

The Role of RT's "Reducing PU's"

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Objectives

- Discuss how RT's can get involved
- Uncover 3 Respiratory Devices that cause Pressure Ulcers & Highlight Interventions
- Review Future Technology and Research

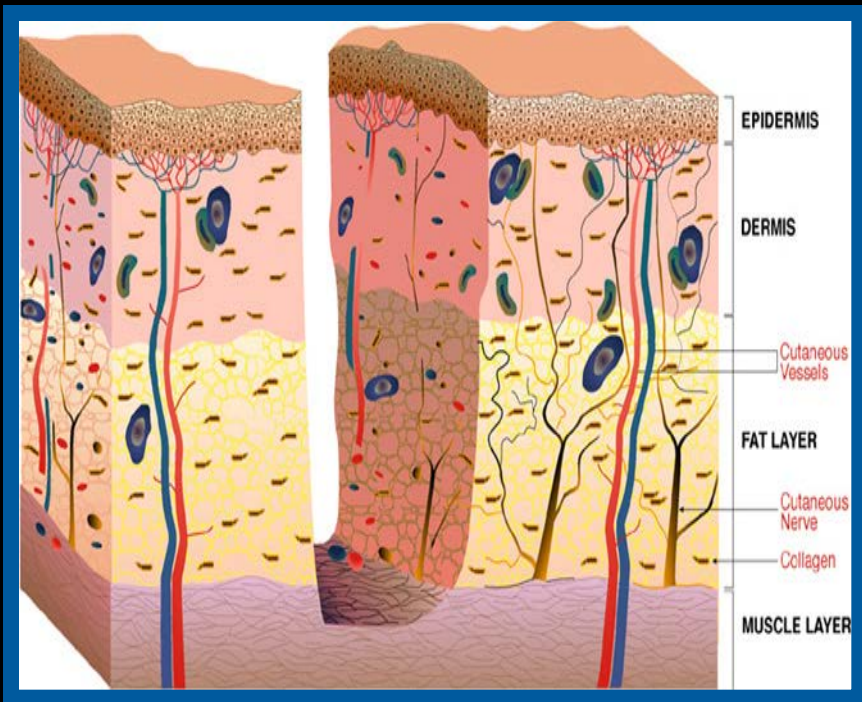
Respiratory Device Related PU's



FACTS- “The Skin”

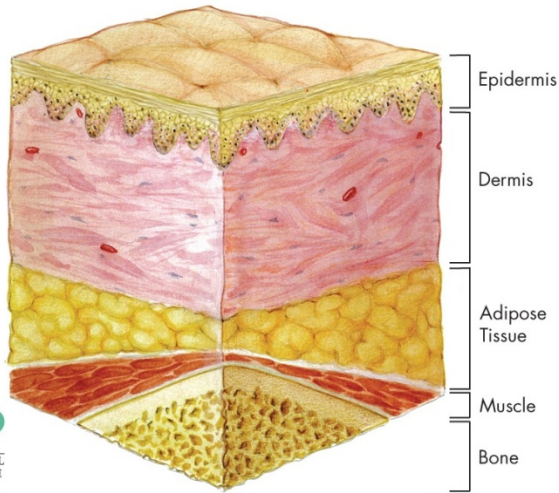
- Skin is the largest organ of the body
- Accounting for 15% of our body weight
- 1/3 of the bodies circulating blood volume
- The skin is composed of three layers:
 - Epidermis
 - Dermis
 - Subcutaneous layer

Brief Anatomy and Physiology

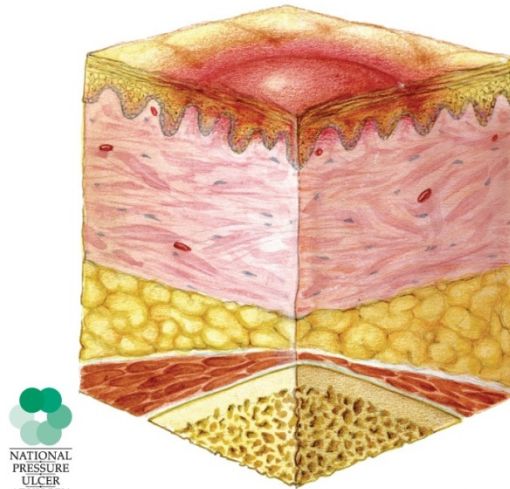


- Epidermis
 - the outer layer of skin
 - shedding every 21 days
- Dermis
 - contains nerve endings, blood vessels, oil glands, and sweat glands. It also contains collagen and elastin.
- Hypodermis
 - The subcutaneous tissue is a layer of fat and connective tissue that houses larger blood vessels and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

