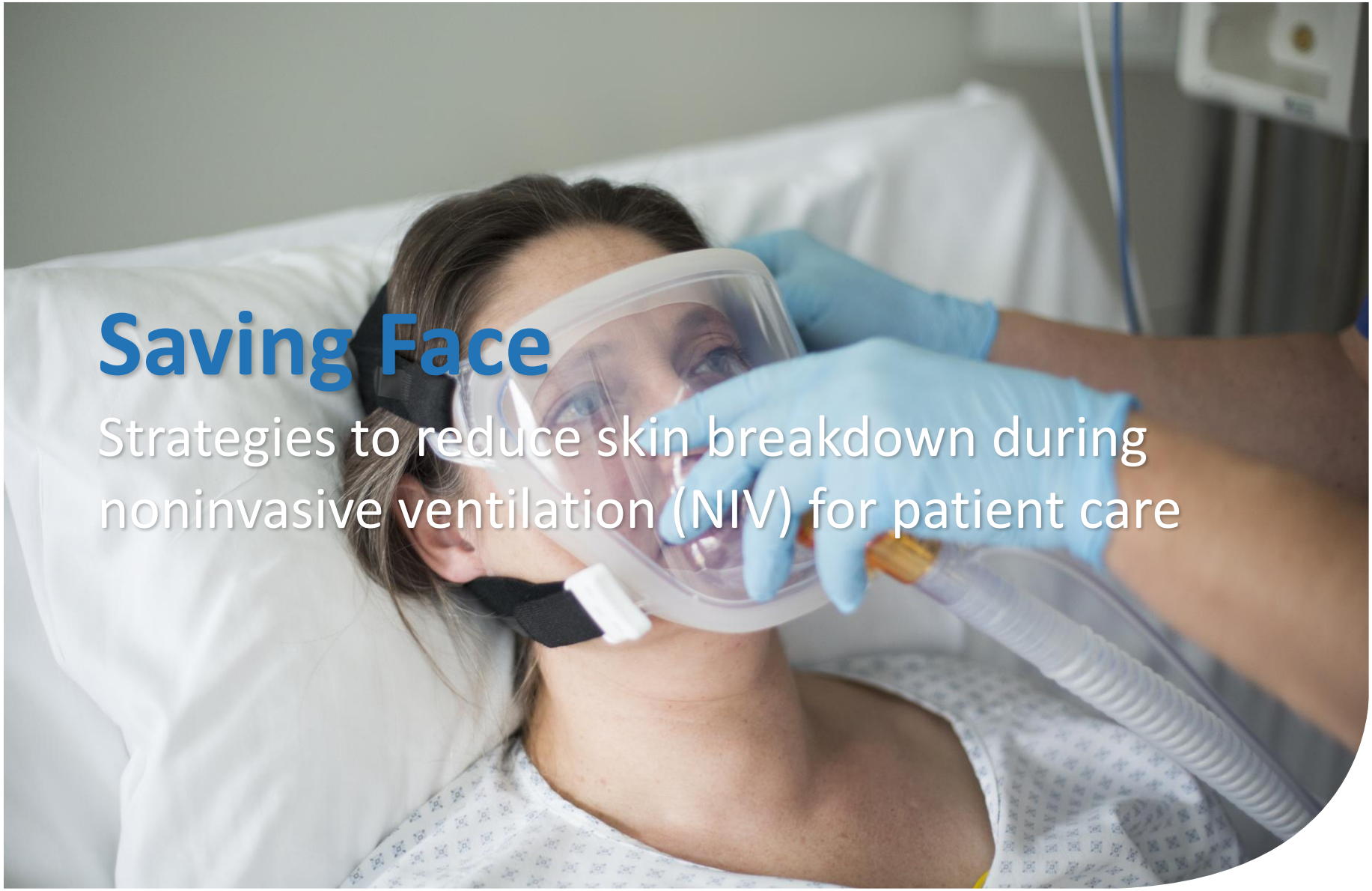


Saving Face

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

innovation you

PHILIPS

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 guidelines[1]

