THE IMPLEMENTATION OF A PREPARATION CHECKLIST AND SIMULATION TRAINING FOR OUT-OF-OR INTUBATION

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A Project Report Submitted to
the Faculty of the School of Nursing at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the
Doctorate in Nursing Practice

Greensboro
2024

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Dedication and Acknowledgements

This project is dedicated to my family. Your love and support made the completion of this work possible. I cannot thank you enough.

Abstract

Background: Intensive care emergency intubations, while infrequent, are high-acuity events that pose significant risks. The role of nurses in these procedures is crucial, yet they often lack formal training in airway management, which can impact patient outcomes. Enhancing ICU nurses' competencies in airway management through targeted education is therefore essential.

Purpose: The purpose of this project was to develop and evaluate the effectiveness of a simulation and checklist-based training program designed to improve critical care nurses' skills and knowledge in airway management, including endotracheal intubation set-up and assisting in difficult airway scenarios.

Methods: This project involved ICU nurses who participated in a graded pre-education simulation, an educational intervention (comprising a PowerPoint presentation), and a graded post-education simulation conducted two weeks later. The simulations focused on seven key competency areas related to airway management.

Results: Post-intervention, significant improvements were demonstrated in all seven competency areas, as analyzed using Chi-Square tests. These areas included equipment identification, medication knowledge, emergency equipment recognition, and practical skills in airway management.

Recommendations and Conclusion: The findings suggest that simulation and checklist-based training can effectively enhance the airway management competencies of ICU nurses. Future research should focus on long-term skill retention, expand to a broader participant base, and integrate similar training programs into regular ICU nursing curricula.

Key Words: ICU nursing, airway management, emergency intubation, nurse education, simulation training, critical care

Background and Significance

Intensive care emergency intubations are high acuity events encountered by bedside nurses infrequently. Respiratory emergencies in critical care require swift action by the medical team to decrease morbidity and mortality. Nurses are important in the identification of patients in respiratory distress and assisting with intubation. Better preparation of these nurses may improve efficiency and patient outcomes. Coyle et al. (2020) found that increased nurse preparation in high acuity situations such as airway emergencies resulted in fewer adverse events in the patients involved. Current research supports airway set-up simulation training for bedside ICU nurses as an effective teaching strategy. While nurses are not formally taught airway set-up and difficult airway interventions, education regarding those topics would be successful at increasing nurse knowledge and technical skills (Cant & Cooper, 2010).

Implementation of a checklist may also improve preparation for intubation. Checklists are the gold standard for certain areas of medical practice, such as before surgery with a pre-incision timeout (Hubert et al., 2014). With this project, a simulation exercise was performed along with providing a checklist of actions to take when encountering a patient who needs to be intubated. The goal of this project was ultimately to improve patient outcomes. This was predicted to be achieved as a result of increasing critical care nurses' familiarity with the components of airway set-up and the sequence of events for an induction and intubation through an educational intervention centered around simulation and checklist training.

Purpose

The purpose of this project was to enhance critical care nurses' preparedness for emergency intubations through a simulation and checklist-based training program. This program aimed to

improve nurses' knowledge and technical skills in airway setup and management, thereby enhancing patient care during out-of-OR intubations.

Review of Current Evidence

Academic literature published within the last 5 years was reviewed to evaluate nurse education regarding endotracheal intubation (EI), anesthesia providers performing out-of-OR intubations, and the efficacy of simulation training and checklists for nurses. Older literature was considered if the content was deemed important to the aims of this project. The databases searched were CINAHL Complete, ProQuest, and PubMed. Key search terms used included "airway, simulation, checklist, intubation, set up, critical care/intensive care/ICU, difficult airway algorithm, nurse/nursing, and anesthesia." Inclusion criteria consisted of randomized control trials (RCTs), systemic reviews, and meta-analyses. Editorials, case reports, and studies not published in English were excluded.

Endotracheal Intubation

Critical care nurses participate in life-saving medical procedures and are responsible for preparing the equipment needed (Conroy et al., 2014). After completion of a nursing program, nurses continue to acquire skills to increase their expertise (Cant & Cooper, 2010). Nurses are with their patients continuously and can evaluate changes in their status to alert providers of any adverse trends. (Hammontree & Kinderknecht, 2022). Endotracheal Intubation (EI) is a crucial but infrequent procedure performed in ICUs. Better preparation and performance of intubation improves patient outcomes (Whytock & Atkinson, 2021). The literature focuses on the time-sensitive nature of intubations outside of the operating room, the importance of preparation by the nurse, and the improved patient outcomes that can be achieved by greater nurse efficiency (Groombridge et al., 2020; Sherren et al., 2014; Whytock & Atkinson, 2021).

EI is a procedure required for patients that are in respiratory failure or need mechanical ventilation. EI is a time-sensitive procedure, especially when needed outside of the operating room (Brindley et al., 2017). There is a substantial risk of morbidity and mortality in these situations due to the critical nature of the procedure and the patient population (Conroy et al., 2014). Any delay in a necessary EI increases the likelihood of negative patient outcomes (Cabrini et al., 2017). Shortening the time required to prepare EI equipment will improve patient outcomes (Smith et al., 2015). Increasing nursing efficiency during EI will improve overall efficiency and decrease morbidity and mortality (Janz et al., 2018). The more efficiently nurses can prepare for EI, the better patient outcomes will be.

Nurses and Endotracheal Intubation

Nurses receive well-rounded medical education in their training. However, traditional nursing education does not include training on the procedure of EI or how to assist providers performing it (Whytock & Atkinson, 2021). When performing an EI, anesthesia providers use the Difficult Airway Algorithm (DAA). The DAA is a series of steps to take if a provider encounters difficulty when ventilating or intubating a patient (Hubert et al., 2014). If nurses were educated on the DAA, they could better anticipate what the anesthesia provider might need during EI.

