Prevention of Respiratory Device–Related Pressure Ulcers: A Collaborative Research Project

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Background: the Literature
(Black et al., 2010; Edsberg et al., 2014)

• Medical devices have been identified as an extrinsic risk factor for pressure ulcer (PU) development.
• Patients with medical devices are 2.4 times more likely to develop PUs.
• 30-70% of medical device-related pressure ulcers result from respiratory equipment.
• These are particularly prevalent in critical care units.
• Tissue edema, impaired sensation, poor nutritional status, and moisture under the device are important contributing factors.

Background: The Problem

• Increased occurrence of PUs in the intensive care units: 12 months prior (12/2013-11/2014), there were eight respiratory device-related PUs in ICU, an upward trend
• Three were associated with BiPAP, five with mechanical ventilation.
BiPAP-related HAPUs
Pre-Project: 12/13-11/14

Vent-related HAPUs
Pre-Project: 12/13-11/14

What is a Medical Device-Related Pressure Ulcer (MDRPU)?

A medical device-related (MDR) pressure ulcer is defined as a localized injury to the skin or underlying tissue as a result of sustained pressure from a medical device (NDNQI).

https://members.nursingquality.org/NDNQIPressureUlcerTraining/Module1/MDRPressureUlcers.aspx
Common Causes of Respiratory Device-Related PUs (Edsberg et al., 2014)

- Continuous positive airway pressure (CPAP)
- Bilevel positive airway pressure (BIPAP)
- Nasal cannula
- Tracheostomy faceplates and ties
- Endotracheal Tube (ETT)
- Pulse oximetry

*Project focus

Critically Ill Patients Most Vulnerable

(Apold & Rydrych, 2012; Black et al., 2010; Cox, 2011; Manzano et al., 2010)

- Impaired sensory perception: paralysis; neuropathy
- Impaired ability to communicate: oral intubation; unconscious; nonverbal state; presence of language barriers
- Sedation
- Edema
- Low arterial pressure MAP<60
- Pressors
- ICU Length of Stay
- Duration of mechanical ventilation
- Comorbid conditions: PVD; CVD; DM; infection

Contributing Factors

- Pressure: tight securement (e.g., ETT, trach plates); pressure from device/prolonged pressure in the same place
- Securement: difficulties in adjusting/securcng to the body
- Fit: poor fit or position; inappropriate size, selection
- Visualization: obscure skin from visualization; failure to check tubing
- Rigidity & inelasticity of devices
- Edema: edematous skin; lack of awareness of edema impact
The Challenge
(Apold & Rydrych, 2012; Dealey et al., 2013; Edsberg et al., 2014; Gilston, 1972)

- Increased attention on MDRPU as "traditional PU" rates have decreased
- MDRPU often misidentified.
- Most standard prevention strategies have not been effective in preventing device-related PUs.
- These devices are often an essential part of treatment.
- There is scant research related to respiratory device-related PUs.

Project Objectives

- Accurately document incidence of respiratory device-related PUs in critical care and intermediate care patients;
- Identify factors that contribute to development;
- Train nurses and respiratory therapists related to contributing factors, preventative strategies, and accurate documentation of respiratory device-related pressure ulcers;
- Institute nursing/respiratory collaborative care rounds on the critical care and intermediate care units.

Project Timeline & Interventions
(Project Year: 12/14-11/15)

- Preparation and planning
- ‘Hands-on’ training of respiratory therapists
- Incidence tracking and documentation
- ACA of device-related PU occurrences
- Interprofessional collaborative rounds
- Educational intervention
- Booster training
- Data analysis
- Month one
- Month two
- Month two; on-going
- Month three; on-going
- Month five; on-going
- Months six-seven
- Month eight
- On-going
Apparent Cause Analysis (ACA)

- Goal was to identify common factors and opportunities for improvement in the prevention of respiratory device-related PUs.
- Nursing and respiratory therapy participated.
- Three occurrences prior to the educational intervention (1 in Dec; 2 in Jan)
- Common factors identified:
  - Device: BIPAP
  - Discrepancy between RN/RT documentation of skin
  - Assessment (timing and staging): ? knowledge deficit in staging
  - Initial documentation of PU was 6-8 hours after BIPAP/mask d/c'd
  - Patient risk factors: NPO > 32 hrs; Braden <16; Resp device > 24 hrs

Suggestions from ACA Team to Reduce PU

- Education/reinforcement to ensure consistent and accurate documentation of mask descriptors (i.e. "full"=regular and "total"=Performax)
- RRT/RN to confirm initial skin assessment post device removal
- Coordination of skin care assessment between RN and RRT (especially at night)
- Reminder to remove device q4hours
- Education on sizing/placement of mask
- Possible use of prophylactic padding with respiratory devices

Incidence Tracking and Documentation

- Respiratory therapist 'hands-on' training related to targeted skin assessment and documentation
- Incidence documentation performed by Respiratory Care Department manager in Performance Insight and Safety Net.
- Also tracked documentation of skin assessment related to BiPAP and vents
Educational Intervention