[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

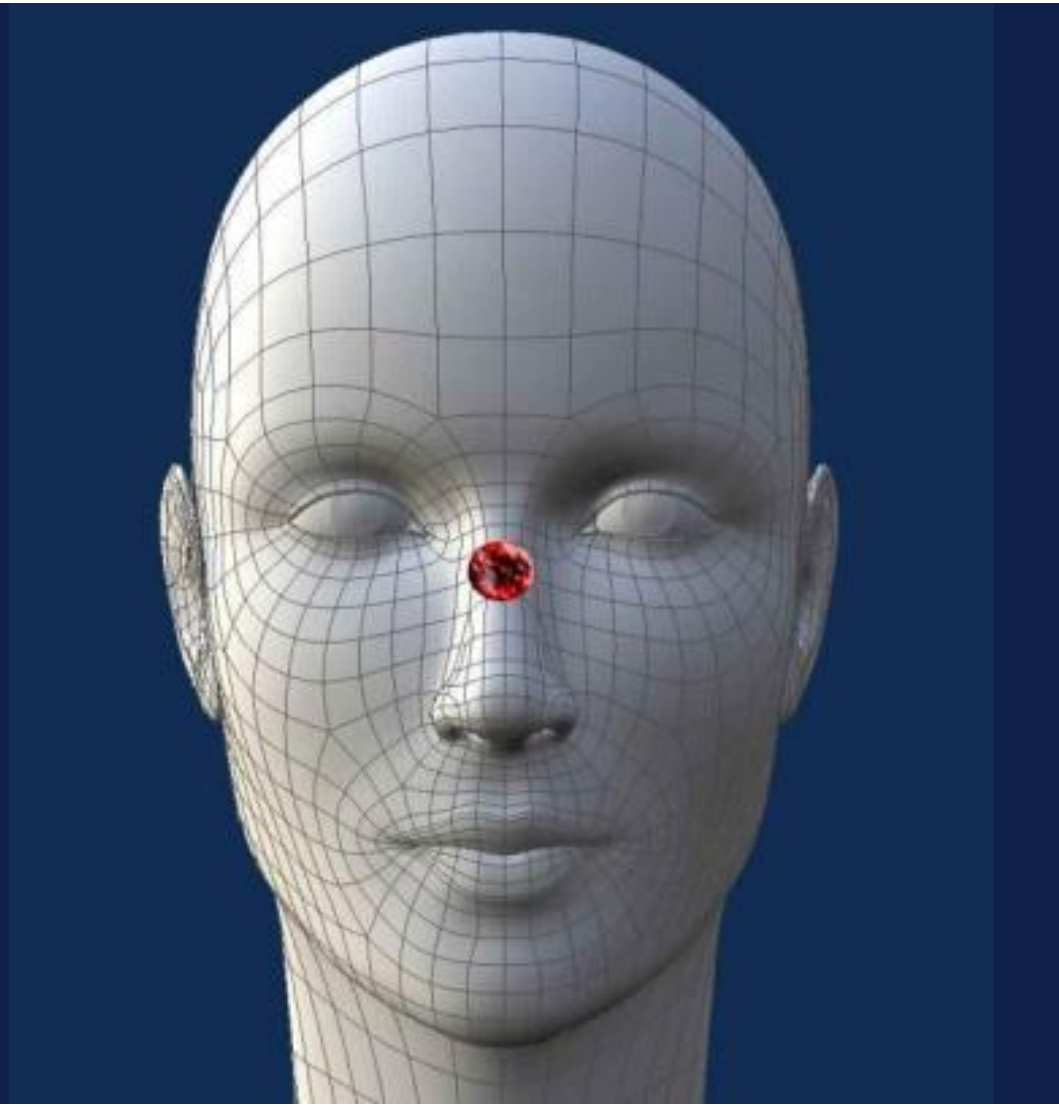
How are pressure injuries impacting your facility?

- Difficult to manage
- Costly
- A cause for litigation

Requires a multidisciplinary approach, from Administration to the bedside clinician.

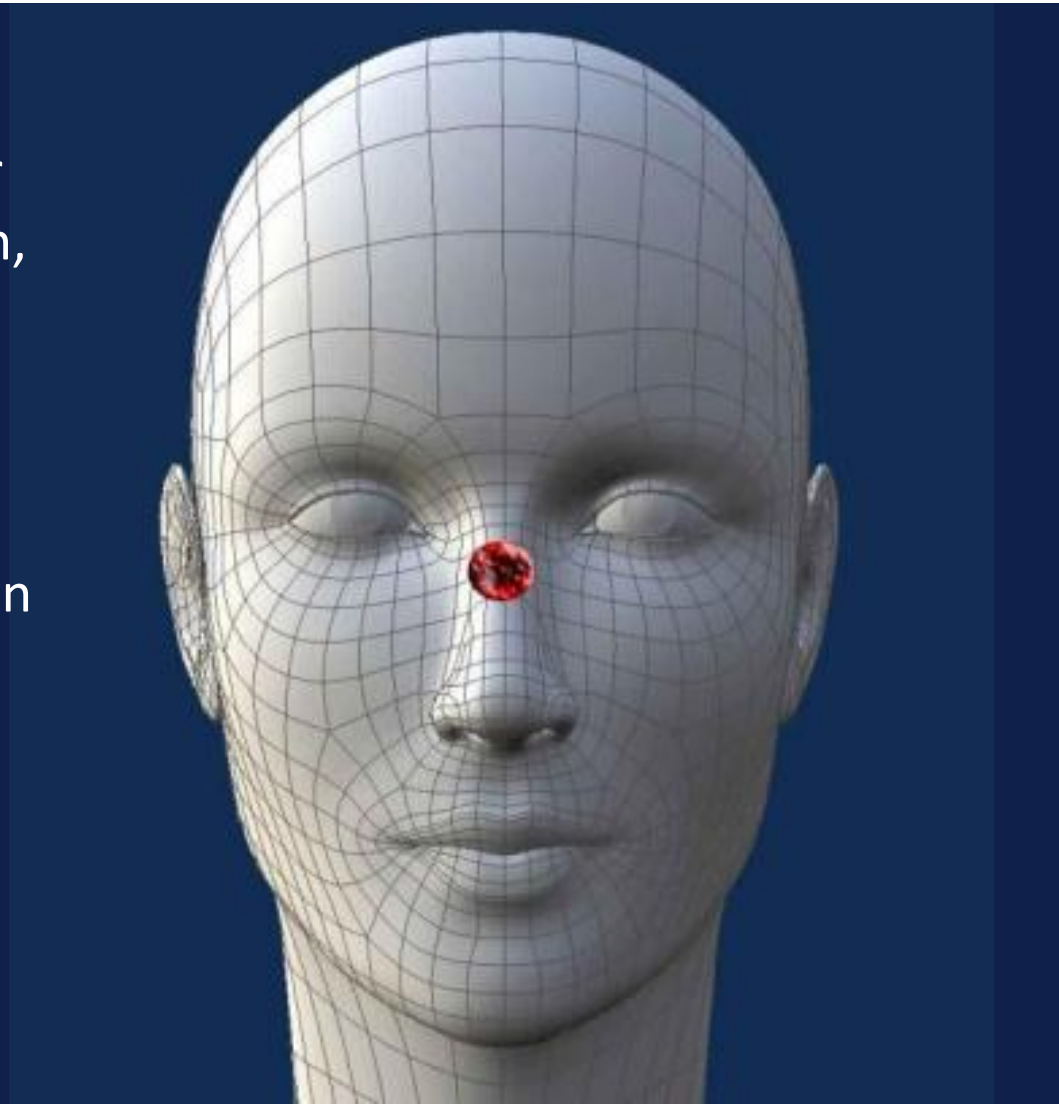
What is a pressure injury?

