Leveraging Technology to Reduce Pressure Ulcers Related to Non-invasive Ventilation

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Purpose

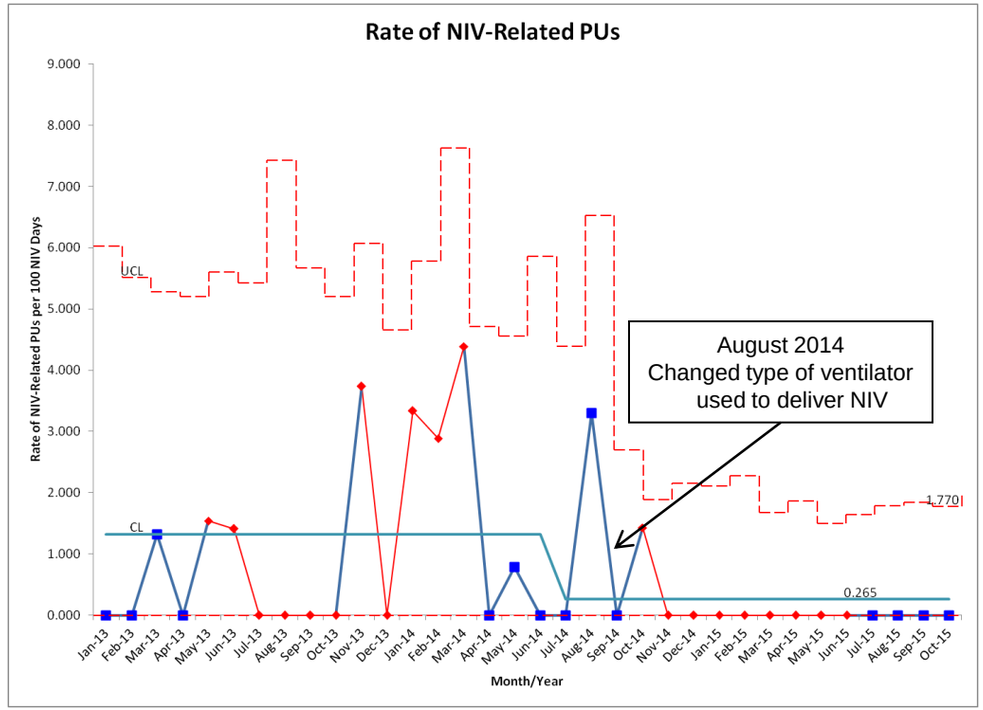
An interprofessional group was assembled with a goal of reducing non-invasive ventilation (NIV) related pressure ulcers. The team decided to change the type of ventilator used for NIV, based on expert understanding of the impact ventilation strategy has on the development of pressure ulcers.

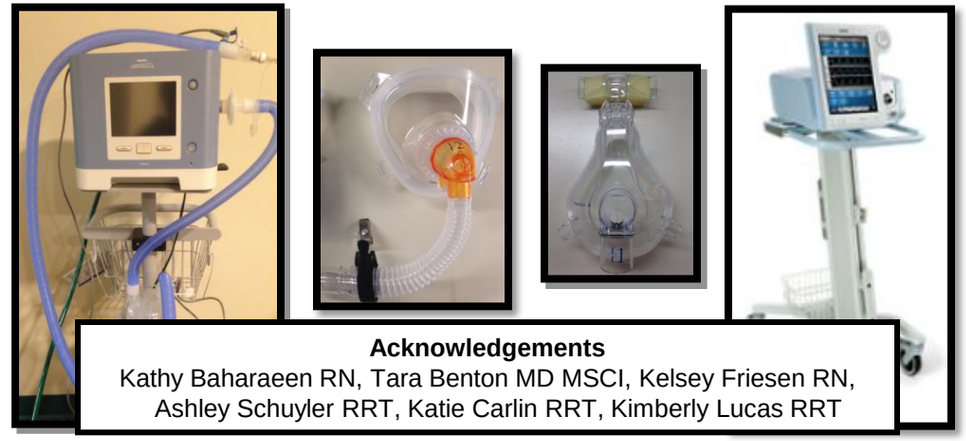
Relevance/Significance

NIV is used for sleep apnea, as a bridge to spontaneous breathing after extubation and may prevent intubation in the presence of respiratory failure. While NIV is generally preferred over invasive mechanical ventilation, it is often associated with formation of pressure ulcers. According to Baharestani, more than 50% of pediatric pressure ulcers are caused by devices (Baharestani & Ratliffe, 2007, p.212). At our hospital, from January 2013 to July 2014, 26% of device-related pressure ulcers were caused by NIV, demonstrating significant opportunity for improvement.

Strategy and Implementation

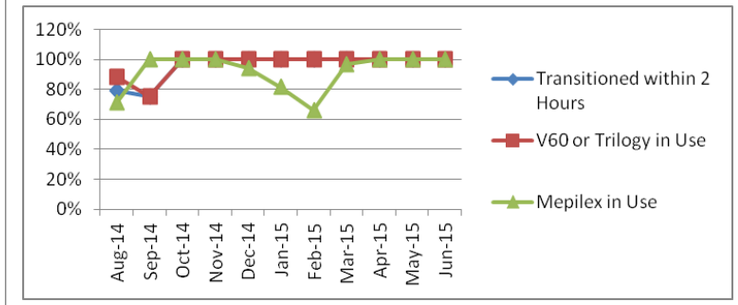
In July, 2014, an interdisciplinary task force was assembled to create plan, do, study, act (PDSA) cycles aimed at reducing the frequency and severity of pressure ulcers caused by NIV masks. Early PDSA cycles focused on padding the face and ventilator circuit support, with some improvement. The team found that frequently pressure ulcers developed due to the force used to create a tight seal between the mask and face in order to deliver desired levels of positive airway pressure. Initially, this seemed like an unavoidable aspect of care for the patient on NIV. However, the team identified that the ventilator being used for NIV only allowed a leak of 25 l/min for infants and 65 l/min in adults. In August 2014, they chose to change the technology available to deliver NIV to a single limb ventilator that allows for a leak of up to 200 l/min. This gave clinicians the ability to loosen the seal between the mask and the patient's face to alleviate pressure on the skin while maintaining desired airway pressures.





Evaluation

The task force created an audit form for every patient placed on NIV to assure the patient was transitioned to the single limb ventilator within 2 hours of initiation of NIV. Average compliance from August 2014 to March 2015 was 94%. After implementation of the single limb ventilator, average rate of pressure ulcers secondary to NIV masks dropped from 5.09 to 1.78 per 100 NIV days.



Implications for Practice

The interprofessional task force made it possible to engage expert bedside clinicians in the quality improvement process, and a new way of thinking about NIV at our hospital was introduced. By changing the type of ventilator we use for NIV to a single limb system with better leak compensation, we were able to reduce the number of pressure ulcers caused by NIV. Through application of technology the team was able to change care delivery and improve patient outcomes.

References

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