Pressure Ulcers

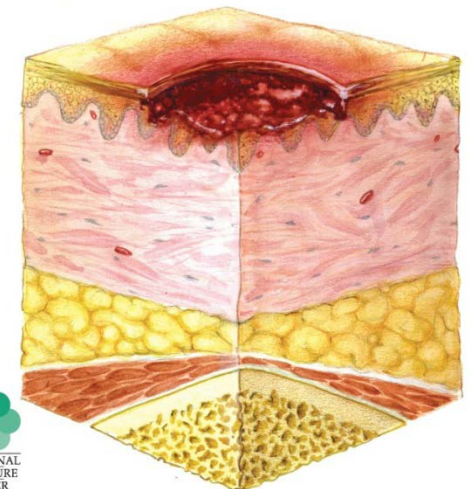


NATIONAL
PRESSURE
ULCER
ADVISORY
PANEL



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STAGE 1



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STAGE 2

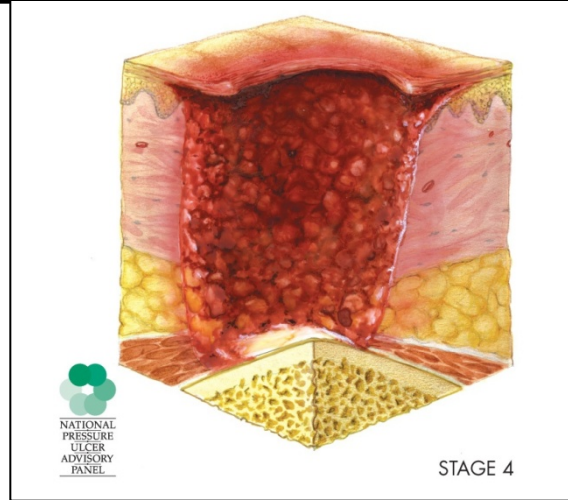
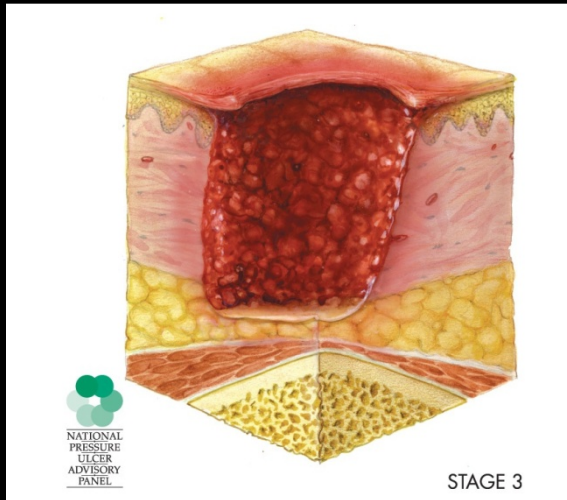
Normal Skin

Stage I:
Non-
blanchable
Redness

Stage II:
Partial dermal
loss, shallow
open ulcer or
intact blister

National Pressure Ulcer Advisory Panel, 2007

Pressure Ulcers



Stage III:
Dermal loss with
visible
subdermal
elements, e.g.,
fat

**Stage IV: Full
thickness
tissue loss with
visible bone,
tissue or
muscle**

**Unstageable:
Covered with
slough or black
eschar, by
definition III or
IV**

PU's During NIV



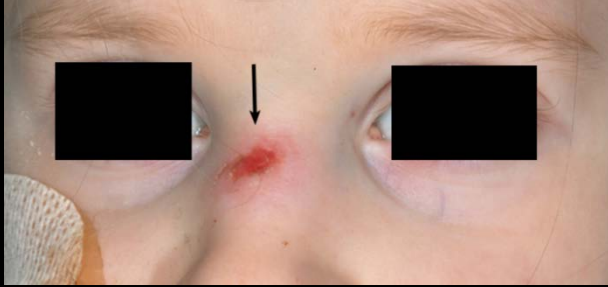
Complications of NIV

Elderly and Pediatric Patients

- At risk for pressure ulcers (PUs) due to
 - immature skin
 - compromised perfusion
 - decreased mobility
 - altered neurological responsiveness
 - fluid retention
 - moisture
 - medical devices



PU's from NIV Interfaces



Stage II: Bridge of Nose

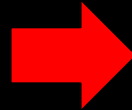


Stage I: Cheeks, Forehead



Stage III: Bridge of Nose

- This stage II PU occurred after one night of mask wear.



Stage II: Forehead

PU on Cheek/ Lower Jaw



Progression: After Mask Removal



Mask removed - morning
Stage I: Bridge of Nose



0.5 hr
after



2 hr
after

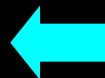


4.5 hr
after

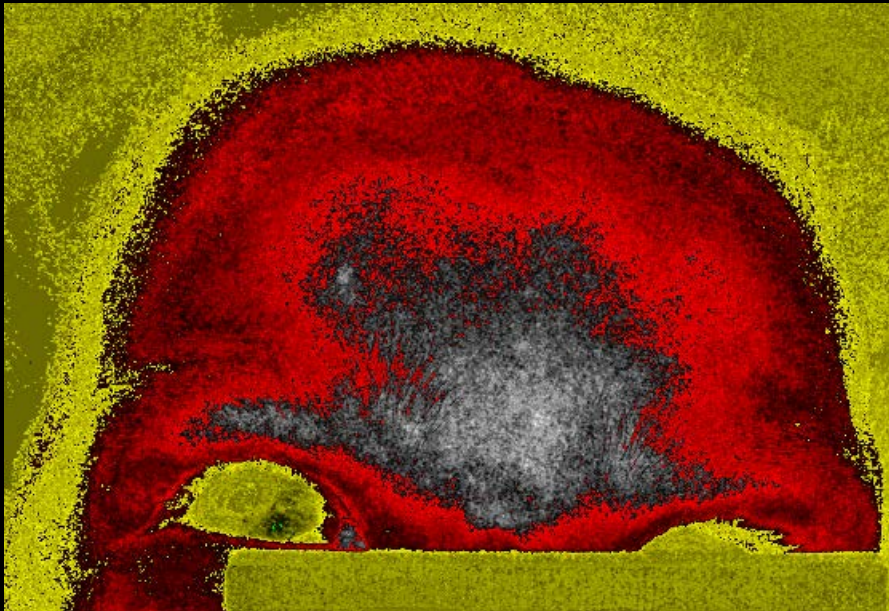
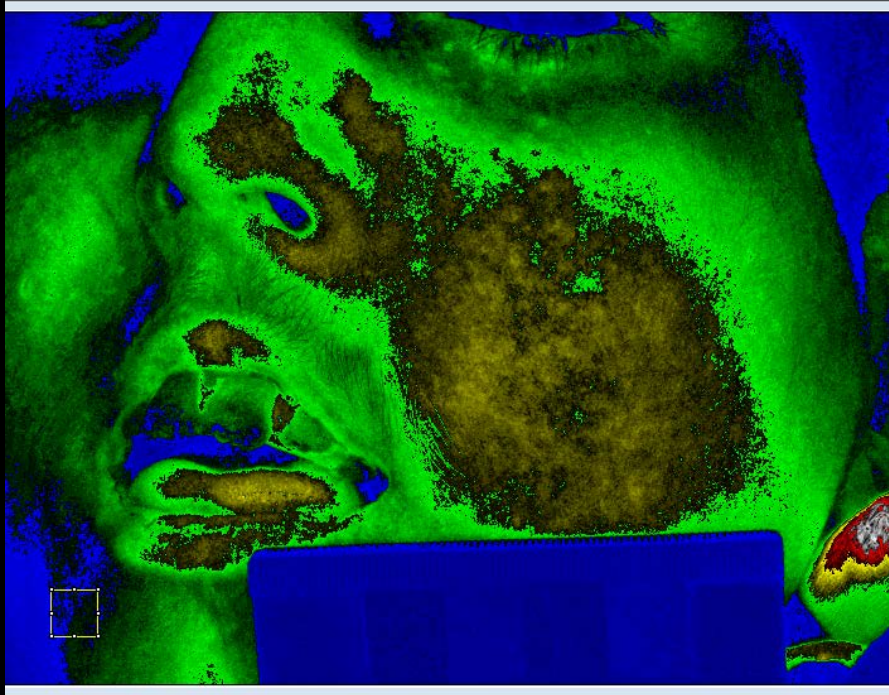