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.



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]

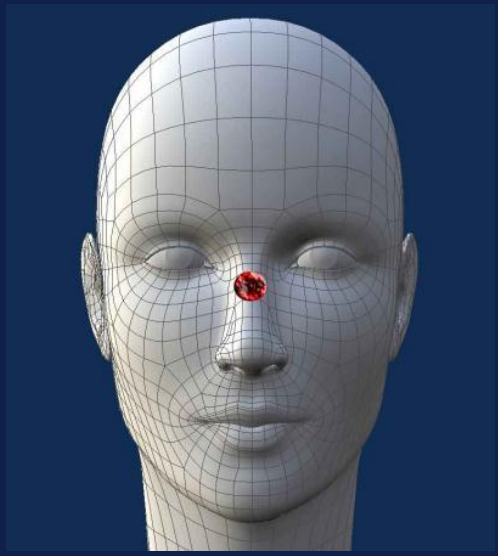


•[1] Epstein, Scott K., M.D. Noninvasive ventilation to shorten the duration of mechanical ventilation; Respiratory Care, January, 2009, Vol. 54 No. 1

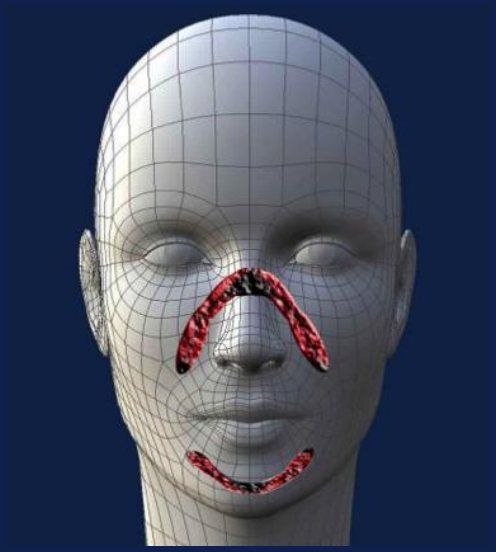
[2] Armour-Burton, T., Field, W., Outlaw, L., Deleon, E.. The Healthy Skin Project: Changing Nursing Practice to Prevent and Treat. Critical Care Nurse, Vol 33, No. 3, June 2013

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 nose[1]



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

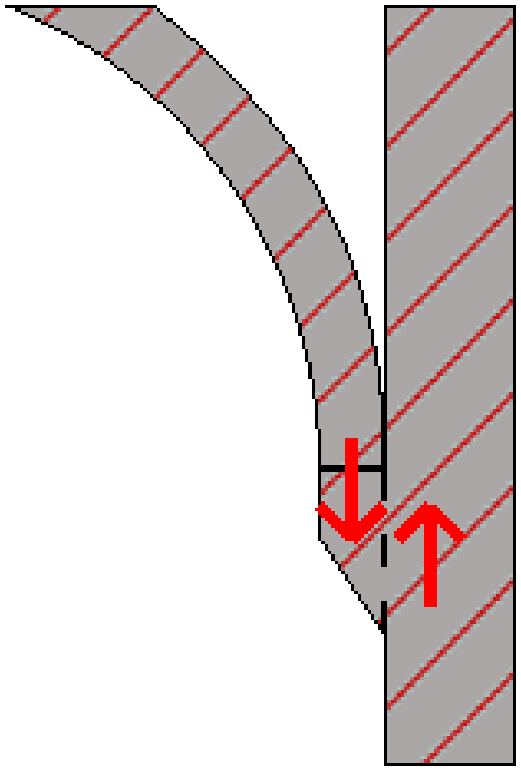
What causes a pressure injury?

