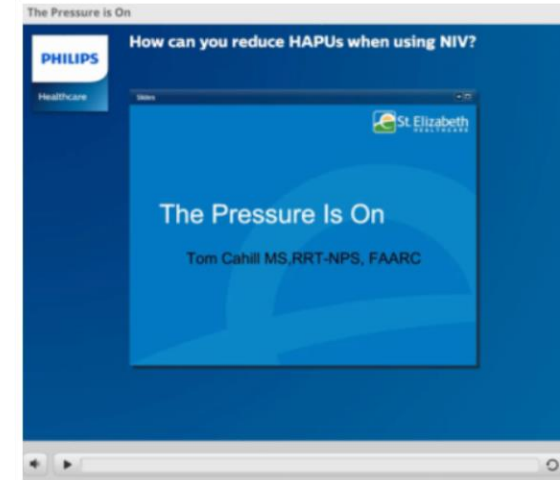
Patient assessment



Best practices



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



Visit www.thinkniv.com

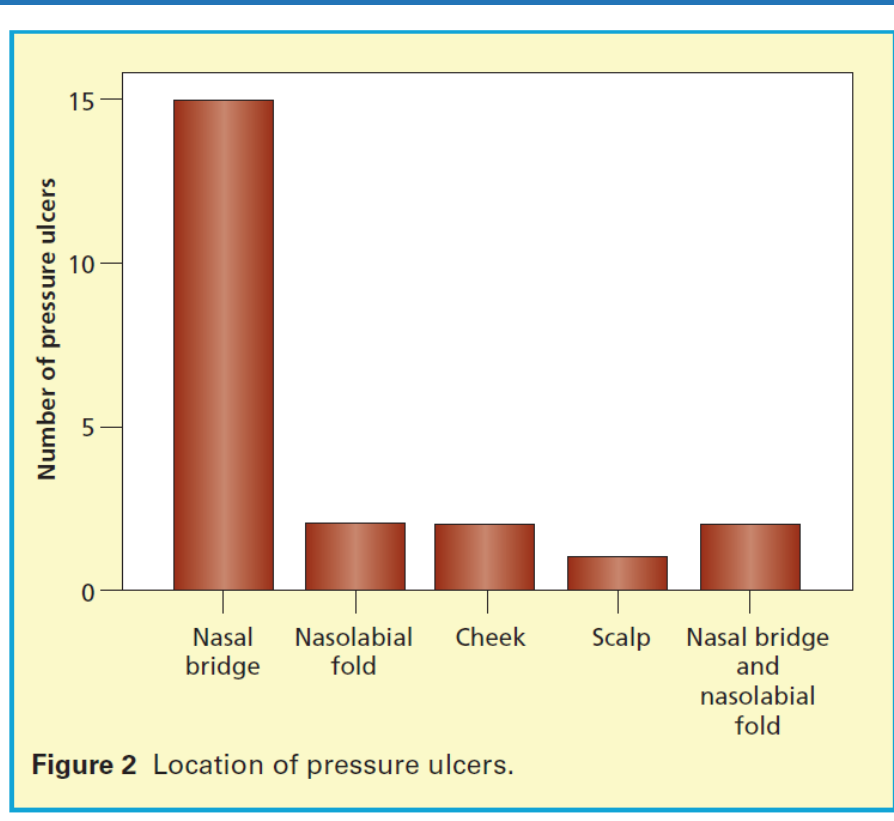
- In literature⁸



Noninvasive ventilation masks are associated with pressure injuries under the mask

Sampling

In literature⁸



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.

- 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
Hess, D. Noninvasive Positive Pressure Ventilation and Ventilation Associated Pneumonia. Respiratory Care, July, 2005, Vol. 50. No. 7924-931

- 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



