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sense and simplicity

Saving Face

Strategies to avoid skin breakdown during NIV

Hospital Respiratory Care
Education Department
August 02, 2011

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Focal areas

NIV Complications

Patient Assessment

Wound Reduction

Noninvasive ventilation

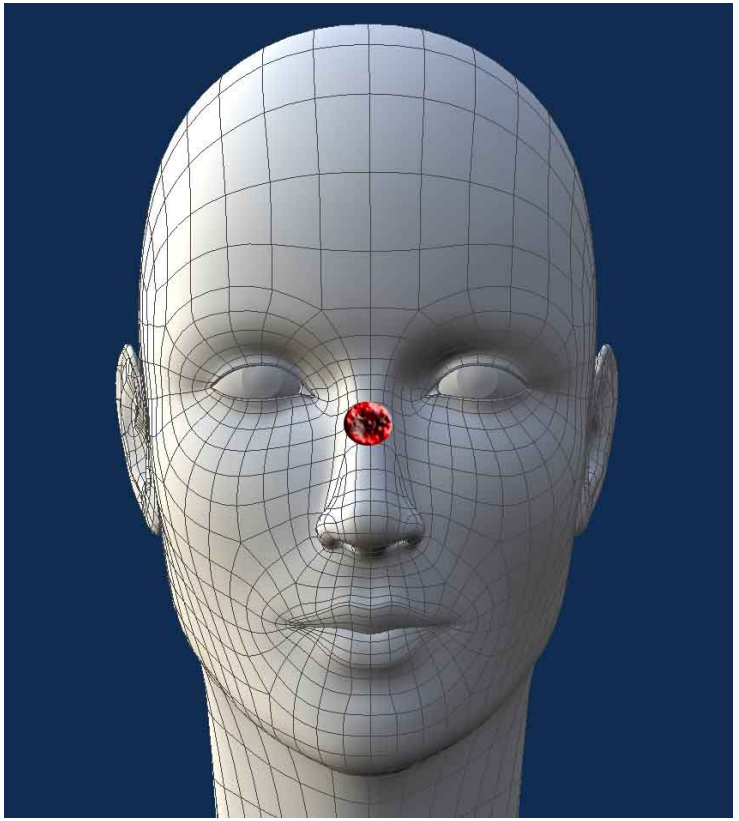
"There is arguably more evidence to support the use of noninvasive ventilation (NIV) than any other practice related to the care of patients with acute respiratory failure"[1]

NIV can also be associated with skin breakdown, leading to formation of hospital-acquired pressure sores

[1]Hess, D.; Patient –ventilator interaction during noninvasive ventilation. *Respir Care 2011;*56(2):153:165

Incidence of skin breakdown

- “Among the adverse effects of mask ventilation, skin breakdown, which occurs at the site of mask contact 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%”[1]



[1]Gregoretti et al. Evaluation of patient skin breakdown and comfort with a new face mask for non-invasive ventilation: a multi-center study. *Inten Care Med 2002*; 28:278-284.

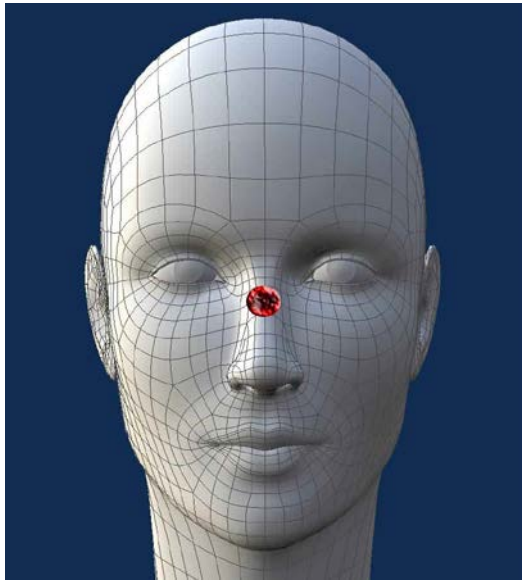
CMS reimbursement changes

- CMS classified Stage III and IV pressure ulcers as a preventable Hospital Acquired Condition (HAC)[1]
- *No longer reimbursed by current insurance guidelines[1]*
- Focal topic at the 2011 National Pressure Ulcer Advisory Panel (NPUAP) Meeting[1]