- Objectives:
  - State contributing factors to development of respiratory device-related PUs;
  - Demonstrate accurate staging and documentation;
  - Discuss evidence based preventative strategies;
  - Explore collaborative roles in prevention

- Co-taught by nursing and respiratory
- 90 minutes
- Pre-test, post-test, and program evaluation
- Training funded

Preventative Strategies

- Choose the correct size of medical device(s) to fit the individual
- Cushion and protect the skin with dressings in high-risk areas (e.g., nasal bridge)
- Inspect the skin in contact with device at least daily (if not medically contraindicated)
- Avoid placement of device(s) over sites of prior or existing PU; be cognizant of areas with minimal/no adipose tissue
- Educate staff on correct use of devices and prevention of skin breakdown; communication & collaboration with other health providers is critical (OT, PT, RT)
- Be aware of edema under device(s) and potential for skin breakdown; resize
- Confirm that devices are not placed directly under an individual who is bedridden or immobile

Source: "Medical Device Related Pressure Ulcer Prevention" Poster, NPUAP website www.npuap.org

Mucosal Pressure Ulcers: Lip and Nares

- Staging system CANNOT be used with PU of mucous membrane:
  - Non-blanchable erythema cannot be seen in mucous membranes;
  - Difficult to distinguish between superficial tissue loss and deeper full thickness ulcers;
  - Soft coagulum seen in mucosal PUs looks like slough but is a soft blood clot;
  - Exposed muscle would seldom be seen; bone is not present

- Documentation of Mucosal Ulcers:
  - Mucosal pressure area/injury
  - Describe what you see
  - Clearly state if it is related to medical device

https://members.nursingquality.org/NDNQIPressureUerTrainingModules/MucosalMembrane.aspx
Collaborative Rounds

- Skin assessment rounds occurred weekly/bi-weekly prior to project initiation, conducted by CWOCN and manager or designee.
- Respiratory skin rounds documentation form was developed.
- Bi-weekly collaborative rounds included nursing and respiratory.
- Interactive, teaching approach with direct feedback staff.
- Focus on communication and collaboration.
- Pre and post measure: How Well Are We Working Together? (10 item, 5 point Likert response format)

Results: Pre/Post Test

Questions
- Q1: accurate documentation
- Q2: contributing factors
- Q3: preventative strategies
- Q4: importance collaboration/communication
- Q5: # device related PUs

% correct
- Q1: Pre: 92%; Post 98% (sign)
- Q2: Pre: 74%; Post 81%
- Q3: Pre: 87%; Post 91%
- Q4: Pre: 3.24/4 agreed; Post 3.75/4
- Q5: Pre: 5.0; **Post = 6.0 (correct)

Results: Teamwork Measure

Pre-Intervention Scores (n=33)
- Q1: 3.97
- Q2: 3.67
- Q3: 3.76
- Q4: 3.39
- Q5: 3.18
- Q6: 3.55
- Q7: 3.56
- Q8: 3.49
- Q9: 3.44
- Q10:3.39

Post-Intervention Scores (n=36)
- Q1: 4.00 (+)
- Q2: 3.59 (-)
- Q3: 3.74 (+)
- Q4: 3.80 (+)
- Q5: 3.33 (+)
- Q6: 3.55 (+)
- Q7:3.54 (+)
- Q8: 3.53 (+)
- Q9: 3.56 (+)
- Q10:3.64 (+)
Results: Incidence (BiPAP-Related)

- Pre-intervention: three BiPAP-related PUs.
- Post intervention: one BiPAP-related PU.
  DTI to bridge of nose under BiPAP: patient with severe septic shock and multi organ failure. All preventive measures in place. BiPAP limited to 24 hrs.
  Determined to be not preventable.

Results: Incidence (Vent-Related)

- During intervention, one vent-related pressure ulcer
  ETT: securement device too tight due to developing edema.
  Stage II, lip (used example during education)
Incidence:
Vent-Related (12/14-11/15)

Summary

• Incidence of device-related pressure ulcers was reduced during study period.
• ACA is a useful tool to analyze contributing factors.
• Collaborative rounds were a key component in building teamwork and interdisciplinary participation.
• Policy was revised to require weekly documentation and measurement of wounds consistent with NPUAP guidelines.
• Nursing and respiratory documentation significantly improved and was more congruent.

Conclusions and Recommendations

• Collaborative rounds are valuable and will be continued.
• An interdisciplinary approach to education was helpful in establishing shared accountability and can be used to promote awareness of OI and EBP.
• Pressure ulcer prevalence (PUP) team members were involved in educational intervention.
• ACA process will be folded into general HAPU subcommittee that examines PU incidence.
• Transition to the EMR required change in documentation and challenges with use of existing skin care protocols.
• On-going monitoring through incidence tracking and auditing of documentation were recommended to sustain change.
Special Thanks

- to Sandy Linde, RN who assisted in this project during a clinical rotation as a RIC MSN student.
- to the nursing and respiratory staff who participated in this project.
- for internal funding facilitated by Maria Ducharme, RN, DNP, NEA-BC, CNO, The Miriam Hospital.

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