10
hr

Tissue compromise does not
resolve before the mask has
to be worn overnight again.



High resolution color imaging and analysis



NIV Masks



Phillips PN831®



Phillips
PerforMax®



Phillips
EasyLife®



Phillips
Simplicity
®



Phillips
Profile Lite®



Phillips AF531®



MiniMe®

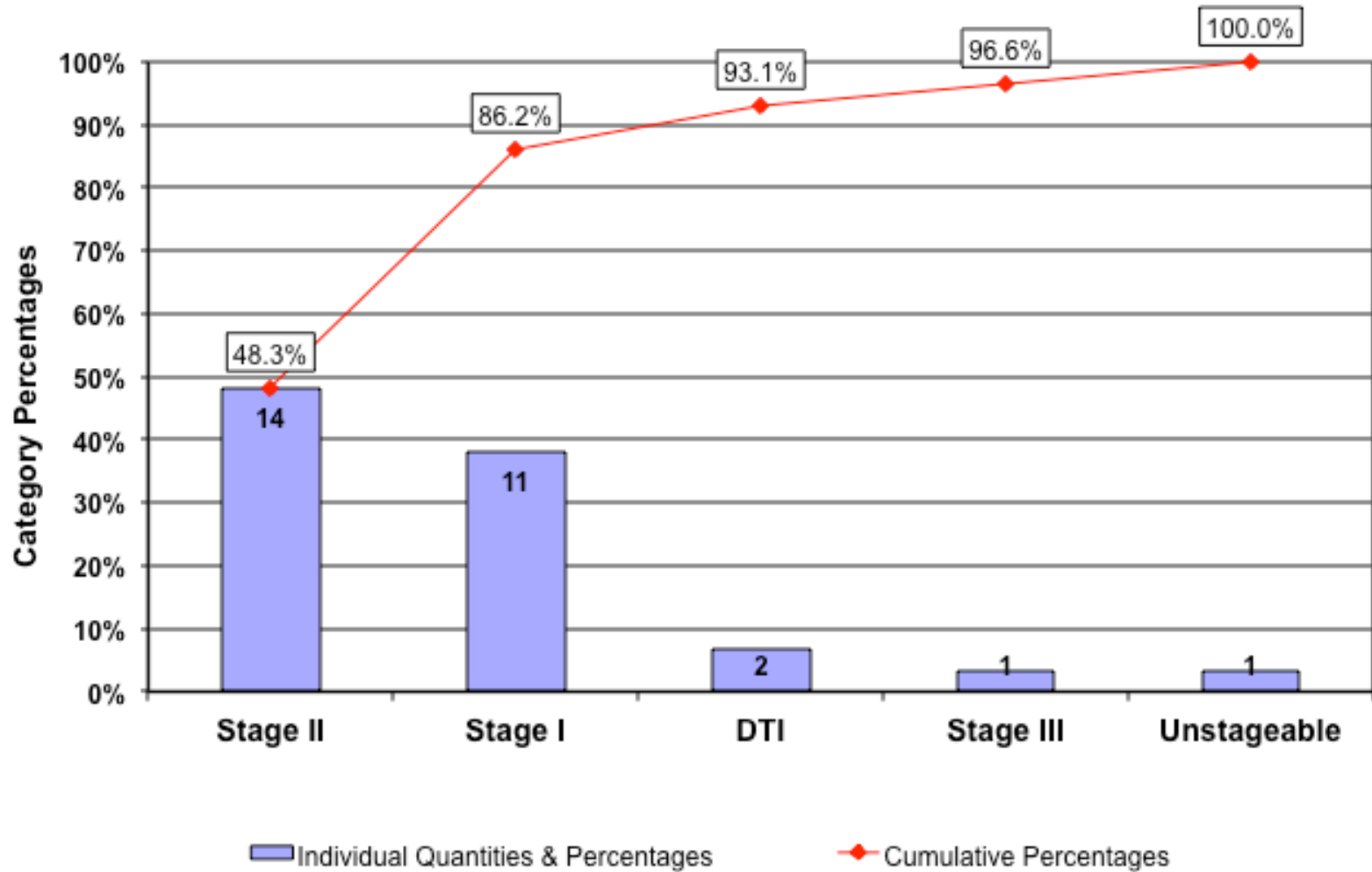


Circadianc
Sleepweaver