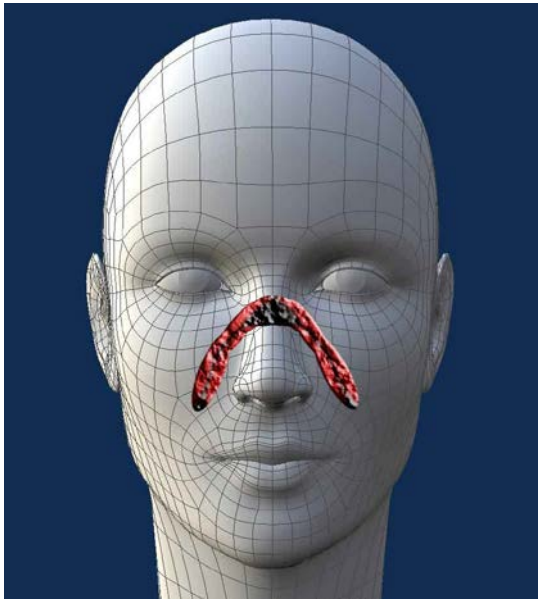
[1]http://www.cms.hhs.gov

Pressure ulcers

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



Most common on bridge of nose

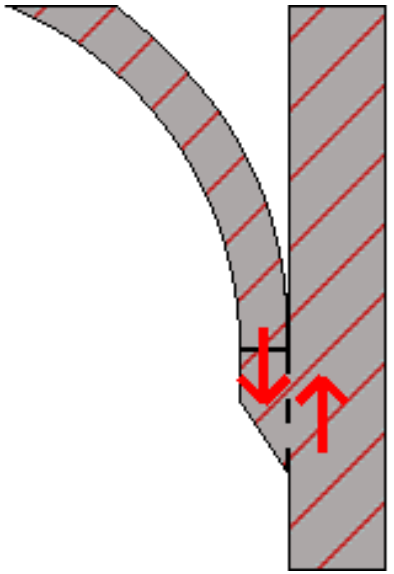


Extreme cases involve surrounding areas

NIV Complications

Pressure tolerance[1]

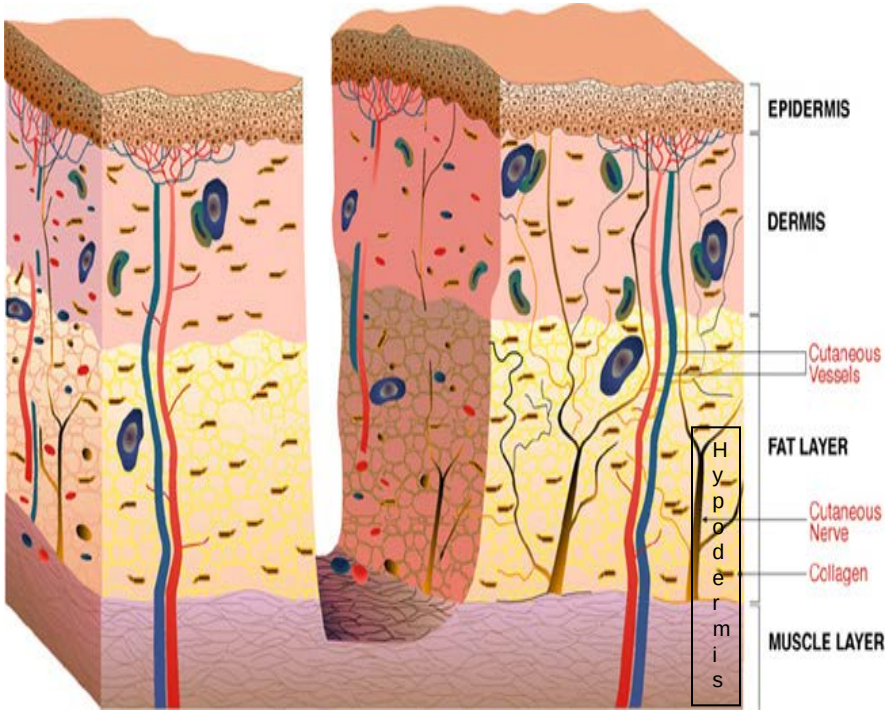
- Shearing forces cause stretching, kinking, and tearing in the subcutaneous tissues leading to deeper tissue necrosis
- Compressive pressure should be < diastolic BP
  - Secondary goal is < capillary BP (32-45 mmHg)
  - Duration of pressure exposure is extremely important
  - Pressure increases markedly over bony prominences