The devices used in the DAA are not common to the ICU. These include oral airways and laryngeal mask airways (LMAs), among others. Education for nurses regarding these tools and their use would increase efficiency and decrease time to intubation (Jaber et al., 2010). Empowering nurses with knowledge related to procedures they assist with improves patient outcomes (Cant & Cooper, 2010). Increased understanding of the tools used by anesthesia providers when encountering a difficult airway would allow nurses to better care for their patients.

Anesthesia Providers and Endotracheal Intubation

Anesthesia providers are called to perform EI for hospital patients in respiratory failure when necessary. EI outside of the operating room carries more risk for the patient (Whytock & Atkinson, 2021). Anesthesia providers are outside their standard environment when intubating in the ICU (Jaber et al., 2010). The ability to correct problems quickly is crucial to preventing morbidity and mortality when performing an EI outside of the OR (Jaber et al., 2010). Delays in having the appropriate tools to ventilate a difficult airway is detrimental to the patient (Sherren et al., 2014). Having emergency supplies at hand during EI allows anesthesia providers to minimize the risk of negative outcomes for the patient.

Simulation

Lectures are more common than simulation training for traditional nursing education. However, lectures do not improve long-term information retention (Forbis, 2018). In a stressful environment such as a decompensating patient in the ICU, only a small percentage of education given via lecture can be recalled (Hubert et al., 2014). Even low-fidelity simulation is effective for teaching nurses technical skills related to high-acuity, low-occurrence (HALO) events (Hersey et al., 2020). Nurses perform well in follow-up competencies after simulation training (Hammontree & Kinderknecht, 2022). The positive effects of airway-related simulation training are seen up to one year after the training takes place (Hubert et al, 2014). Simulation is more effective than lectures at increasing retention of knowledge for nurses.

Efficiency improves as a result of simulation training because nurses are able to practice new skills in a low stress environment. Simulation allows for clinical knowledge and skills to be synthesized in a safe way (Forbis, 2018). Difficult airway situations can produce anxiety in nurses and anesthesia providers, which leads to poor clinical judgement (Coyle et al., 2020). Simulation improves collaboration among the healthcare team, which in turn promotes efficiency (Jaber et al.,

2010). Simulation training regarding the EI set-up and procedure would improve information retention, efficiency, and patient outcomes.

Checklists

Checklists serve as critical tools in standardizing the sequence of actions in high-acuity situations like emergency EI, thereby enhancing procedural efficiency and safety. These tools are invaluable for providing clear, concise instructions and ensuring that no critical steps are missed during emergency medical interventions. The utilization of checklists has been shown to significantly improve the preparedness of healthcare teams, facilitating swift and accurate responses during crises (Brindley et al., 2017; Janz et al., 2018; Smith et al., 2015). By establishing a uniform baseline of knowledge, checklists help unify the approach of different team members, promoting coherence and teamwork.

Moreover, the routine use of checklists in emergency situations, such as EI in the intensive care unit (ICU), has been linked to a reduction in medical errors, which are often the result of oversight or miscommunication during high-pressure scenarios (Brindley et al., 2017). By providing a visual reminder of required equipment and procedural steps, checklists ensure that essential supplies and actions are not overlooked, a critical factor noted by Conroy et al. (2014). This diligence is vital, particularly in the ICU where procedures like EI can have life-or-death consequences.

Furthermore, the adoption of checklists in medical settings contributes to the cultivation of a safety-oriented culture within healthcare teams. This shift not only supports clinical staff in maintaining high standards of patient care but also builds confidence among team members as they perform complex procedures. The systematic integration of checklists into medical practice is expected to lead to a decrease in morbidity and mortality associated with emergency intubations, underscoring their importance as both educational and practical tools in medical environments.

Gaps

Significant gaps exist in the literature surrounding nursing education, EI outside of the operating room, and simulation training. Nurses are not commonly taught to set up for EI and depend on bedside training to learn this critical skill (Hersey et al., 2020). No studies were found that examine the benefits of simulation on airway set-up for nurses. There is a lack of literature that evaluates the effect of simulation on patient outcomes. Literature exploring the effectiveness of simulation training, checklist utilization, and continuing education for nurses at the bedside all point to the utility of airway set-up education for ICU nurses (Hammontree & Kinderknecht, 2022; Hersey et al., 2020). However, more research is needed to study the effectiveness of simulation training and checklist implementation for ICU nurses related to EI.

Theoretical Framework

This project aimed to change how nurses prepare for EI by providing a checklist of actions to take. This behavior change in the healthcare setting was based on Lewin's Theory of Change (Burnes, 2019). This idea suggests that behavior change can be achieved by "unfreezing" existing behavior, "moving" toward a new behavior, and then "refreezing" to make the new behavior permanent. Lewin's theory directs the planned educational intervention to change critical care nurses' airway set-up behavior.

The pre-test evaluation first identified the nurses' existing behavior, and the intervention will seek to change it. The "unfreeze" stage entailed educating nurses on airway set-up. Simulation training emphasized airway set-up skills (Hersey et al., 2020). The "move" stage applied the knowledge gained from the educational intervention to change the nurses' behavior. The "refreeze" stage came after the intervention as nurses integrated use of the airway set-up checklist into the

organizational culture. This was assessed by a follow-up post-test given two weeks after the educational intervention.

Lewin's Theory of Change can assist in developing a systematic intervention to alter behavior. It also provides a framework for assessing the intervention's efficacy by comparing multiple data sets across the pre-test and post-test. In this mixed methods quality improvement project, Lewin's Theory of Change helped ensure the intervention was well-designed, effectively implemented, and sustainably changed behavior (Burnes, 2019).