®

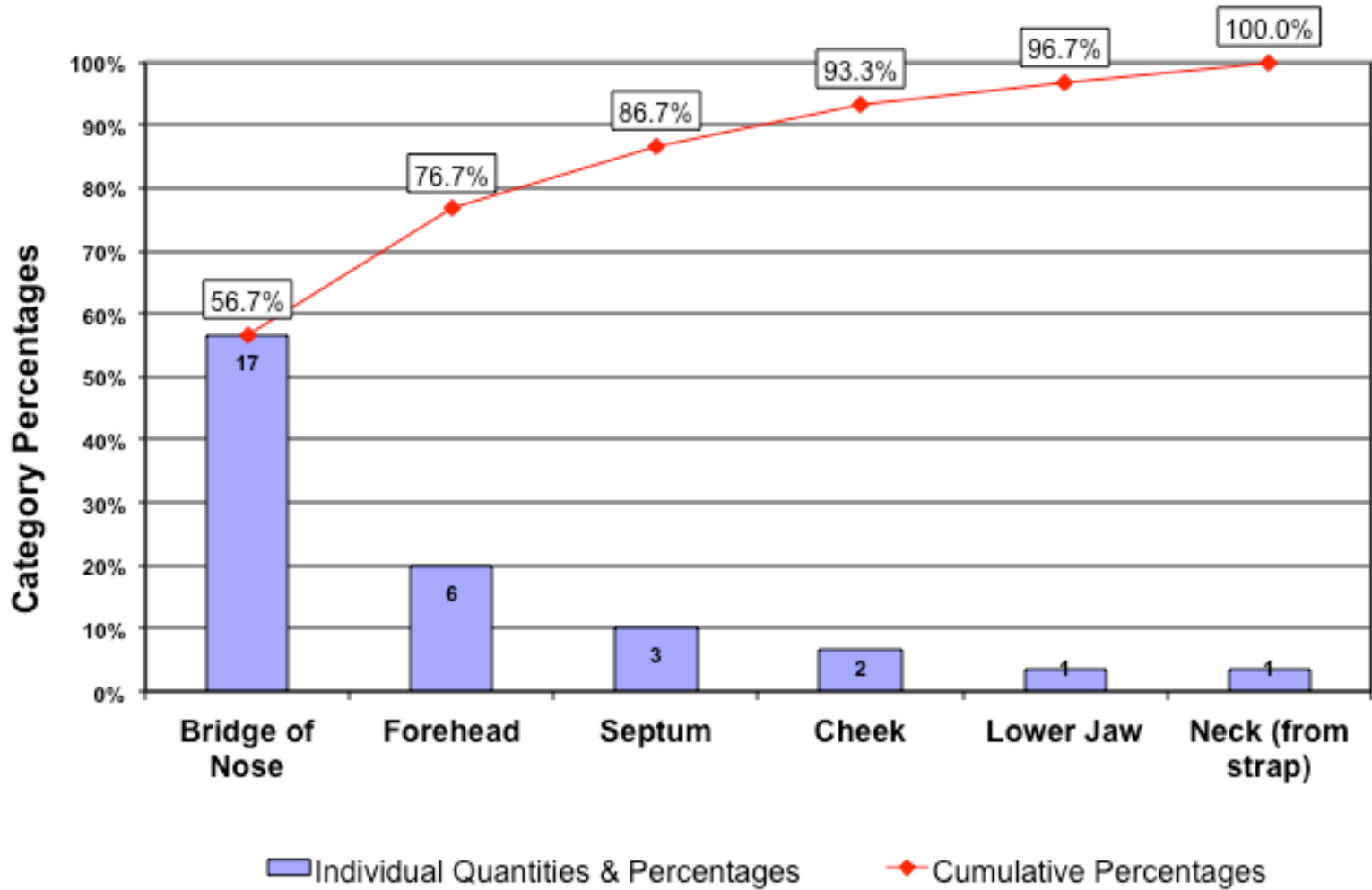


Contour
Deluxe®

% NIV PU's per stage July 2012-Current



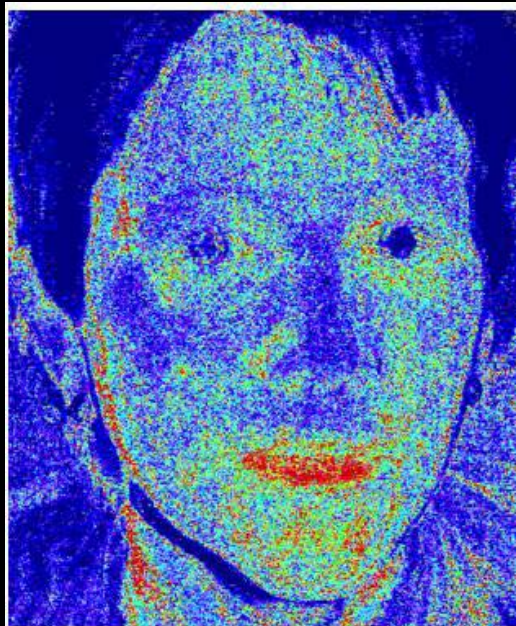
Location of Pressure Ulcers from NIV (2012-Current)



Questions and Possible Explanations

1. Why did so many stage II ulcers occurred on the bridge of the nose?
2. What features of face masks could be responsible?

