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REDUCING SKIN BREAKDOWN IN PATIENTS RECEIVING EXTRACORPOREAL MEMBRANE OXYGENTATION (ECMO)

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Background/Significance

- Indications for Arterio-venous (AV) ECMO:
  - Patients with refractory cardiogenic shock who have an underlying potentially reversible heart condition.
  - Can also be used as a bridge to a ventricular assist device or cardiac transplantation.
  - Can also be used as a salvage technique during cardiac arrest.

- Indications for Veno-venous (VV) ECMO:
  - Provide proper oxygenation to vital organs while resting the lungs.
    - ARDS and pneumonia
    - Graft dysfunction after lung transplantation
PICO QUESTION

- In ECMO patients, does the use of the Tortoise system and fluidized positioner with q2 hour turning/off-loading, compared to the current practice of q2h turning with pillows, decrease the development of skin breakdown (> or = stage I pressure ulcers)?

- **P**=ECMO patients

- **I**=The use of the Tortoise system and fluidized positioner with q2 hour turning/off loading

- **C**=Compared to the current practice of q2h turning with pillows

- **O**=Decrease the development of skin breakdown (> or = stage I pressure ulcers)
Iowa Model: Trigger?

**Problem vs. Knowledge**

- **Problem Focused Trigger: Identification of Clinical Problem**
  - Significance: Due to the hemodynamic instability of EMCO patients, they are more susceptible to skin breakdown.

- **Knowledge Focused Trigger: New Research**
  - Significance: New research has shown with the use of the Tortoise system and fluidized positions there has been a reduction in skin breakdown.
EVIDENCE

- Patients receiving extracorporeal membrane oxygenation (ECMO) are at a greater risk of developing skin breakdown as cannulas are placed centrally providing oxygenation primarily to vital organs resulting in decreased peripheral tissue perfusion and increased potential of skin breakdown (Adams, Chadwick, Creehan, Currie, Falls, Malhotra, O'Rourke, Swenson, Brindle, Tuason, & Watson, 2013, p. 254-267).

- Poor perfusion coupled with hemodynamic instability, ischemia due to capillary occlusion, reperfusion injury, impaired lymphatic drainage, accumulation of metabolites, comorbid conditions and fear of accidental decannulation by healthcare providers contribute to the potential for skin breakdown (Clements, Moore, Tribble, Blake, 2014, p. 61-68).

- Vasopressors pharmacologically cause vasoconstriction to increase MAP, but in turn cause inadequate tissue perfusion and possibly hypoxia to areas most vulnerable to skin breakdown. The literature has identified Norepinephrine (Levophed) as the chief vasopressor associated with skin breakdown (Cox, 2013, p. 50-60).
Current literature suggests that off-loading of pressure points with the use of pillows, turning/repositioning devices and/or gel positioners has been effective in reducing skin breakdown in hemodynamically unstable, critically-ill patients (Cooper, 2013, p. 57-67).

External pressure has been identified as the main factor in the development of skin breakdown. External pressure is a variable that can be significantly (and further) reduced with the use of repositioning devices, proper skin care, and a virtually weightless system such as the Tortoise (Thomas, 2010, p. 397-405).

Implementation of an evidenced-based skin breakdown bundle has been demonstrated to be effective in ICU environments worldwide. Strategies that have been effective in reducing skin breakdown: (Gray-Siracusa, Schrier, 2011, p. 216-255).

- The involvement of physicians in skin care
- Early detection of the existence of and potential for skin breakdown
- Skin assessment at each change of shift
- A strict adherence to repositioning schedules
- Awareness and education of all involved in patient care
Current Practice at LVHN

- Current practice: Q2h turning and repositioning with pillows unless otherwise specified by the provider.
ECMO CPG

- There is no explanation on how to provide skin care for a patient on ECMO in the current CPG.
- In EPIC, the CPG for ECMO will be revised to implement a skin care bundle including: q2h turning, the use of the tortoise system and fluidized positioner, and a skin cream regimen.
IMPLEMENTATION: STANDARD TOOL

- **Indicator:** ECMO patients
- **Unit:** Open Heart Unit
- **Purpose:** Identify critically ill patient at high risk for skin breakdown in order to implement the tortoise system.
- **How/when to use system:** All ECMO patient’s. All critically ill patient’s at risk for skin breakdown.

**STANDARD PROCESS STEPS**
- Patient on ECMO
- BMI ≥35
- Pre-existing comorbidities (Diabetes, PAD, PVD)
- On vasopressors/hemodynamically unstable
- Pre-albumin/Albumin below suggested range
- Lactate >2
- GCS <8
- Braden <14
- Pre-existing skin breakdown
Instructions for Use

Tortoise Instructions for Use in the Supine Position

Place the patient in the center of the Tortoise with a loose fitting draw sheet under the patient. The patient’s shoulders should be aligned with the top of the Tortoise mat and the bottom air bolsters should fall below the patient’s gluteal fold.