Methods

The extensive review of current literature underscored the critical need for enhanced education among critical care nurses regarding EI and airway management, particularly in high-stress, out-of-OR scenarios. The evidence highlighted a significant gap in traditional nursing education concerning practical, firsthand experience with airway setup and management during emergency situations. Simulation-based training and the use of checklists were identified as effective methods to improve knowledge, technical skills, and procedural efficiency among nurses, potentially leading to improved patient outcomes. The purpose of this project, therefore, was to implement a simulation and checklist-based training program for critical care nurses, aimed at bolstering their confidence and competence in preparing for and assisting with EI procedures. This initiative sought to address the identified educational gap, equipping nurses with the necessary skills to enhance patient care and safety during critical respiratory emergencies.

Design

This was a quality improvement project with a mixed-methods design incorporating quantitative analysis from the Primary Investigator (PI). The project's objective was to determine if a simulation-based educational intervention would improve critical care nurses' ability to prepare for an EI. This

project used several points of data collection to assess the success of the intervention. Quantitative data was gathered based on the accuracy of a simulated set-up, as well as knowledge retained after the educational intervention with a pre-education simulation and a post-education simulation. This project was conducted during an annual “Skills Blitz” for ICU nurses. The project used a convenience sample of critical care nurses to take part in the intervention. All critical care nurses who attended the skills blitz were invited to participate.

Translational Framework

In this quality improvement project, the Johns Hopkins Evidence-Based Practice (EBP) Model for Nursing and Healthcare Professionals was meticulously applied to ensure a systematic and evidence-based approach to improving airway management training for ICU nurses. The three main components of this model—practice question, evidence, and translation—were each addressed to form a cohesive strategy aimed at enhancing patient outcomes through improved nursing practices.

The initial step in the Johns Hopkins EBP Model involves defining a clear and focused practice question or problem that the project aims to address. For this project, the identified problem was the lack of comprehensive knowledge among ICU nurses regarding airway set-up for EI. This deficiency was recognized as a potential risk factor that could negatively impact patient outcomes during critical care scenarios. The focus was thus to determine how simulation-based training and the use of checklists could enhance nurses' proficiency and confidence in preparing for intubations, thereby minimizing the risk of adverse patient events.

The second component of the model involved gathering and appraising relevant evidence to support the intervention. An extensive review of current literature was conducted, which underscored the efficacy of simulation training and checklist use in medical education, particularly in high-stakes environments like the ICU. Studies such as those by Cant & Cooper (2010) and Conroy et al. (2014)

provided robust evidence that simulation and checklists significantly improve the technical skills and procedural knowledge necessary for effective airway management. This evidence base was critical in justifying the chosen intervention strategies and aligning them with proven practices.

The final component, translation, involved implementing the evidence-based intervention within the clinical setting. This project translated the evidence into practice by developing a comprehensive simulation-based training program, complemented by a detailed checklist for airway setup. The intervention was specifically tailored to the needs of the ICU nurses at the project site, ensuring relevance and applicability. The training sessions included practical simulations that allowed nurses to engage directly with the equipment and scenarios they would encounter in real cases, thus bridging the gap between theoretical knowledge and practical application. The use of checklists during these simulations helped standardize the process, ensuring that all necessary steps were followed, and critical equipment was accounted for.

Throughout the project, the Johns Hopkins EBP Model guided the systematic approach to integrating research findings into practical training methods. This structured application of evidence ensured that the educational interventions were not only based on the latest research but were also directly aligned with the specific needs and conditions of the ICU environment, ultimately aiming to improve patient care outcomes.

Population

The study population consisted of critical care nurses selected through convenience sampling during an annual skills enhancement event, known as the "Skills Blitz." Participants were required to be registered nurses (RNs) currently practicing in intensive care units and directly involved in patient care, particularly in scenarios necessitating airway management interventions. Exclusion criteria

were non-nurses and non-critical care nurses. Critical care nurses who were not present at the Skills Blitz due to extenuating circumstances were excluded.

Setting

The project was implemented within a controlled environment, specifically a multi-purpose room designated for the Skills Blitz event. This setting was chosen due to its accessibility for participants and its suitability for conducting both the educational sessions and the simulation exercises. The room was equipped with standard medical equipment and simulation tools donated by the anesthesia department of the facility, thereby providing a conducive learning environment for the participants.

Project Implementation

Participants were given a recruitment speech outlining the project's components and time requirements in detail. A scored simulation was conducted (Appendix A), which included 22 questions across 7 categories, prior to the educational intervention. These questions were asked orally and marked as correct or incorrect by the PI in Yes/No columns. Participants were then provided with a checklist (Appendix C) of components of an airway set-up. Instructions were given on how to use the checklist and why each component of the set-up is important via a PowerPoint presentation (Appendix D). The educational content included information about standard equipment (endotracheal tubes, stylets, laryngoscopes, etc.), emergency equipment (oral airways, LMAs, tracheostomy kits), and medications (propofol, etomidate, rocuronium, succinylcholine, etc.). In addition to equipment and medications, participants were also instructed on who to inform of the situation in addition to the anesthesia team, such as respiratory therapy and the charge nurse.

A second graded simulated (Appendix B) was conducted to assess knowledge retained two weeks following the education, assessing the same 22 questions across 7 categories. The ultimate goal of this project was to improve patient outcomes by increasing airway set-up knowledge and

efficiency of critical care nurses. Improvements in the level of knowledge retained by participants prove the educational intervention was successful.

Budget, Time, and Resources

There was no budget for this project, as there were no costs to complete it. Three minutes were spent introducing the project and education to the participants. Five minutes were spent on the first simulation (Appendix A). The checklist (Appendix C) and PowerPoint education (Appendix D) was presented for approximately seven minutes. The second simulation (Appendix B) administered two weeks later took approximately five minutes. This totals seventeen minutes of time required from participants.

IRB approval

Critical care nursing leadership of the facility gave their written consent for this project to be conducted at the site. Institutional Review Board (IRB) permission was obtained from the university and the facility prior to initiating the project.