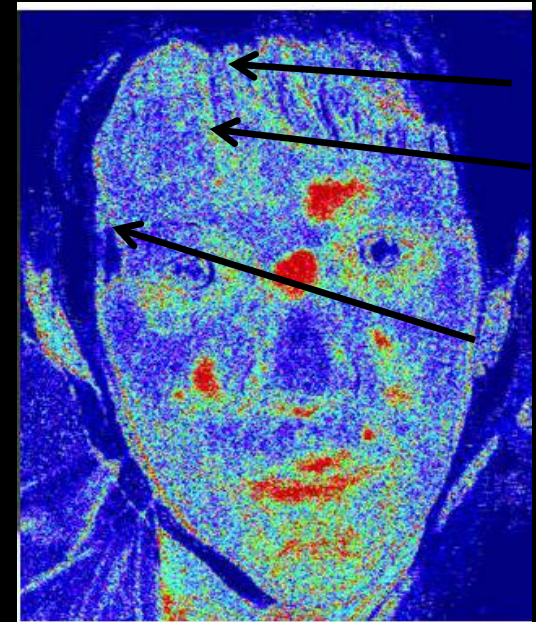
Decreased Perfusion



Perfusion before mask



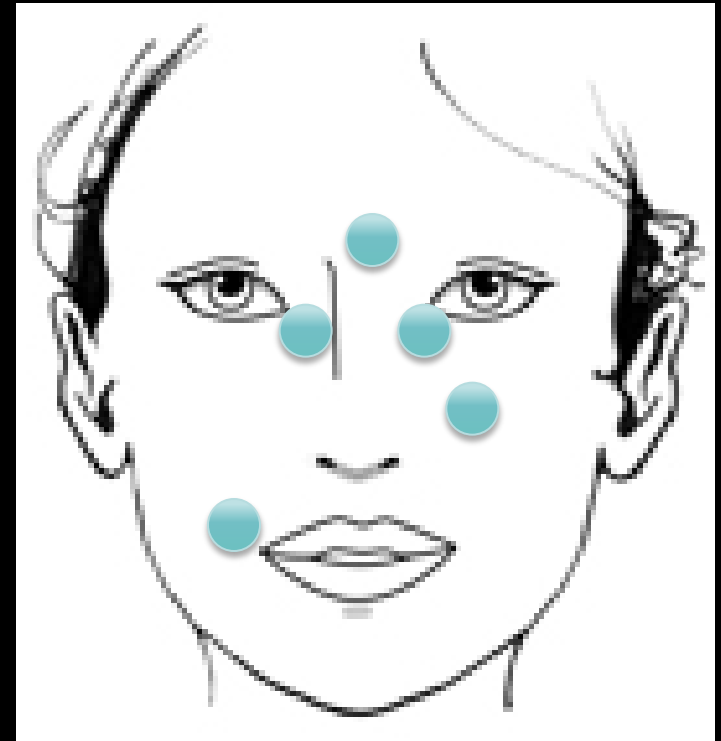
Subject with mask



Perfusion after mask

Problem #1= Moisture

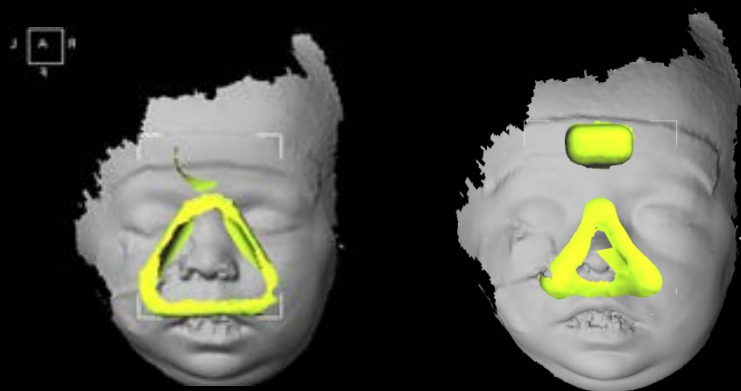
- Masks are often occlusive & *impermeable* to TEWL allowing moisture accumulation.
- Wet skin is susceptible to frictional effects, e.g., blistering.
- Immediately after removal:
Capacitive reactance (NOVA DPM 9003)