The primary causes 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

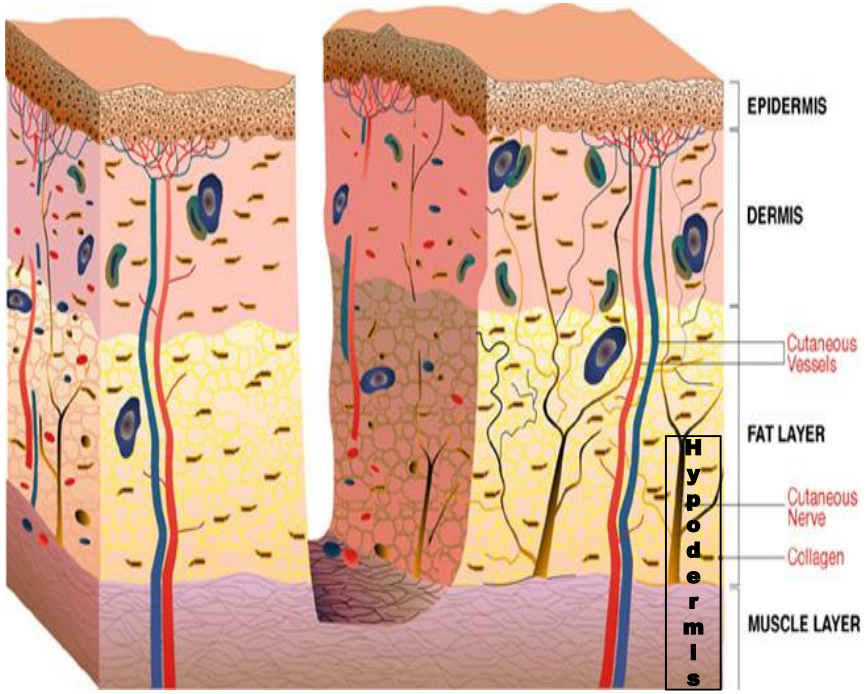


Shearing forces

[3] DeFloor, T. The risk of pressure sores: a conceptual scheme; *Jour of Clin Nursing 1*999;8:206-216.

Skin anatomy and physiology[4]

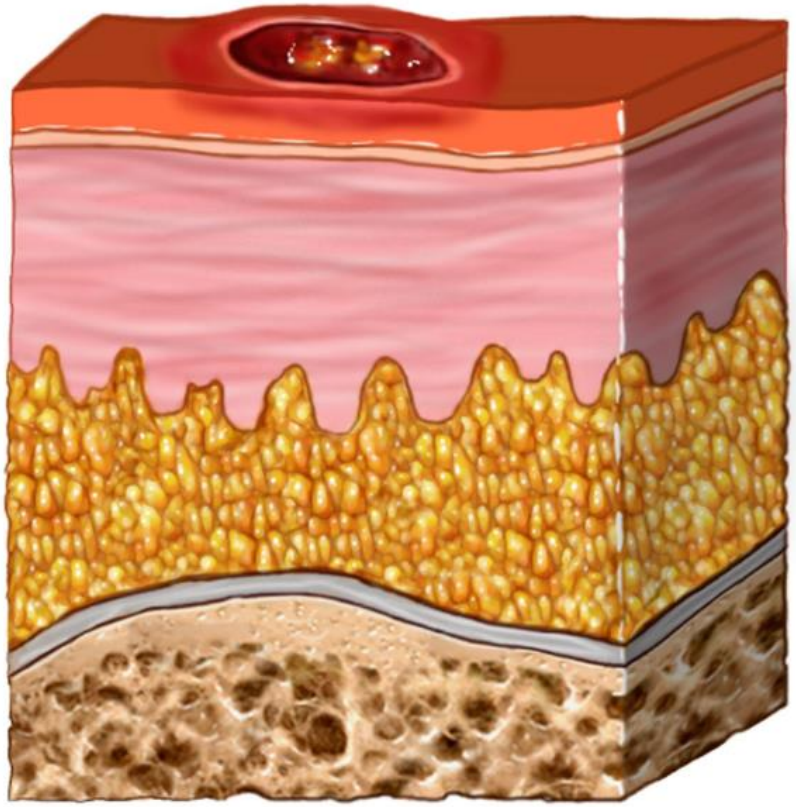
- Epidermis
  - The outer layer of skin sheds every 21 days
- Dermis
  - The middle layer of skin contains nerve endings, blood vessels, oil glands, sweat glands
  - collagen and elastin
- Hypodermis
  - The subcutaneous layer of skin; fat and connective tissue that houses larger blood vessels and nerves



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

Pressure injury - Stage 1[4]