Data Collection

The process for this project involved conducting two detailed simulation exercises, developed, and overseen by PI. The initial simulation, referred to as the Pre-Education Graded Simulation Rubric (Appendix A), was implemented before the educational intervention. This simulation was designed to assess the critical care nurses' baseline competencies in airway management, specifically their readiness and effectiveness in preparing for emergency intubations. Nurses were evaluated on their ability to identify essential staff to notify, deliver an appropriate report to the anesthesia provider, demonstrate correct hand placement during AMBU bag use, hand correct equipment to the intubating provider, safely give pertinent medications, and identify emergency equipment needed in complex scenarios.

Following the initial assessment, the participants were introduced to a structured educational session utilizing a checklist (Appendix C) that outlined the critical steps and components in managing airway emergencies. The educational content, delivered through a PowerPoint presentation, emphasized the procedural aspects of intubation, the use of specific equipment, and the administration of medications crucial during intubation procedures.

Two weeks post-education, the second simulation (Appendix B) was conducted to evaluate the retention of knowledge and the improvement in practical skills following the intervention. This follow-up simulation was crucial in determining the efficacy of the educational intervention in enhancing the nurses' practical abilities and their application of the learned concepts in simulated high-pressure scenarios. The aim was to observe tangible improvements in their performance, with a focus on increased accuracy and efficiency in airway setup, a clearer understanding of the roles during EI, and better overall preparedness, which are vital in reducing patient morbidity and mortality during actual intubation procedures.

Data Analysis

The data analysis plan for this project involved a quantitative assessment of the effectiveness of a simulation and checklist-based training program for critical care nurses on airway management during EI. The analysis focused on a pre-education simulation and a post-education simulation model to evaluate the improvement in nurses' knowledge and preparedness, which is essential to decreasing morbidity and mortality during respiratory emergencies.

The chosen statistical test for this analysis was the Chi-Square test for independence. This test is well-suited for nominal data to determine if there is a statistically significant association between two categorical variables—in this case, the simulation scores before and after the educational

intervention. The data collected represented correct ("Yes") and incorrect ("No") answers for 22 questions across 7 categories related to airway management and emergency intubation procedures.

Microsoft Excel was used to perform the Chi-Square tests. Excel's functionality allows for the computation of Chi-Square values and the associated p-values, which are crucial for determining statistical significance. By using a reliable statistical method to compare pre-intervention and post-intervention responses, the project ensured that its goal—to increase nurses' familiarity with the components of airway set-up and the sequence of events in induction and intubation—was met and the hypothesis was tested appropriately.

In this analysis, the expected frequency for each category in the pre-test and post-test was calculated assuming an equal distribution across categories. This assumption is based on the premise that, in the absence of educational intervention, nurses would have an equal likelihood of answering each question correctly. Therefore, for each question in the pre-test and post-test, the expected frequency of correct answers was set at 50%, reflecting no initial bias towards correct or incorrect responses. This approach aligns with the standard method for calculating expected frequencies in Chi-Square tests where no prior information suggests a deviation from uniform distribution among categories.

Results

The Chi-Square analysis yielded a p-value less than 0.05 for each of the seven categories, indicating a statistically significant improvement in nurses' knowledge and skills after the educational intervention. Specifically, the p-values for each category were significantly lower than the conventional alpha level of 0.05, suggesting that the improvements observed in the post-education simulation were not due to chance. These results reinforce the effectiveness of the simulation and checklist-based training program in enhancing critical care nurses' competencies in

airway management during intubation procedures. The findings from the initial scored simulation indicated low initial proficiency levels in various competencies: informing relevant personnel during intubation (36.7%), knowledge of critical history elements for report to anesthesia providers (44.5%), correct hand placement for AMBU bagging (40.7%), identification of standard intubation equipment (42.0%), understanding of medications for induction and paralysis (40.0%), identifying emergency equipment (37.7%), and verification of tube placement (39.6%).

The post-education simulation results demonstrated substantial improvements across all assessed competencies. The ability to inform relevant personnel during intubation showed a significant rise to 92.3%. Knowledge of essential history elements improved to 82.9%, and proficiency in the correct hand placement for AMBU bagging increased to 90.5%. Similarly, the identification of standard intubation equipment rose to 87.5%, and the understanding of medications relevant to induction and paralysis improved to 82.9%. There was also a notable increase in the ability to identify emergency equipment, reaching 94.0%. Most impressively, the verification of tube placement saw a dramatic increase to 98.8%.

These findings highlight the efficacy of simulation training as a method for enhancing clinical skills and knowledge in critical care nursing, particularly in the context of airway management and intubation. The project underscores the value of practical, firsthand learning experiences in augmenting theoretical knowledge and improving patient care outcomes. The retention of knowledge and skills, demonstrated by the high percentage of correct responses in the post-test, suggests that the training had a lasting impact, which is critical for successful implementation in high-stress situations.

Barriers

Throughout the course of this quality improvement project, a few barriers were encountered that posed challenges to its execution and outcomes. One anticipated barrier was the diverse range of baseline knowledge and experience with airway management among critical care nurses, which posed the risk of affecting their motivation to engage with new learning material. To address this, a brief assessment of each participant's level of experience was conducted at the outset of each educational session. This approach made it possible to tailor the educational content in a manner that built upon the nurses' existing knowledge. By positioning the intervention as an opportunity to augment their current skills rather than a critique of their competencies, the nurses were encouraged to view the training as a valuable addition to their professional skill set. This strategy fostered a positive learning environment, mitigating the potential for demotivation and instead, inspiring an eagerness to learn and embrace new concepts in airway management.

Additionally, logistical challenges, such as scheduling conflicts for nurses to participate in the training sessions during the Skills Blitz, were anticipated and initially addressed through flexible session timings. Several sessions of the Skills Blitz event were organized, offering multiple opportunities for nurses to participate. This flexibility ensured broader participation and engagement with the training program. Additionally, the support from the nursing management and education department was instrumental in addressing scheduling conflicts and ensuring adequate resources for the training sessions.