Mask Fit

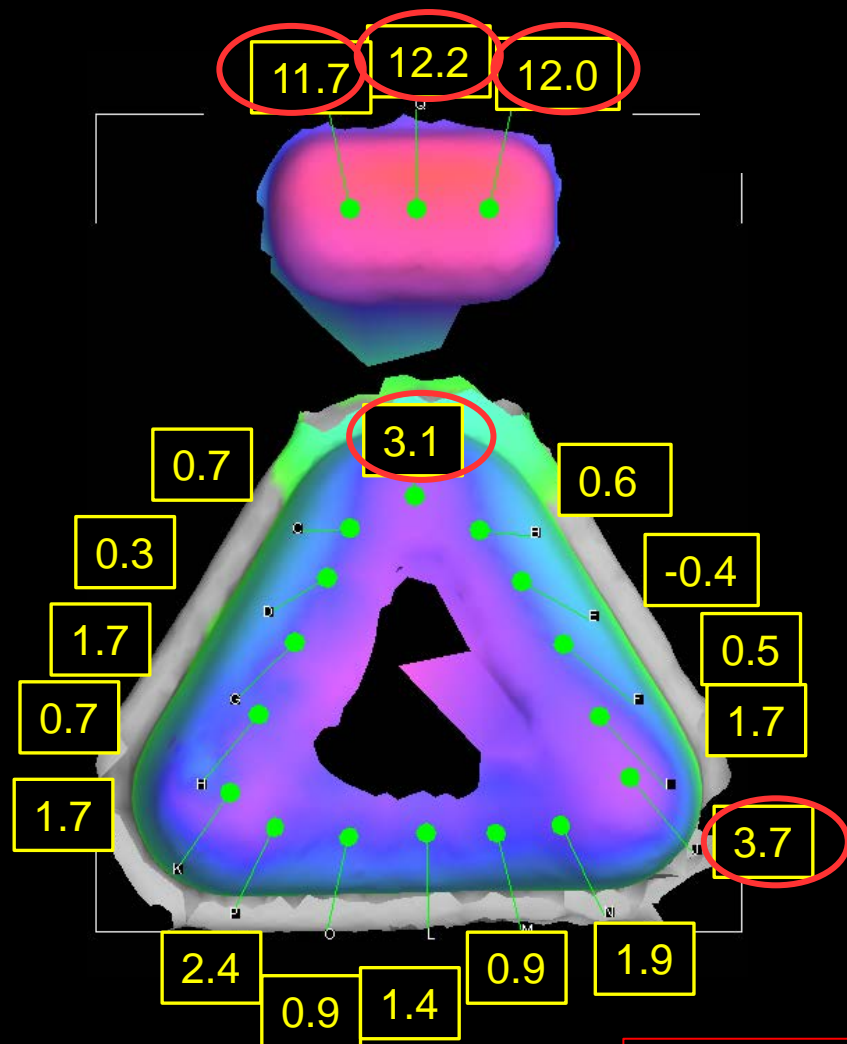
Nasal Gel Mask

Note areas of redness



Front view

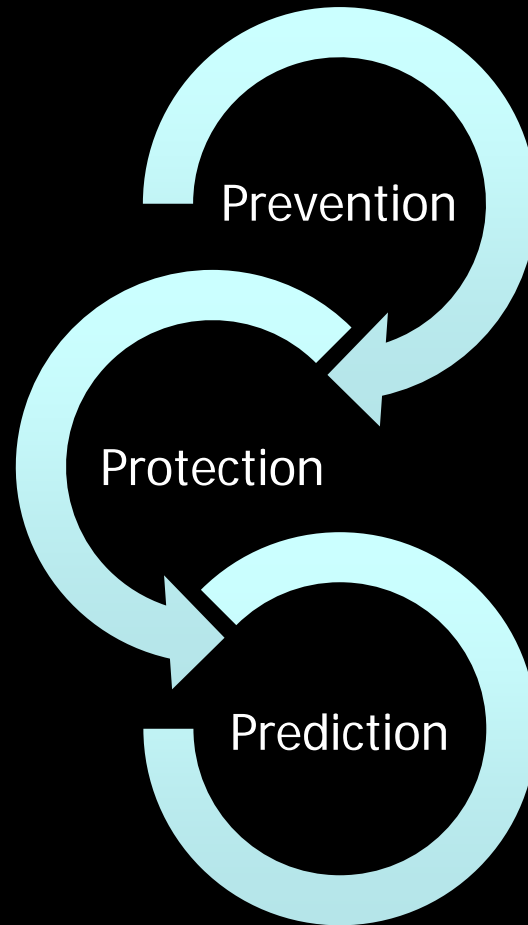
From behind



$M = 3.0$
 $sd = 4.1$

$M \pm sd = 7$

Focus on 3 P's



Face Mask Care Standards

- Assess skin under mask Q4 hours
- Rotate mask to offload pressure as able
- Wash face
- Wash mask to remove oils
- Apply barriers to redness and high risk areas (goal is to wick away moisture)