Engage tailby using the handles, tucking them up towards the sacrum. The black non-skid material should be tucked under the Tortoise, against the bed sheet.

Tuck the handles under the Tortoise on both sides or down along the side of the bed between the mattress and rail. Then elevate the head of bed if needed.

Tortoise Instructions for Use in the Turning Position

Grasp the turning handles on the Tortoise with your hands approximately shoulder width apart and palms facing upward for greatest efficiency. Take one step back as you slowly pull the Tortoise towards you until you reach an angle slightly greater than the desired turn angle.

Place the fluidized positioner between the Tortoise and the mattress from the scapula down towards the buttocks. The fluidized positioner may be molded slightly towards the body to increase the degree of turn. Allow the patient to ease back into the positioner. This will displace the air and help to offload the greater trochanters. Tuck the turning handles as shown under supine above.

Boosting

Locate the white boosting handles.

With arms at hip distance and weight evenly distributed, use shoulders and buttocks to boost the patient up in bed. Re-align the tail and tuck in the sides as mentioned above.

Items to consider:

- Patient should be centered in the bed.
- The Tortoise System is designed to offload the bony prominences without significantly lifting the patient.
- The Tortoise System accommodates normal under pads and bed linen usage without compromising its effectiveness.

Cleaning Instructions:

- Wipe down with hospital approved disinfectant.

THE TORTOISE SYSTEM IS INTENDED FOR SINGLE PATIENT USE ONLY
Sundance Solutions: Tortoise and Fluidized Positioners

- **Pneumonic for Equipment Use:**
  - S: Shoulders - at or slightly below patient shoulders
  - E: Edges - meet at mattress edge
  - T: Tail - tuck it!

- **Uses a combination of fluidized positioning and positive air replacement while simultaneously:**
  - Turning and repositioning patients safely
  - Offloading bony prominences (ie. sacrum and greater trochanter)

- **Components:**
  - Ultra low pressure air chamber
  - Rip-stop cover with reinforced handles
  - Fluidized positioner

- **Promotes:**
  - Less effort from caregiver to reposition patients: allows for strong grip, maintenance of proper body mechanics, decreases resistance
  - Adapts to patient shape and size through displacement of air
  - Additional air chamber space on sides of patient as a barrier between patient skin and side rails
  - Adherence to therapeutic turning and repositioning: allows for control of degree of turn and individualized custom positioning
Keys to Success - The 3 most important things to remember

S.E.T. the Tortoise

S
SHOULDERS
Tortoise Positioning System should always be at or slightly below the patient’s shoulders

E
EDGES
Black edges should always be at the mattress edge

T
TAIL
The tail should always be tucked USING HANDLES to maintain proper position in bed

The Tortoise™ should be covered with a flat sheet during use
Expected Outcomes

- Reduction in incidence of skin breakdown in ECMO and other critically-ill patients
- Hospital-wide ICU adoption of Tortoise system and fluidized positioners
- Increased compliance in turning and repositioning schedule due to ease of use.
- Increased staff satisfaction, better ergonomics, potential for reduced work-related injury
- Reduction in costs of patient care and decreased risk of litigation
  - Cost of system=$150.00, a significant savings relative to cost of pressure ulcer, increased LOS and potential for litigation
RESULTS

- Several factors were taken into consideration when looking at the effectiveness of the tortoise system. (Please see table)
- Eight patients were observed during the initial study of the tortoise system and fluidized positioner.
  - Two out of eight patient’s were discharged or decreased with skin breakdown. Their skin breakdown was noted prior to being placed on the tortoise system. The skin breakdown in these two patient’s did not worsen once placed on the tortoise system.
  - Six out of eight patient’s observed in this study did not have skin breakdown at time of discharge.
- Study is ongoing.
Implications for LVHN’s Future

- Extending the tortoise system to all ICU patients in need based on the standard work tool.
- Replace specialty beds with the Tortoise system and fluidized positioners.
- Advocate for change and provide ongoing education to staff.
Strategic Dissemination of Results

- Utilize screening tool
- Implement Tortoise system for all ECMO patients and those identified as high risk
- Place “Set” sheet at bedside
- Provide ongoing staff education via TLC
- Continue data collection long-term
Lessons Learned

Barriers:

- Small sample size
- Consistency of use
- Skin breakdown present prior to implementation of Tortoise system
- Length of study
- Some resistance to change

Strategy to Overcome:

- Increase sample size
- Educating and reinforcing staff on proper use
- Emphasize benefit to patients and staff
- Chart reviews for consistent documentation
- Proper skin assessment and documentation prior to implementation of tortoise system
References

- NCQ.0b013e31820e11be
Make It Happen

- Questions/Comments?

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