Shearing forces

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

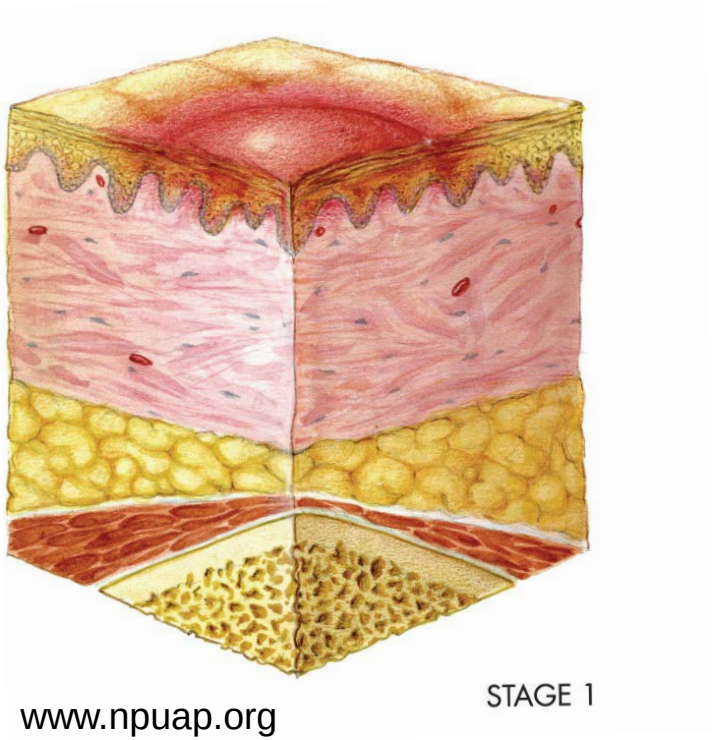
Skin anatomy and physiology



www.npuap.org

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

Pressure ulcer - Stage 1



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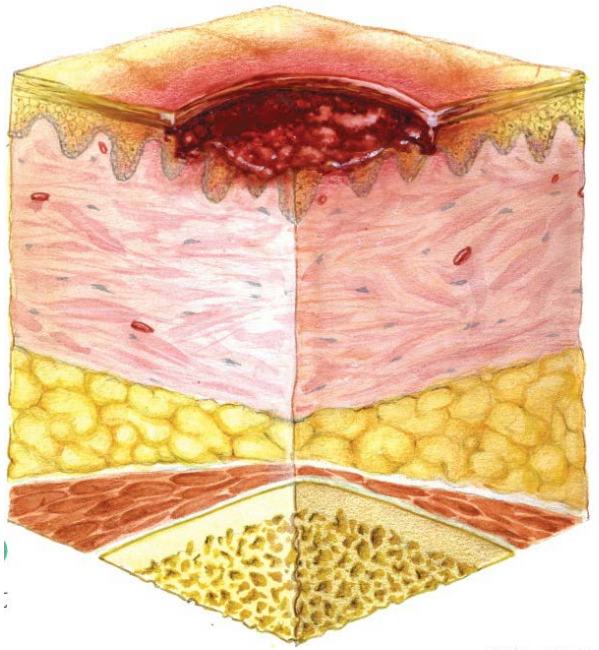
- Intact skin with non-blanchable redness
- A change in the skin temperature (warm or coolness)
- Tissue consistency (firm or boggy feel)
- And/or sensation (pain or itching)

Pressure ulcer – Stage 2



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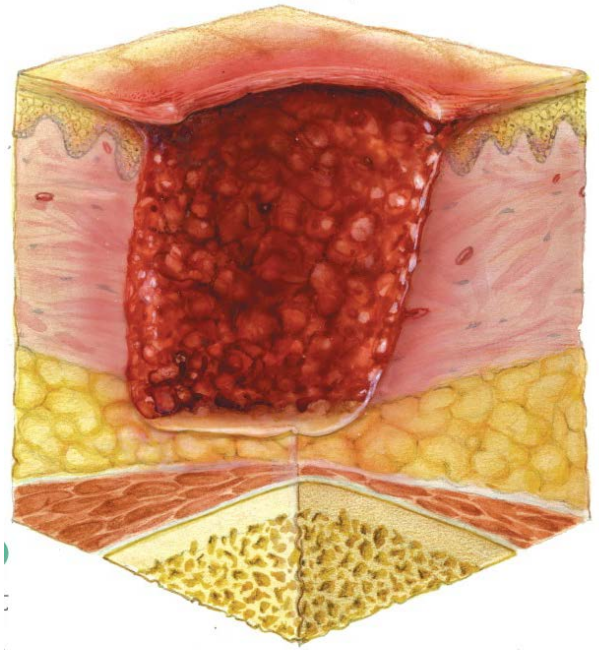
- Partial thickness loss of skin involving epidermis and/or dermis
- Presents as a intact or open serum filled blister or shallow crater