Rotate Mask/Offset Pressure



Barriers



Pulse Ox Probes





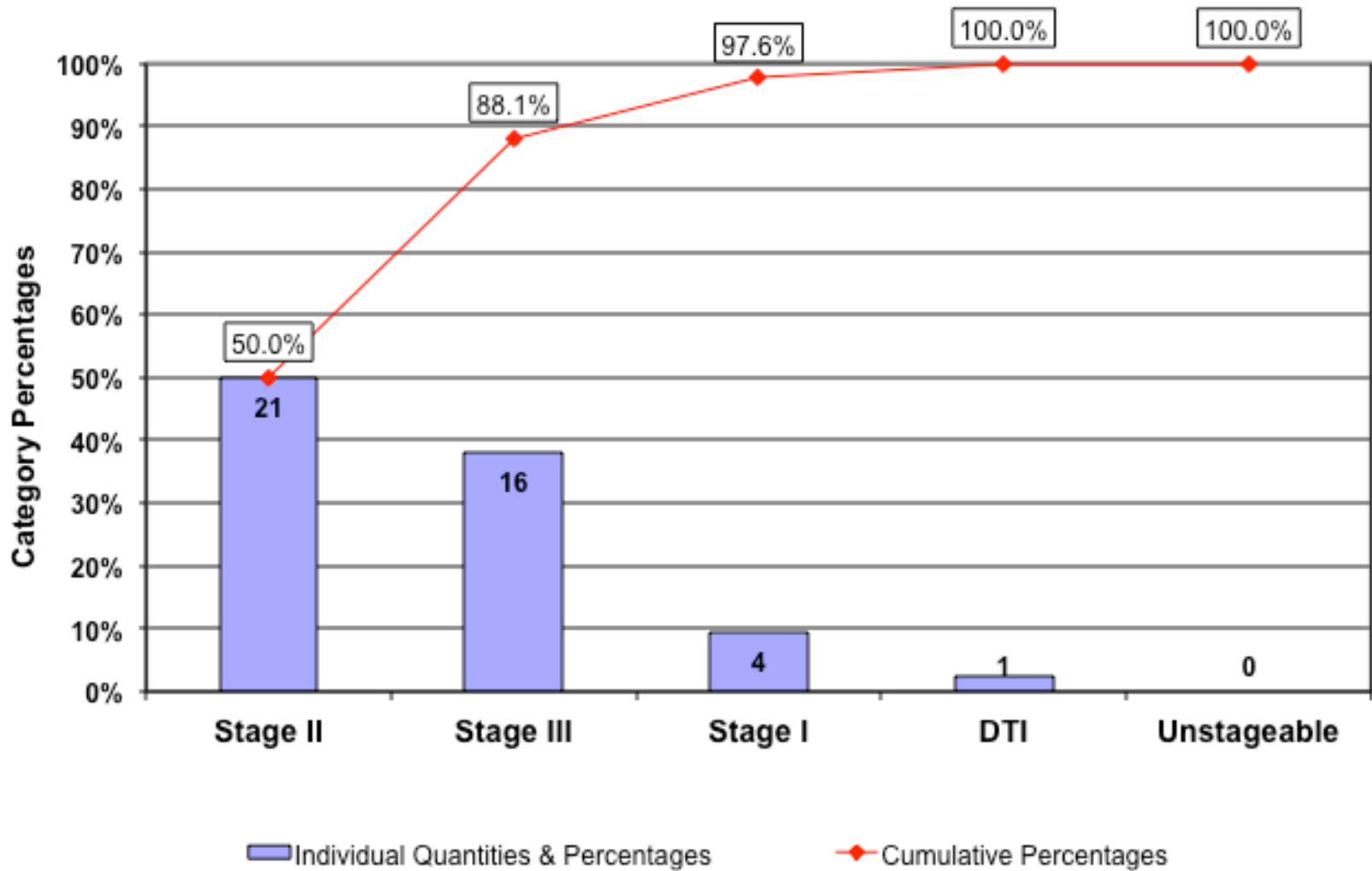
Prevention: Pulse ox Probes

- Rotate site Q8 hours
- Eliminating bad practices
- Change Q24 hours
- Low profile MLNC cables and sensors

Trach Related PU's



% Trach PU's per stage July 2012-Current





Prevention: Trachs

- Extended Trachs
- Mepilex Lite under Trach site in OR
 - Moisture management
 - Routine Trach Care
- Research study/ Post op Patients

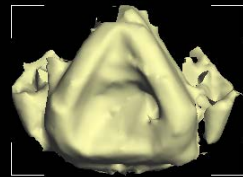
Thermal Imaging



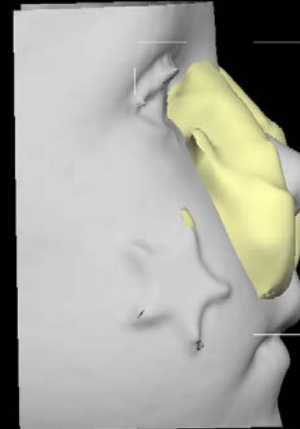
3D Camara



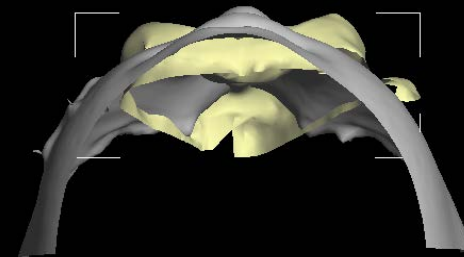
3D Surface Imaging



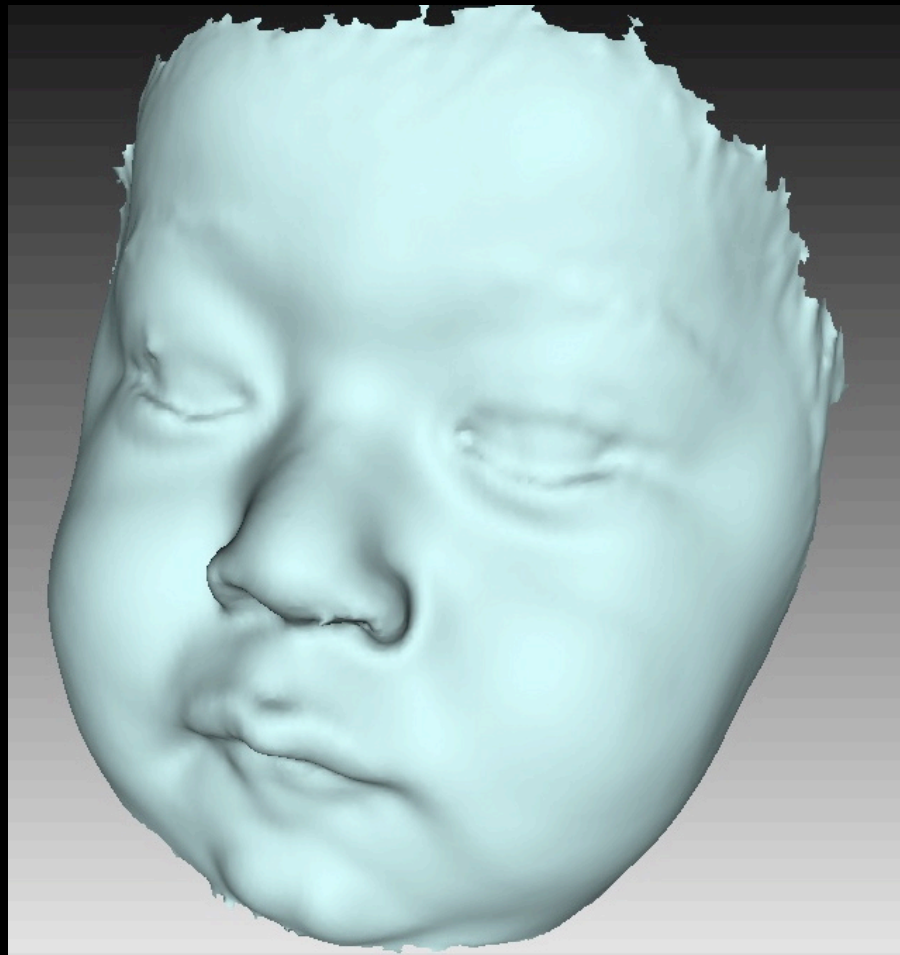
- 3D surface images of patient face and mask.