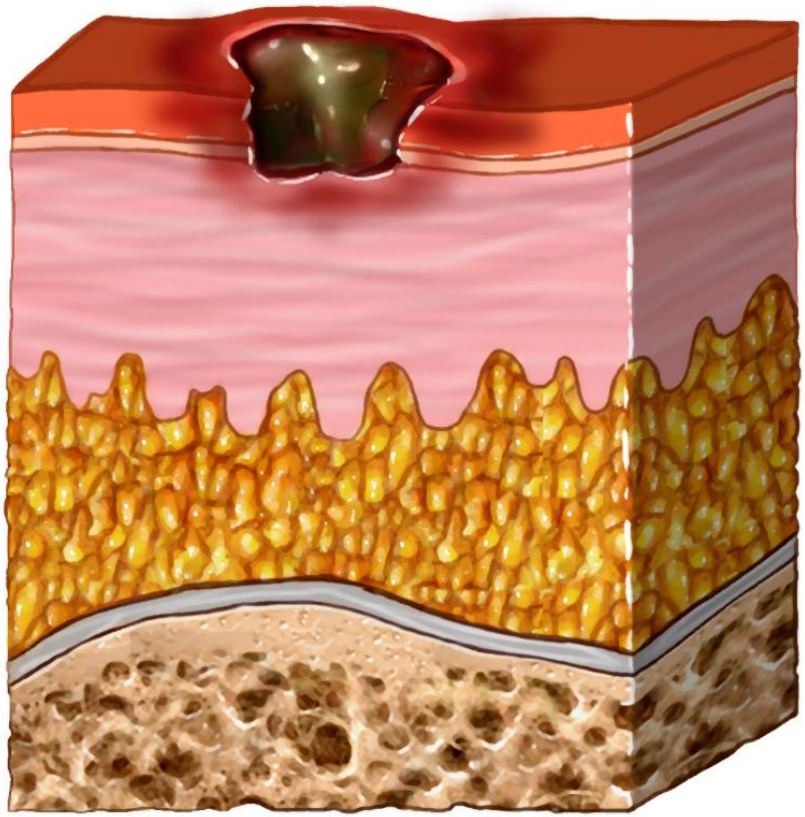
- Intact skin with non-blanchable redness
- A change in the skin temperature (warm or coolness)
- Tissue consistency has a firm or boggy feel
- Possible patient sensation pain or itching



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

Pressure injury - Stage 2[4]

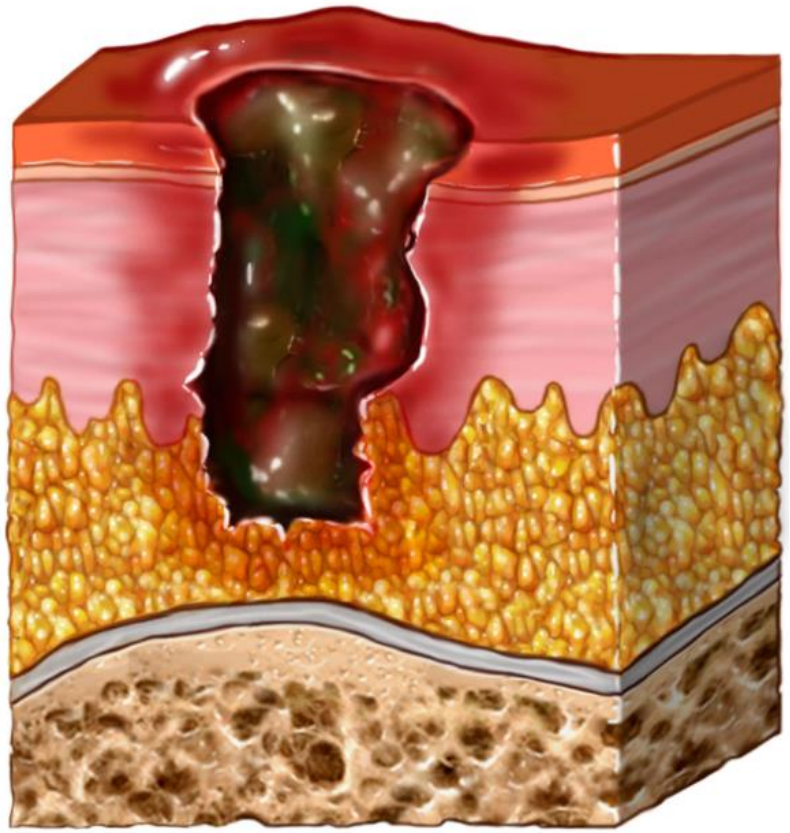
- Partial thickness loss of skin involving epidermis and/or dermis
- Presents as a intact or open serum filled blister or shallow crater



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

Pressure injury - Stage 3[4]