Pressure ulcer – Stage 3



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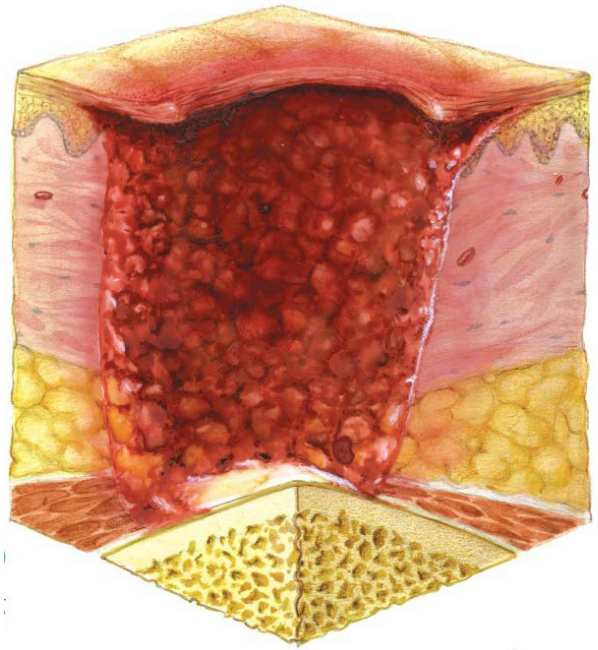
STAGE 3

- 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



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

Initial assessment

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

Assessment and documentation

Patient Assessment

- *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* on the respiratory flow sheet or the treatment plan if a wound or red area is present
- *Document* off-loading and/or implementation of protective devices

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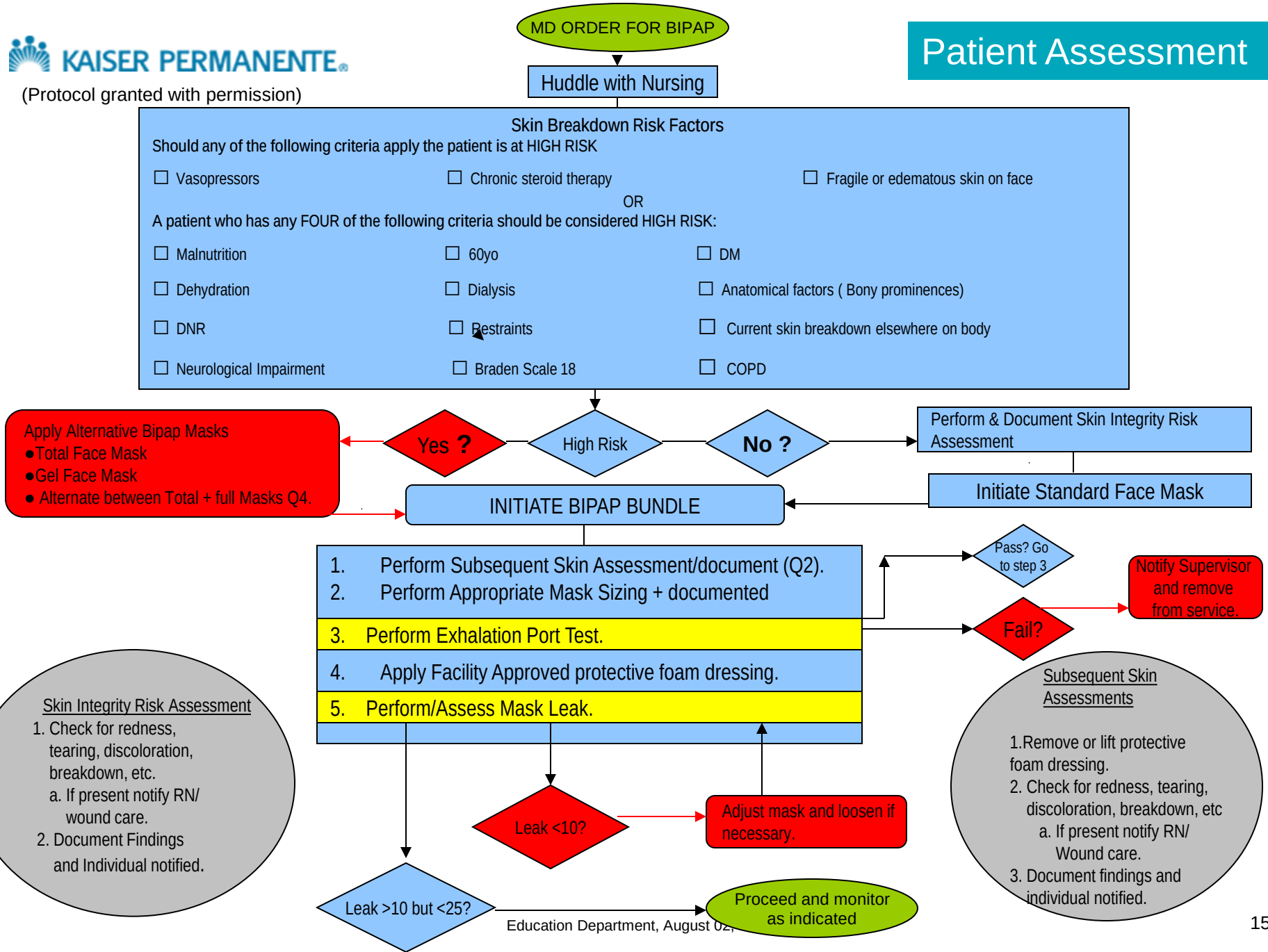
Patient Assessment



