Reducing Skin Breakdown in Patients Receiving Extracorporeal Membranous Oxygenation

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KEYWORDS

- Pressure ulcers • Extracorporeal membranous oxygenation
- Critically ill surgical patients • Mechanical circulatory support
- Nurse sensitive indicator

KEY POINTS

- Pressure ulcer prevention is a top priority within nursing practice when it comes to hospital-acquired infections.
- Poor outcomes associated with pressure ulcers include increased length of stay, increased pain and discomfort, decreased patient and family satisfaction, and increased cost.
- Using evidence and clinical experience with the ECMO population, a multidisciplinary team developed three strategies to improve the rate of hospital-acquired pressure ulcers in an ECMO population.

INTRODUCTION

Pressure ulcer prevention is a top priority within nursing practice.[1] The Centers for Medicare and Medicaid Services and the Agency for Healthcare Research and Quality have recognized pressure ulcers as an important metric measuring quality of nursing care and hospital safety.[2] Poor outcomes associated with pressure ulcers include increased length of stay, increased pain and discomfort, decreased patient and family satisfaction, and increased cost.[3] Studies indicate that patients classified as critically ill are at greatest risk for pressure ulcer development.[4,5] Risk factors associated with pressure ulcer development in critical care patients are poor nutritional status, age, altered sensory perception, exposure to moisture, infection, diabetes and severity of illness.[6] In 2009, 3.3% of intensive care unit patients in the United States developed

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a severe facility-acquired pressure ulcer defined as stage III, stage IV, unstageable, or deep tissue injury.[5] Cardiac surgery patients are reported as one of the most at-risk patient populations for developing hospital-acquired pressure ulcers, with incidence rates reported as high as 29.5%.[7] Data on the cost of pressure ulcers vary; however, reported hospitalization treatment costs range from $37,800 to $70,000 with total annual costs in the United States as high as $11 billion.[8]

PRESSURE ULCER DEVELOPMENT IN PATIENTS ON EXTRACORPOREAL MEMBRANOUS OXYGENATION

Through quality monitoring the authors' identified the cardiovascular-thoracic intensive care unit (CVTICU) had a high incidence of pressure ulcers in their patients receiving extracorporeal membranous oxygenation (ECMO) for cardiac and/or pulmonary support. ECMO is a modified form of cardiopulmonary bypass used to provide support to critically ill adults with respiratory or circulatory failure refractory to conventional management strategies.[9] Critically ill patients are defined as those patients who are at high risk for actual or potential life-threatening health problems.[10] There are several factors that make the nursing care for ECMO patients unique as compared to other critically ill intensive care patients. The most important being, patients are wholly dependent on the ECMO circuit for survival. This circumstance demands a level of nursing vigilance and technological expertise greater than required for most other intensive care patients. Many patients on ECMO may require life-saving measures many times during a 12 hour shift.[11] Adult ECMO treatment requires the placement of two large bore catheters (21-23 F). Cannulation for ECMO occurs at the right internal jugular vein, right common femoral vein, femoral artery, or chest. Bleeding is the most common complication of ECMO, largely due to the requirement of systematic anticoagulation. Therefore, bleeding and decannulation of the ECMO catheter are of great concern when mobilizing the patient. Blood flow, while on ECMO, is directed to the brain and the heart, organs that are most responsive to increased perfusion pressure and least dependent on arteriolar tone. At the same time, blood flow is decreased to organs in which vasculature is the least sensitive to increased perfusion pressure, like the skin and skeletal muscle.[11] Peripheral tissue perfusion during ECMO can become constricted, despite seemingly adequate central hemodynamics and oxygenation. The adequate central hemodynamics and oxygenation can lead the nurse to believe that skin tissue perfusion is adequate, when it actually may be at risk for pressure ulcer development.[11] In 2010, our unit admitted approximately one ECMO patient per month. However, in 2012, the number of ECMO patients admitted to our unit tripled at three per month. In 2012, it came to our attention through a patient safety report that one of our patients on ECMO had developed a deep tissue injury. A retrospective chart review of ECMO patients revealed a pressure ulcer rate of 41% in 2010 and 65% in 2011. Safety concerns related to hemodynamic instability, poor perfusion and dislodgement or accidental decannulation of the ECMO catheter were verbalized by nursing staff as possible reasons contributing to the lack of repositioning ECMO patients thus increasing the risk of pressure ulcers in this population.[12]

OUR UNIT/DEVELOPING A MULTIDISCIPLINARY TEAM

In January of 2012, a multidisciplinary group comprised of CTVICU bedside nurses, physicians, the clinical nurse specialist and the wound care specialist began developing a focused and aggressive plan to reduce the rate of hospital-acquired pressure ulcers in our ECMO patient population. Our CTVICU is a 16-bed unit. The unit patient population includes those who have received cardiac surgery, heart or lung