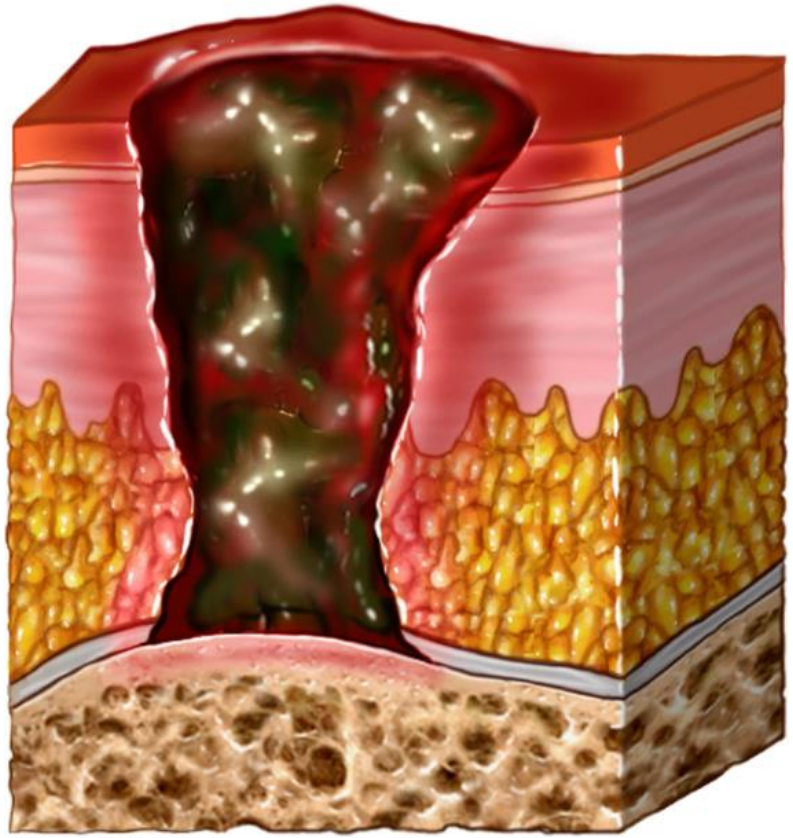
- Full thickness tissue loss involving damage to or necrosis of subcutaneous tissue
- May extend down to, but not through, underlying fascia
- Presents as a deep crater which may include undermining or tunneling



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

Pressure injury - Stage 4[4]

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



[4] 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

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

Considerations for mask selection

[6] Squardone, 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.

Mask design considerations[8]

- 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

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

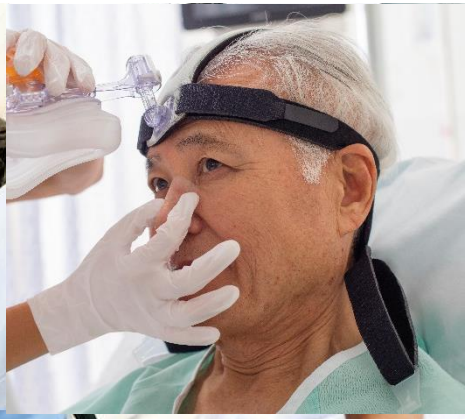
Patient considerations[9]

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

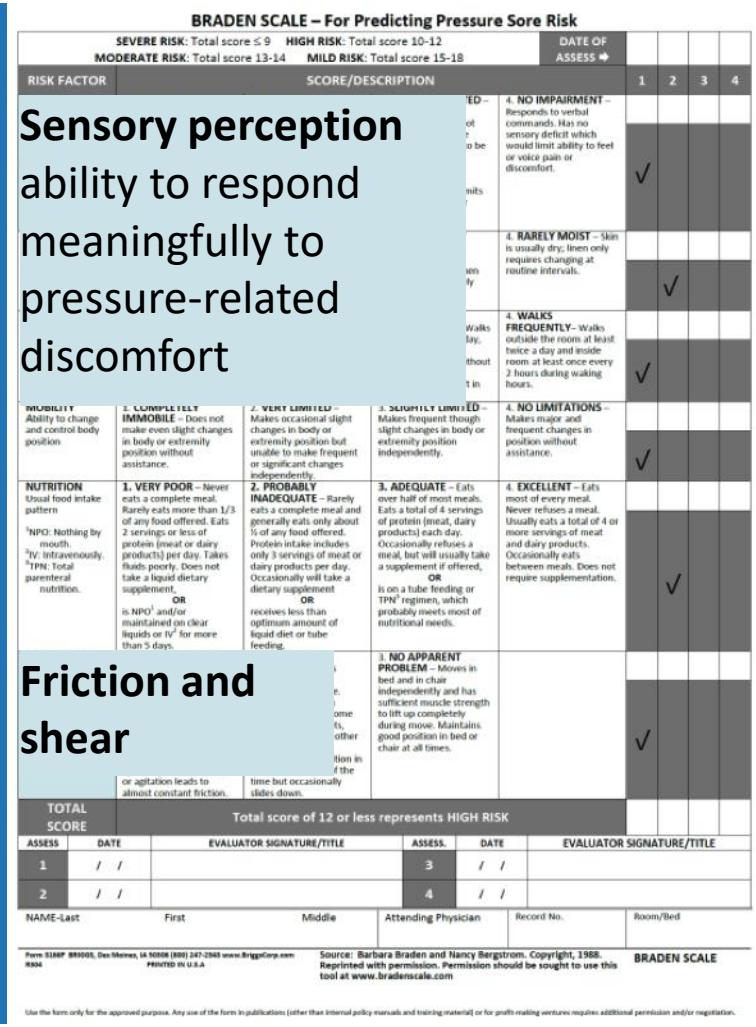
[9] Nava, S., Hill, N., Non-invasive ventilation in acute respiratory failure. Lancet 2009;374-250-59.