Discussion

The findings from this project robustly support the significant role that simulation-based training and checklist utilization have in enhancing critical care nurses’ proficiency in airway management and endotracheal intubation (EI). The results, affirmed through Chi-Square analyses, reveal marked enhancements across all evaluated competencies, especially in tube placement verification,

emergency equipment identification, and the understanding of critical history elements necessary for communicating with anesthesia providers. This pronounced advancement in skills and knowledge among critical care nurses directly aligns with the project's objectives and addresses the critical gaps identified in the literature review (Janz et al., 2018; Sherren et al., 2014).

The effectiveness of simulation training, as demonstrated by substantial improvements in various competencies, highlights its superiority over traditional lecture-based methods in high-acuity, low-occurrence (HALO) scenarios. These scenarios require rapid, accurate interventions to reduce patient morbidity and mortality, illustrating the vital role of simulation in enhancing clinical skills and knowledge retention (Cant & Cooper, 2010; Forbis, 2018). Furthermore, the integration of checklists has been shown to significantly foster procedural efficiency and minimize errors, leading to safer, more effective patient care during emergencies (Conroy et al., 2014; Smith et al., 2015).

Improving proficiency in airway management, particularly in the swift and accurate execution of EI procedures, directly contributes to reducing the likelihood of hypoxic events. Efficient and correctly executed intubation processes decrease the duration of time patients spend in a hypoxic state, thereby minimizing the risk of resultant brain damage and other serious hypoxia-related complications. This correlation underscores a direct link between enhanced nursing competencies and improved patient outcomes, highlighting the potential for substantial positive impacts on patient health and recovery times.

This project fits well within the conceptual framework advocating continuous learning and skill enhancement in nursing practice. It further advances the application of evidence-based knowledge, specifically simulation training and checklists, to improve clinical practice effectively in real-world settings (Dang et al., 2022). The implementation of such training modules within ongoing education programs for nurses, particularly in critical care environments, is strongly recommended to ensure

that nurses are well-prepared to manage complex clinical scenarios (Groombridge et al., 2020; Hammontree & Kinderknecht, 2022).

Key takeaways from this project include the essential role of firsthand, practical learning experiences in augmenting theoretical knowledge and the critical importance of standardized procedures in managing high-stress scenarios effectively. However, this project was limited by its scope—being confined to a single institution—and its reliance on convenience sampling methods, which may not fully represent the broader nursing demographic (Hersey et al., 2020).

Recommendations for Future

Building on these findings, a few recommendations are proposed for future research and educational practices in nursing. Firstly, there is a clear need to extend the scope of research to include a variety of clinical settings and diverse nursing populations. By conducting studies across different healthcare institutions, both rural and urban, a more comprehensive understanding of the effectiveness of simulation-based training and checklists could be gained. This approach will not only enhance the generalizability of the findings but also offer insights into the adaptability of these methods in varying contexts and patient demographics.

Secondly, it is crucial to undertake longitudinal studies to evaluate the long-term retention of skills and knowledge imparted through simulation-based training. Such studies would track the sustained impact of these educational interventions on nurses' clinical performance over longer periods of time than two weeks. This research would be invaluable in determining the frequency at which refresher courses might be needed to maintain high levels of proficiency in critical care practices, specifically in airway management and emergency intubation.

Thirdly, adopting interdisciplinary training approaches that involve collaborative learning with other healthcare professionals, such as anesthesiologists and respiratory therapists, could offer a

more rounded perspective in managing critical care scenarios. This strategy would not only enrich the learning experience, but also foster essential teamwork and communication skills.

Lastly, future research should focus on assessing the direct impact of these improved nursing competencies on patient outcomes and healthcare efficiency. Investigating aspects such as the reduction in complications during emergency procedures, patient recovery times, and the economic benefits of such educational interventions can provide tangible evidence. This evidence would be instrumental in advocating for the integration of these innovative training methods into standard nursing education and ongoing professional development programs.

The results of this project were disseminated to relevant stakeholders. A summary of the findings and recommendations were shared via email with the participating institution's nursing department. By adhering closely to these recommendations and continuously striving for improvement, the project's outcomes can lead to a sustainable enhancement of clinical practice, contributing to safer and more effective patient care in critical care environments.

Conclusion

The objective of this DNP project was to enhance critical care nurses' proficiency in airway management through simulation-based training and the implementation of checklists, assessing their impact on nursing preparedness and patient outcomes during EI. Over the course of the project, critical care nurses demonstrated marked improvements in their ability to effectively set up for and assist in intubations. Post-intervention assessments showed significant increases in the nurses' knowledge and readiness, correlating with enhanced patient care during airway management scenarios. This aligns with existing research, which supports the efficacy of simulation and checklists in improving clinical outcomes in high-acuity situations. The findings from this project advocate for the integration of these educational interventions into routine nursing training,

particularly in environments characterized by high stress, such as the ICU. Future initiatives should focus on the continuous adaptation of these evidence-based practices into nursing curricula and the ongoing development of protocols that leverage interdisciplinary collaboration to further enhance quality and patient safety.

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Appendix A:
Pre-Education Graded Simulation Rubric

	Yes	No
Correctly identifies staff to inform of intubation:		
• Anesthesia		
• Respiratory Therapy		
• Charge Nurse		
Gives appropriate report to anesthesia provider:		
• Brief patient history		
• Allergies		
• Pertinent labs (potassium, glucose, etc.)		
• Vasoactive medications		
• Prior oxygenation status (nasal cannula, BiPAP, etc.)		
Displays correct hand placement when using AMBU bag		
Hands correct equipment when asked:		
• Oral Airway		
• Nasal Airway		
• Endotracheal Tube		
• Stylet		
Provides appropriate medications and identifies their purpose:		
Induction:		
• Propofol		
• Etomidate		
Paralytic:		
• Succinylcholine		
• Rocuronium		
• Vecuronium		
Identifies emergency equipment the anesthesia provider may ask for if unable to mask ventilate or place the endotracheal tube (ETT):		
• Laryngeal Mask Airway		
• Cricothyrotomy Kit		
States the first priority after the anesthesia provider has placed the ETT:		
• Confirm placement via end-tidal CO_2		
• Bilateral breath sounds		