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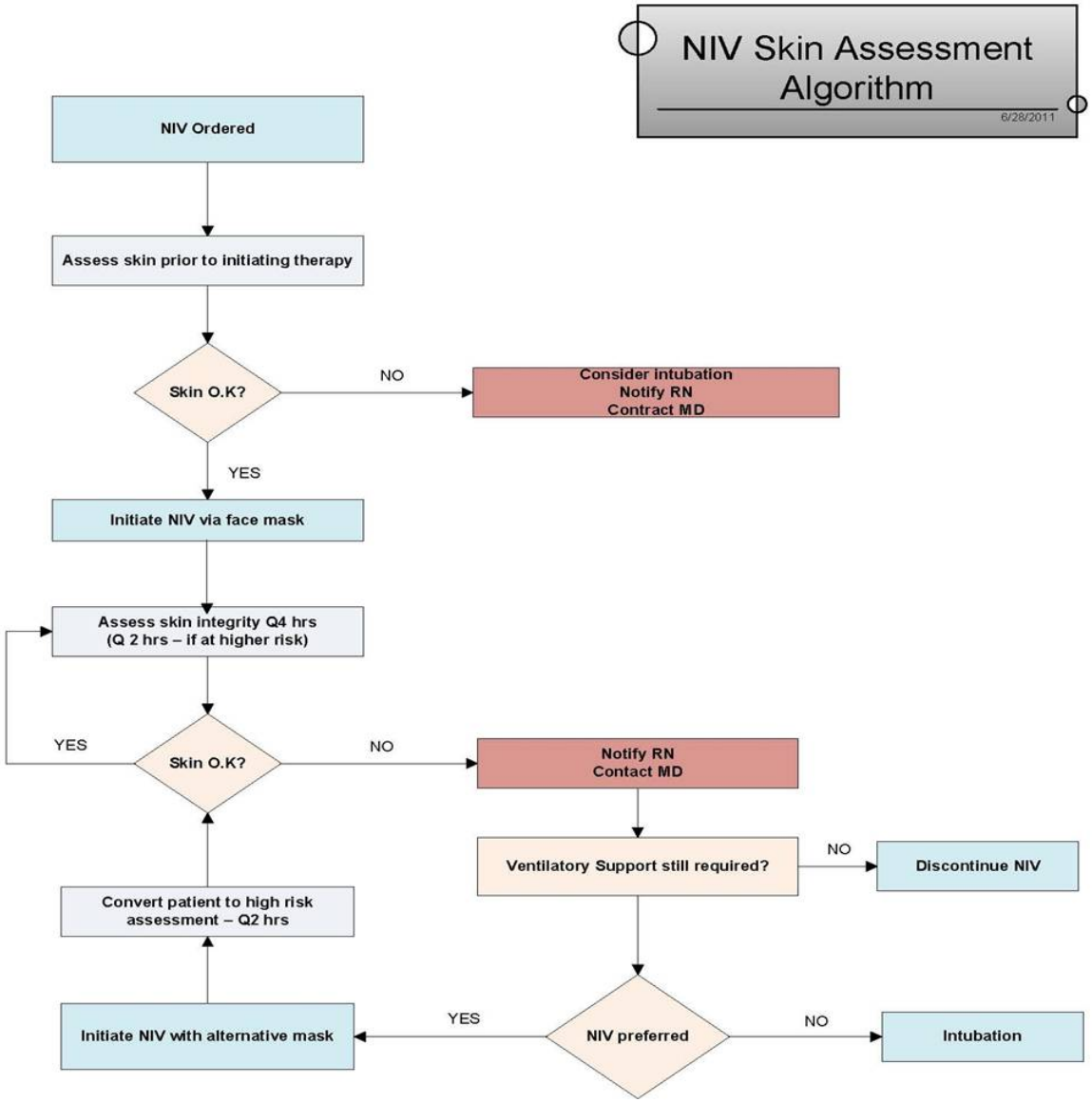
Patient Assessment