Choosing the right mask for your patient

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



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				4. **NO IMPAIRMENT** – Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.				
				4. **RARELY MOIST** – Skin is usually dry; linen only requires changing at routine intervals.				
				4. **WALKS FREQUENTLY** – Walks outside the room at least twice a day and inside room at least once every 2 hours during waking hours.				
MOBILITY Ability to change and control body position	1. **COMPLETELY IMMOBILE** – Does not make even slight changes in body or extremity position without assistance.	2. **VERY LIMITED** – Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	3. **SLIGHTLY LIMITED** – Makes frequent though slight changes in body or extremity position independently.	4. **NO LIMITATIONS** – Makes major and frequent changes in position without assistance.				
NUTRITION Usual food intake pattern [1]NPO: Nothing by mouth. [2]IV: Intravenously. [3]TPN: Total parenteral nutrition.	1. **VERY POOR** – Never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement, **OR** is NPO[1] and/or maintained on clear liquids or IV[2] for more than 5 days.	2. **PROBABLY INADEQUATE** – Rarely eats a complete meal and generally eats only about ½ of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement **OR** receives less than optimum amount of liquid diet or tube feeding.	3. **ADEQUATE** – Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) each day. Occasionally refuses a meal, but will usually take a supplement if offered, **OR** is on a tube feeding or TPN[3] regimen, which probably meets most of nutritional needs.	4. **EXCELLENT** – Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.				
Friction and shear			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.					
	or agitation leads to almost constant friction.	time but occasionally slides down.						
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

Source: Barbara Braden and Nancy Bergstrom. Copyright, 1988. Reprinted with permission. Permission should be sought to use this tool at www.bradenscale.com