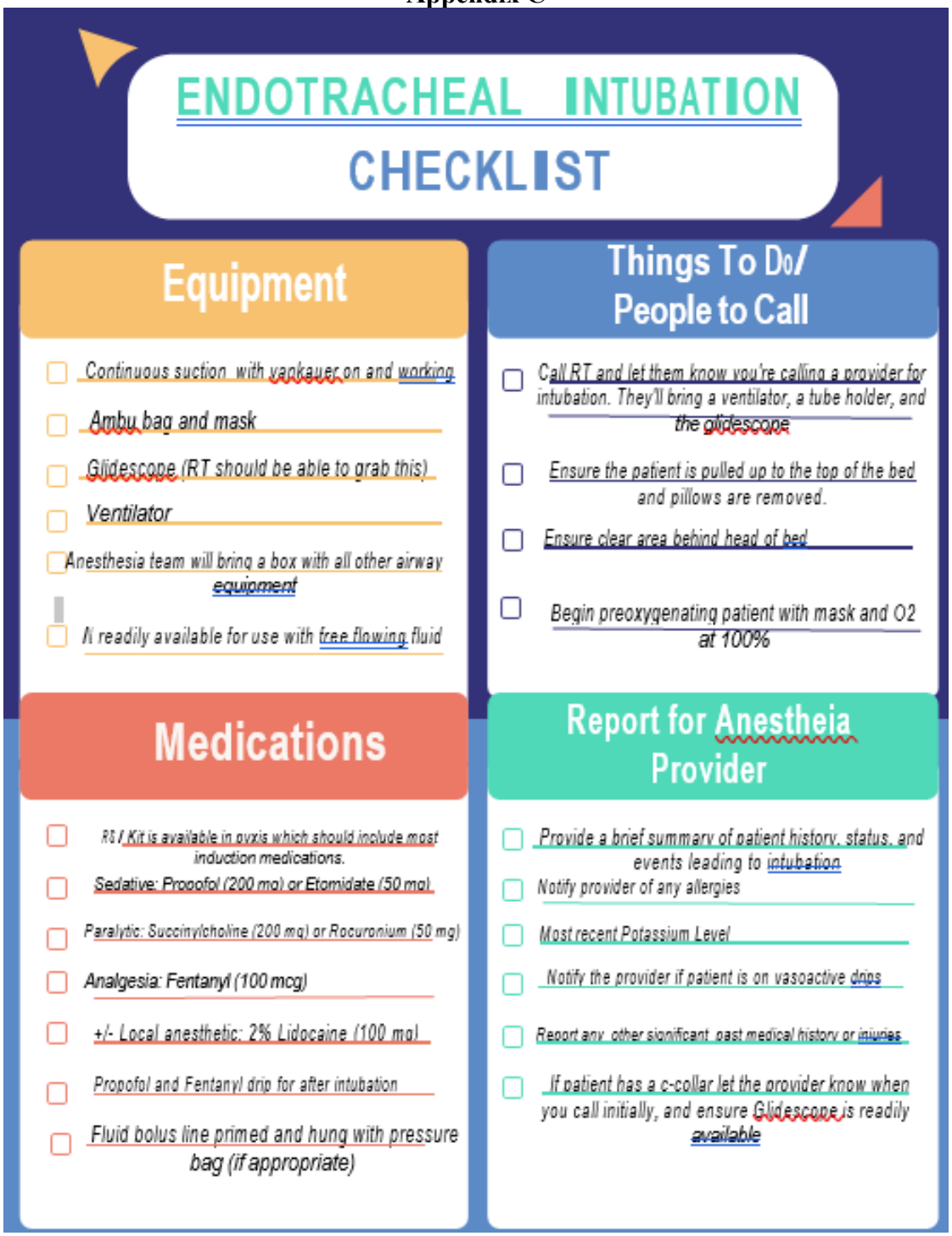
Time to completion: _____

Appendix B
Post-Education Graded Simulation Rubric

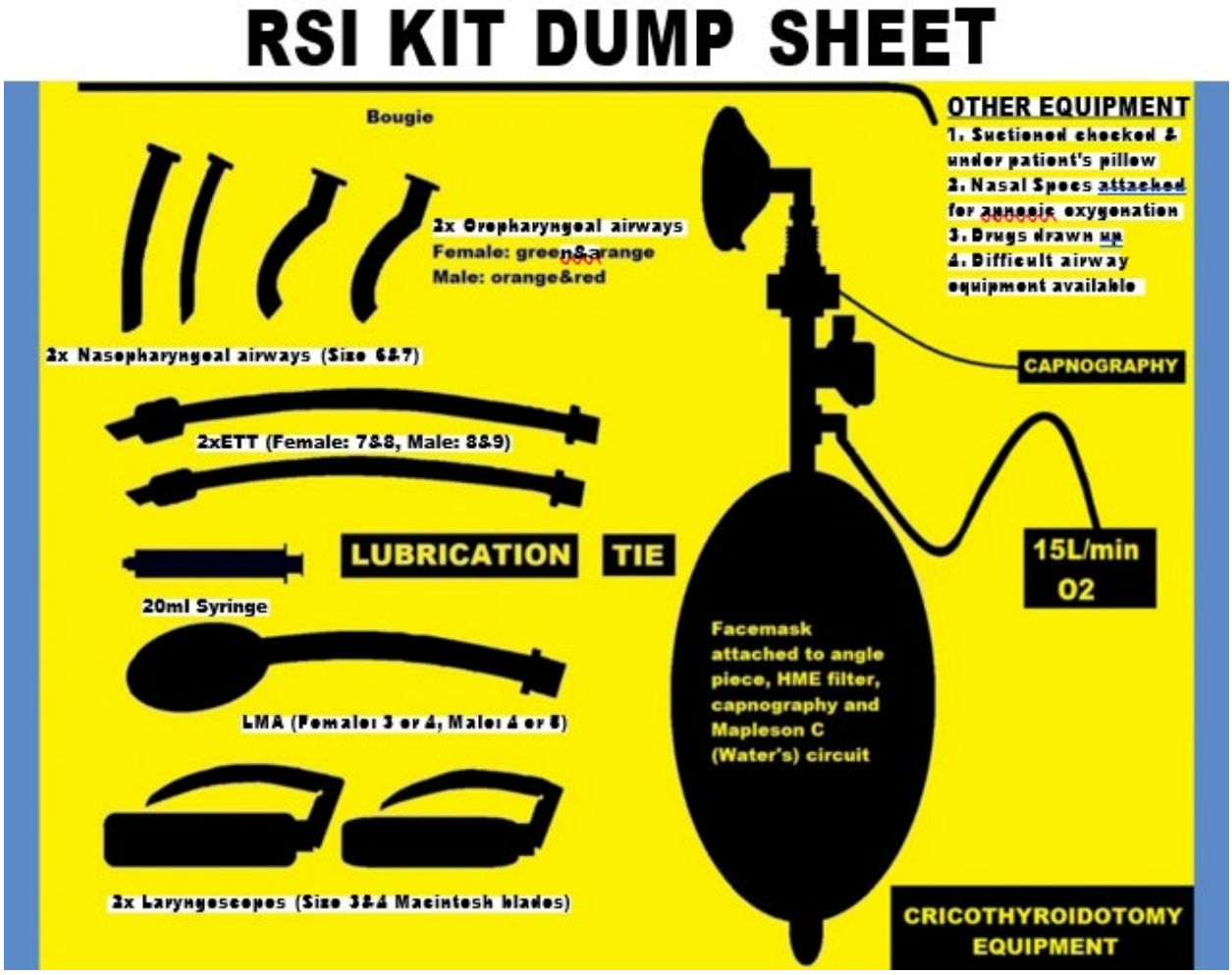
	Yes	No
Correctly identifies staff to inform of intubation:		
• Anesthesia		
• Respiratory Therapy		
• Charge Nurse		
Gives appropriate report to anesthesia provider:		
• Brief patient history		
• Allergies		
• Pertinent labs (potassium, glucose, etc.)		
• Vasoactive medications		
• Prior oxygenation status (nasal cannula, BiPAP, etc.)		
Displays correct hand placement when using AMBU bag		
Hands correct equipment when asked:		
• Oral Airway		
• Nasal Airway		
• Endotracheal Tube		
• Stylet		
Provides appropriate medications and identifies their purpose:		
Induction:		
• Propofol		
• Etomidate		
Paralytic:		
• Succinylcholine		
• Rocuronium		
• Vecuronium		
Identifies emergency equipment the anesthesia provider may ask for if unable to mask ventilate or place the endotracheal tube (ETT):		
• Laryngeal Mask Airway		
• Cricothyrotomy Kit		
States the first priority after the anesthesia provider has placed the ETT:		
• Confirm placement via end-tidal CO_2		
• Bilateral breath sounds		

Time to completion: _____

Appendix C


ENDOTRACHEAL INTUBATION
CHECKLIST
Equipment
Continuous suction with yankauer on and working
Ambu bag and mask
Glidescope (RT should be able to grab this)
Ventilator
Anesthesia team will bring a box with all other airway equipment
N readily available for use with free flowing fluid
Things To Do/ People to Call
Call RT and let them know you're calling a provider for intubation. They'll bring a ventilator, a tube holder, and the glidescope
Ensure the patient is pulled up to the top of the bed and pillows are removed.
Ensure clear area behind head of bed
Begin preoxygenating patient with mask and O2 at 100%
Medications
RSI Kit is available in pyxis which should include most induction medications.
Sedative: Propofol (200 mg) or Etomidate (50 mg)
Paralytic: Succinylcholine (200 mg) or Rocuronium (50 mg)
Analgesia: Fentanyl (100 mcg)
+/- Local anesthetic: 2% Lidocaine (100 mg)
Propofol and Fentanyl drip for after intubation
Fluid bolus line primed and hung with pressure bag (if appropriate)
Report for Anesthesia Provider
Provide a brief summary of patient history, status, and events leading to intubation
Notify provider of any allergies
Most recent Potassium Level
Notify the provider if patient is on vasoactive drips
Report any other significant past medical history or injuries
If patient has a c-collar let the provider know when you call initially, and ensure Glidescope is readily available