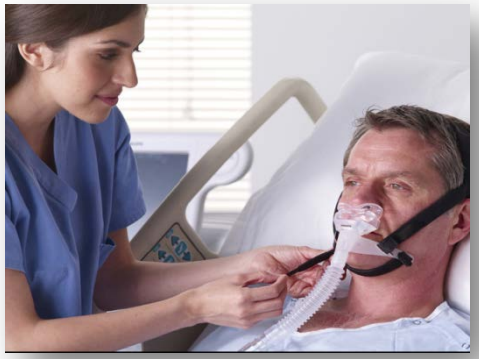
Clinical considerations

- Clinicians remove and reposition masks many times per day[1]
  - Mouth Care
  - Medication administration
  - Hydration
  - Mask breaks
- Select a mask that can be easily repositioned correctly

[1]Hilbert et al. Noninvasive ventilation for acute respiratory failure. Quite low time consumption for nurses *Eur Respir J* 2000; 16:710-716

Choose the right mask design

Patient Assessment



Up to 50% of NIV failures are related to the mask[1]

[1]Nava et al. Interfaces and humidification for noninvasive ventilation; *Respir Care 2009*; 54:71-82

Mask selection considerations

- Estimated length of use
- Compatibility with device
- Safety features
  - Quick release clips
  - Anti-asphyxia valves
- Facial features
  - Skin condition
  - Facial abnormalities

Patient selection considerations

- Mouth breather
- Claustrophobic
- Level of consciousness
- Cooperation
- Facial structure

Mask selection considerations

- Mask types
  - Total face mask
  - Oro-nasal face mask
  - Nasal mask
  - Nasal prongs
- Headgear selection
  - Four-point straps
  - CapStrap
- Soft, self-sealing cushions
  - Balanced pressure on nose, chin, and forehead
- Anti-asphyxia features

Airflow and pressure-related complications of NIV

Adverse Effect	Remedy
Nasal congestion	Try humidification or speak to the physician for various remedies to assist with this problem
Nasal or oral dryness	Add humidification, nasal saline, oral/nasal hygiene, or decrease leak
Sinus or ear pain	Lower inspiratory pressure
Gastric inflation	Avoid excessive inspiratory pressures (over 20 cmH_2O)
Eye irritation	Check mask fit, readjust bottom headgear straps
Failure to ventilate	Use sufficient pressures, optimize patient-ventilator synchrony

Mask-related complications of NIV

Adverse Effect	Remedy
Discomfort	Check fit, adjust straps, change mask
Excessive air leaks	Realign mask, check strap tension, change to full face mask
Nasal bridge redness or ulceration	Use artificial skin, minimize strap tension, use spacer, alternate mask or use a PerforMax or Total face mask
Skin irritation or rashes	Use skin barrier lotion and/or topical corticosteroids, change to mask made from a different material, properly clean mask
Claustrophobic reactions	Try nasal mask or PerforMax or Total face mask, sedate judiciously

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Mask rotation practices

Wound Reduction

By rotating mask designs, the pressure points are redistributed to help prevent skin breakdown

Summary - Helping prevent pressure ulcers

- Good patient assessment is essential
  - Identify persons at risk
  - Document skin integrity on admission
- Proper mask design selection
  - Total face, oro-nasal, gel, nasal
  - Rotate designs to redistribute pressure points
- Keep mask leak no less than 7 L/min
- Skin care and early interventions
  - Use barriers as needed
- Continuing education


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