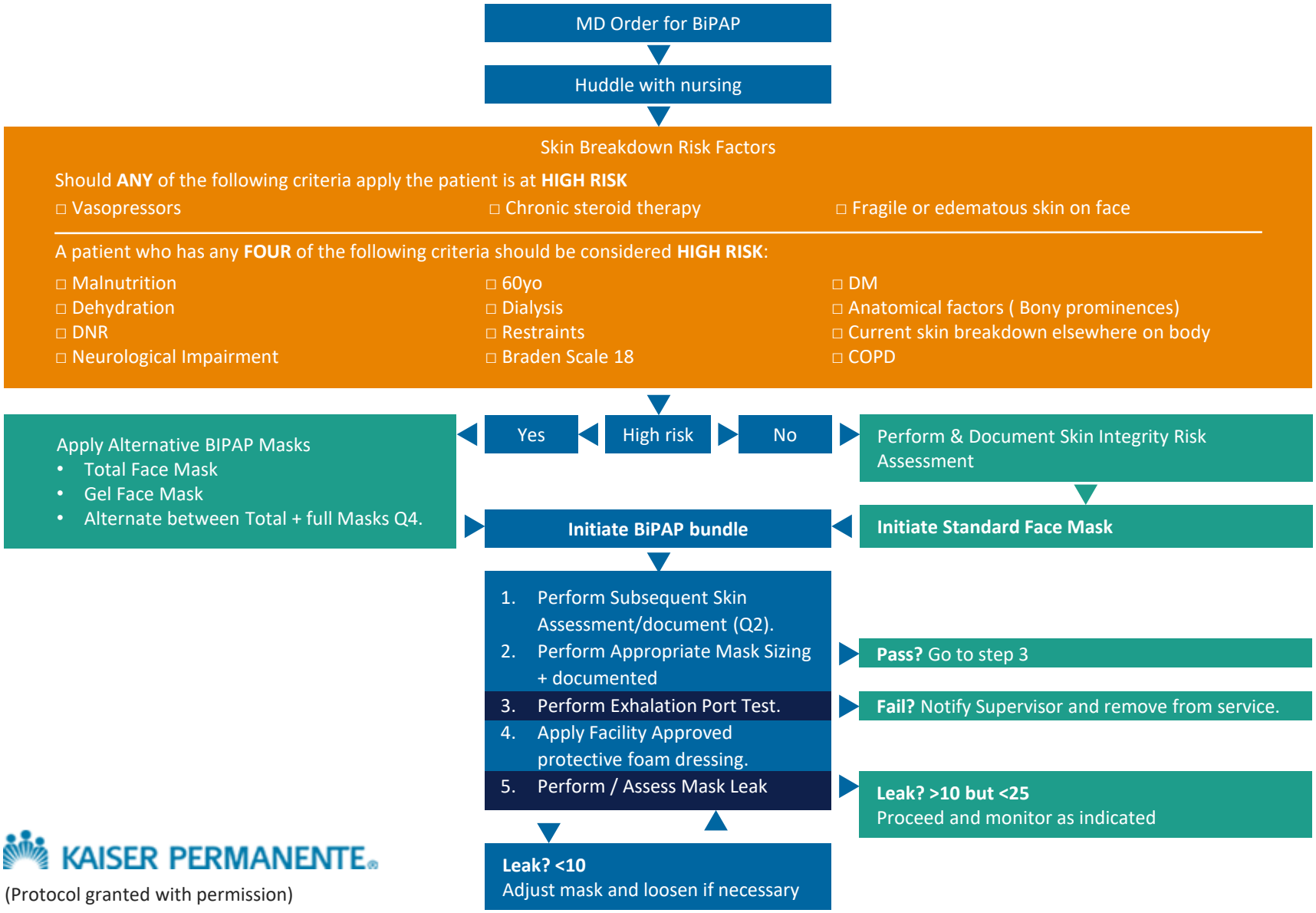
BRADEN SCALE

- 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



KAISER PERMANENTE®

 (Protocol granted with permission)

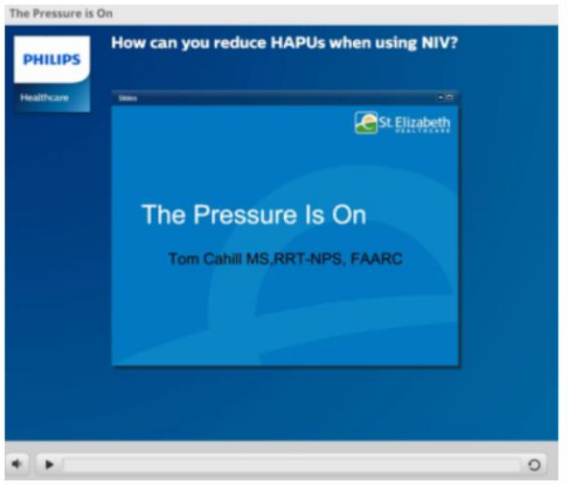
Mask rotation practices

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

Best practices

Saving Face

Strategies to reduce skin breakdown during NIV for patient care



Visit www.thinkniv.com

In literature[8]

Noninvasive ventilation masks are associated with pressure injuries 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

[8] Squardone, 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..

In literature[8]

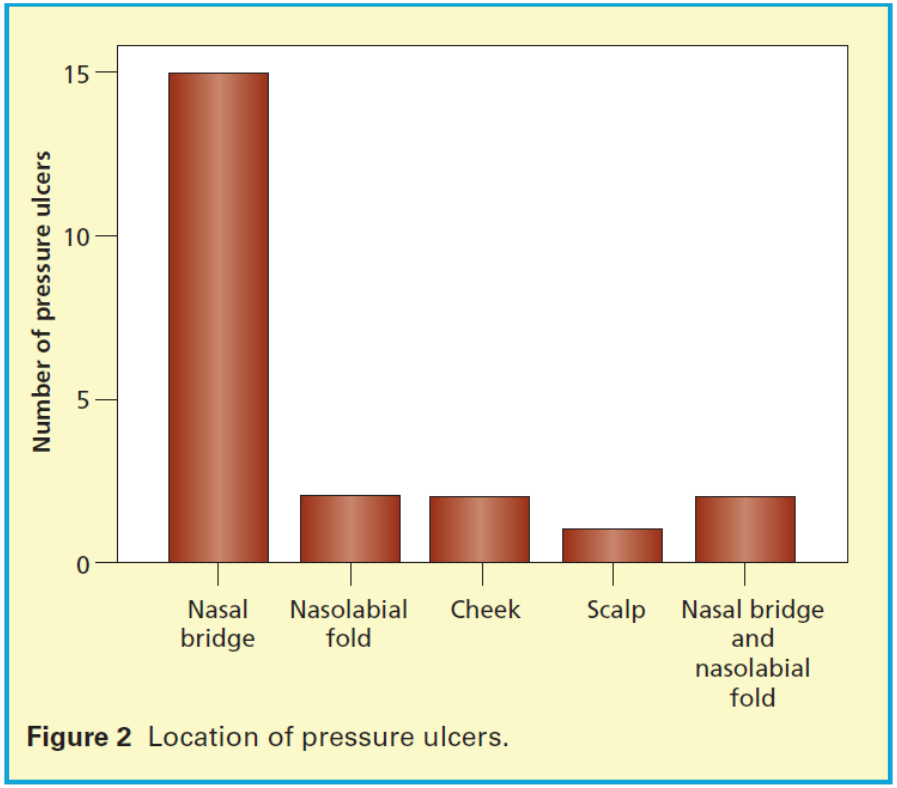


Figure 2 Location of pressure ulcers.

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.

[8] Schallom M, Cracchiolo L, Falker A. Pressure ulcer incidence in patients wearing nasal-oral versus full-face noninvasive ventilation masks. American Journal of Critical Care Medicine. 2015;24(4):349-356.

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


PHILIPS