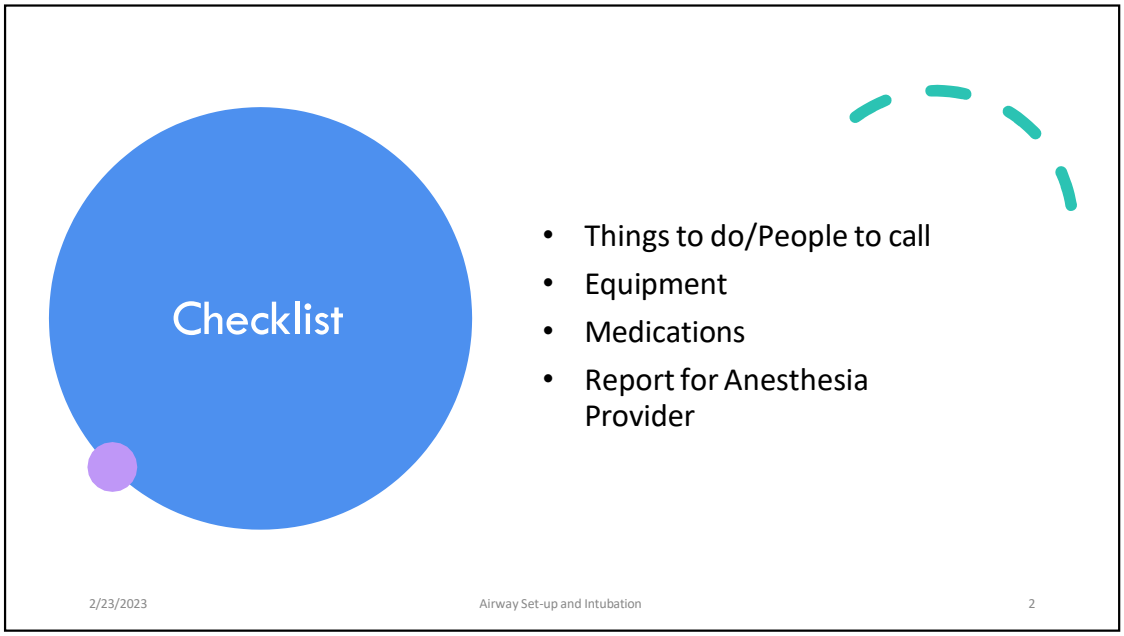
Appendix C continued



Appendix D:

Educational Power Point

1



2

People to Call

- Call RT and let them know you are calling anesthesia for an intubation.
  - They will bring the ventilator, tube holder, and glidescope
- Make sure your charge nurse is aware of the situation

Things to Do

- Ensure the patient is pulled up to the top of the bed and pillows are removed.
- Make sure the area behind the patient's head is clear and pulled away from the wall.
- Begin pre-oxygenating the patient with 100% FiO_2

3

Equipment

- Continuous suction with yankauer on and working
- AMBU bag and mask
- Glidescope and ventilator (if not brought by RT)
- IV readily available for use with free-flowing fluid
- Anesthesia team will bring a box with all other airway equipment

4

Timeline for Equipment Use

1. AMBU Bag

2. Oral Airway

3. Laryngeal Mask Airway (LMA)

4. Endotracheal Tube (ETT)

5. Cricothyrotomy Kit

Medications

RSI Kit: In pyxis, should have most induction medication

Induction: Propofol or Etomidate

Paralytics: Rocuronium and/or Succinylcholine (Roc or Sux)

Other: Fentanyl, Lidocaine

Post-intubation: Fluids, Propofol, Fentanyl

Report for Anesthesia

- Brief summary of patient history, status, and events leading to intubation
- Notify the provider of any allergies
- Most recent potassium level
- Current vasoactive drips
- If patient has a c-collar, let anesthesia know when you first call and have glidescope readily available

7

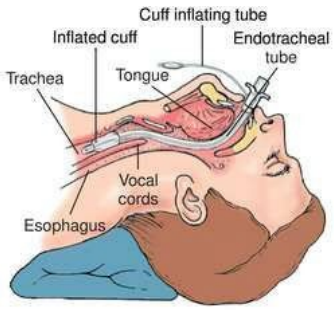
Post-Intubation

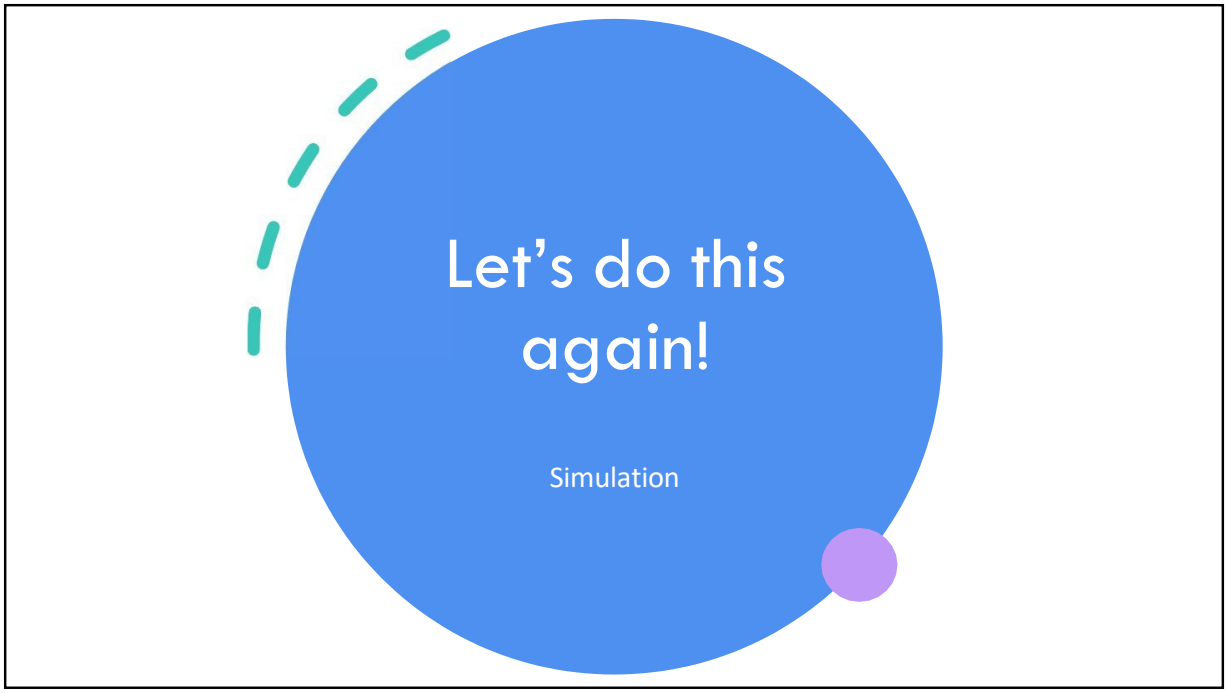
The anesthesia provider has placed the endotracheal tube – now what?

Correct placement of the tube must be confirmed!

- Condensation in tube
- Chest rise
- Bilateral breath sounds
- **Positive end-tidal CO_2**

If end-tidal CO_2 cannot be confirmed, the tube is most likely in the esophagus.




Let's do this again!
Simulation