Executive Summary: Preventing Pressure Injuries from Endotracheal Tubes in the Intensive Care Unit

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Doctor of Nursing Practice Program

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This Doctor of Nursing Practice project presented several main points, including the following:

- Endotracheal tubes (ETTs) are among the leading causes of medical device-related pressure injuries (MDRPIs) in mechanically ventilated intensive care unit (ICU) patients.
- This intervention increased the frequency of ETT repositioning from every 12 hours to every four hours and provided interdisciplinary education to registered nurses (RNs) and respiratory therapists (RTs).
- Zero endotracheal tube-related pressure injuries occurred during the twelve-week implementation period.
- Thirty-one clinicians completed the educational module. The percentage reporting they were very or extremely knowledgeable regarding ETT MDRPI prevention increased from 54.8% to 83.9%, while confidence increased from 58.1% to 83.9%.
- 97% of participants in the educational intervention reported being very or extremely likely to apply the knowledge gained to their clinical practice.
- Overall, endotracheal tube repositioning compliance was 85% with the inclusion of an outlier of over 63 hours. Removal of this outlier brought the endotracheal tube repositioning compliance up to 88%.
- Oral care was provided every four hours with an overall compliance rate of 96.6%.

Background and Purpose

MDRPIs are a subcategory of pressure injuries that result from the use of therapeutic medical devices used in the medical industry. Medical device-related pressure injuries are a type of hospital-acquired pressure injury (HAPI), with ETTs being the top contributors to MDRPIs, accounting for up to 55% in the intensive care setting (Fulbrook & Butterworth, 2025). ETTs are used for mechanical ventilation and life support for critically ill patients in the intensive care setting. ETTs can cause pressure injuries to mucosal membranes, typically in the lips and inside the mouth. Pressure injuries related to ETTs can be prevented by repositioning, cushioning, and early parenteral nutrition (Cambaz, Koken, & Sayin, 2024; Ozdemir & Kavakli, 2025). Cambaz, Koken, & Sayin (2024) show that 80.14% of intubated patients with ETTs developed an MDRPI by 3 to 4 days after intubation.

Based on the review, the project site had an increase in HAPIs. Respiratory delivery devices, specifically ETTs, were overwhelmingly responsible for the MDRPIs. Following three ETT MDRPIs within a six-month period, the project site identified prevention of ETT-related pressure injuries as a quality improvement priority. Currently, the hospital uses a skin care bundle implemented on June 3rd, 2025; however, this protocol is broad and lacks specific guidance on preventing MDRPIs, including the timing and frequency of repositioning (Executive Director of Nursing Excellence, 2025). Therefore, this Doctor of Nursing Practice (DNP) project aimed to reduce ETT MDRPIs by increasing ETT repositioning frequency from every 12 hours to every four hours. Secondary objectives included improving RN and RT knowledge of ETT MDRPI prevention and evaluating patient risk factors associated with pressure injury development. The projects intended audience

includes critical care nurses, respiratory therapists, nurse leaders, quality improvement specialists, and healthcare organizations seeking to reduce HAPIs. The findings provide a low-cost, feasible, and sustainable intervention that can be adapted in other critical care settings to improve patient safety, support quality improvement initiatives, and strengthen interdisciplinary collaboration.

Methodology

The project was conducted as a prospective, descriptive study guided by the IOWA Model of Evidence-Based Practice and implemented over a 12-week period following approval from the organization's leadership and an exemption from the Institutional Review Board (IRB). Implementation was conducted from January 2026 to April 2026 over a 12-week period in the ICU.

Scheduled ETT repositioning times were aligned with routine patient assessments at 0000, 0400, 0800, 1200, 1600, and 2000. Oral care was also performed every four hours in accordance with unit standards and was monitored concurrently. Compliance with ETT repositioning and oral care was provided by frequent electronic medical record (EMR) audits at least every other day.

An educational module was developed and delivered to RNs & RTs before implementation. Education focuses on MDRPI risk factors, prevention strategies, ETT repositioning techniques, documentation requirements, and project expectations. Ongoing stakeholder engagement and reinforcement were provided throughout the project through on-site meetings and visual reminders throughout the unit.

Results

During the 12-week implementation period, there were zero endotracheal tube-related pressure injuries among the 29 mechanically ventilated patients, compared with three injuries identified in the six months preceding the implementation.

The primary process measure was compliance with endotracheal tube repositioning every four hours. Overall, the compliance rate was 85%, with an outlier exceeding 63 hours between repositionings. Removal of this outlier brought the overall compliance rate up to 88%. Out of 710, only 53 repositioning intervals exceeded 4 hours, and only 13 exceeded 10 hours. After removing the outlier of more than 63 hours, the average delayed repositioning interval was approximately 8.7 hours. The secondary process measure was oral care compliance. Out of 710 scheduled oral care opportunities, only 26 exceeded four hours, resulting in a compliance rate of 96.6%. Additionally, an unintentional finding was that the serum albumin level decreased by an average of 0.3 by day 2 of mechanical ventilation.

Thirty-one nurses and respiratory therapists completed the educational interventions. Prior to education, only 54.8% reported being very or extremely knowledgeable regarding the prevention of endotracheal tube-related pressure injuries. Following the educational intervention, this increased to 83.9%. Similarly, confidence increased from 58.1% to 83.9%. Nearly 97% of participants reported they were very or extremely likely to apply the knowledge gained to their clinical practice.

Strengths and Limitations

Several factors contributed to the success of this project, including strong leadership support, interdisciplinary collaboration, ongoing stakeholder engagement, and routine compliance audits that provided timely feedback to bedside staff. The intervention required no additional equipment or financial investment, making it feasible and sustainable within the existing workflow. Aligning ETT repositioning with routine patient assessments furhter facilitated staff adherence.

Project limitations included implementing within a single ICU and a relatively small sample size of 29 patients, which may limit generalizability. Additional barriers included onboarding new staff unfamiliar with the intervention, competing clinical priorities, and prolonged times in repositioning when patients were off the floor. Future projects should include larger patient populations, longer implementation periods, multiple ICU settings, and inclusion of the perioperative team to further evaluate the intervention's effectiveness.

Implications and Conclusion

This project demonstrates that increasing the frequency of ETT repositioning from every 12 hours to every four hours, combined with interdisciplinary education and routine compliance monitoring, is a feasible, sustainable, and low-cost strategy for preventing ETT MDRPIs. The intervention improved adherence to evidence-based practices while substantially increasing clinician knowledge and confidence regarding prevention of ETT MDRPIs.

Preventing these injuries improves patient safety, reduces pain and tissue damage, decreases the risk of infection, and supports better patient outcomes. For healthcare

organizations, preventing pressure injuries can reduce costs associated with treatment, improve quality metrics, support regulatory compliance, and contribute to quality-based reimbursement initiatives. Beyond the project site, this initiative provides a practical model that can be repeated in other ICUs and healthcare organizations seeking to reduce ETT-related pressure injuries. Because implementation required no additional equipment or financial investment, this intervention is readily scalable and sustainable across diverse critical care settings.

References

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