- Rotate both 90°
- Measure fit



3D Image



Objects

Name	Transparency
<input checked="" type="checkbox"/> M094_mi...	
<input checked="" type="checkbox"/> Mask_mi...	

3D Viewer

Home Basic Settings Superimposition Radiography 3dMD Analysis Multimedia Refinement Simulation

Density Medium Trans

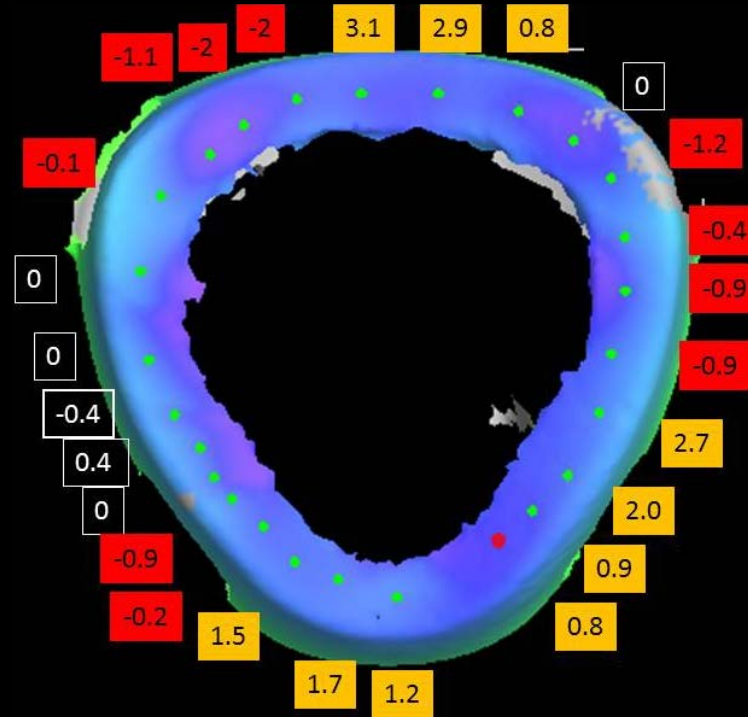
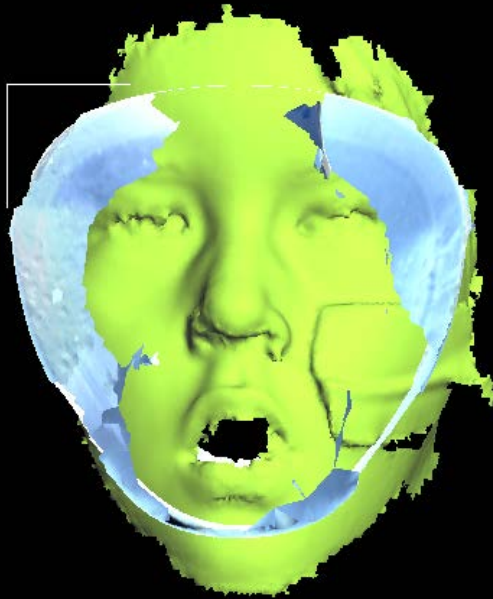
Lock Rotation Lock Position

Select All Select None

Object Properties Objects

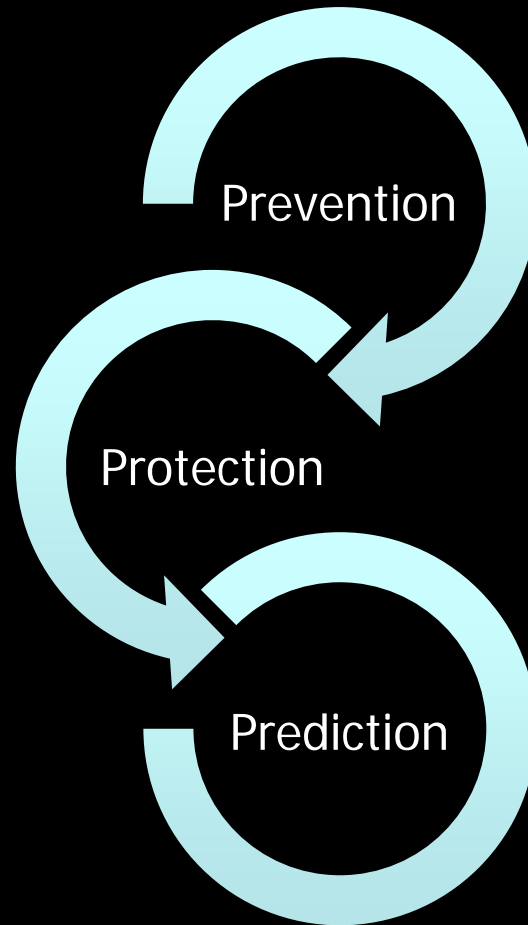


3D Surface Imaging



- **Red** areas show the distances (mm) “pushing” into the face.
- **Gold** areas show the distance away from the face.
- The mask is tightened to reduce leak.

Take Home Messages ?



Questions?

