

Utilizing a Standardized Early Mobility Guideline in the Pediatric Intensive Care Unit

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“On my honor, I pledge that I have neither given nor received any unauthorized assistance on this assignment.”- Katherine Thompson

Abstract

Purpose: This quality improvement study aimed to evaluate the impact a standardized, age-based, mobility guideline, implemented in a pediatric intensive care unit, had on number of patient mobilizations per day. This project also addressed nurses' knowledge, attitudes, and behaviors related to mobilization of critically ill children.

Methods: The intervention was an age-based mobility screening tool with a progressive mobility action list, and accompanying nursing education materials. The project was implemented over six weeks with data being collected for four weeks prior to implementation and four weeks after implementation. Additional data were collected from one year prior to the post implementation period for accurate comparison between patient demographics. A pre- and post-implementation survey was distributed to nursing staff to measure knowledge, attitudes, and behaviors pertaining to mobility.

Results: There was no statistically significant change in number of mobilizations per day, or active mobilizations per day between the pre- and post-implementation groups or between the comparison and post-implementation groups. There was a statistically significant change in nurses' reports of behaviors related to mobilizing intensive care patients.

Conclusion: The use of a standardized mobility guideline improved nurses' knowledge, attitudes, and behaviors related to mobilization of pediatric patients in the intensive care unit. This study emphasizes the importance of standardized guidelines in clinical practice to create a framework to drive patient care.

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Introduction

With almost six million patients admitted to intensive care units across the United States each year, addressing mobility practices is vitally important to patient safety and cost of healthcare delivery (Society of Critical Care Medicine, 2015). Early mobilization of critically ill patients provides multiple clinical benefits including decreased hospital acquired conditions, decreased length of stay, decreased incidence of delirium, and increased functional outcomes (Wieczorek, Burke, Al-Harbi, & Kudchadkar, 2015). Nationally, the Agency for Healthcare Research and Quality (AHRQ), a subgroup of the United States Department of Health and Human Services, recommends early mobility for all ICU patients. The AHRQ provides resources for healthcare professionals and healthcare organizations including data collection tools to track compliance, screening forms to determine mobility interventions, and educational presentations highlighting the importance of early mobility to improve ventilator outcomes and clinical metrics (AHRQ, 2017). Despite this knowledge and resource availability, early mobility practices are not standardized in pediatric intensive care units (PICUs) across the country (Wieczorek et al., 2015).

Background

The literature outlines benefits of early mobility in the pediatric population. Current mobility practices in a PICU at an urban, tertiary, academic medical center are varied and inconsistent from nurse to nurse. No centralized policy exists to ensure pediatric patients are receiving standard mobilization therapies from nursing staff or physical/occupational therapies. The existing clinical mobility guideline, in the PICU, is due for revision. This leaves the pediatric ICU population at risk for prolonged mechanical ventilation, prolonged hospital

admissions, and delirium (Wieczorek et al., 2016). Traube et al. (2017) identified pediatric delirium as a statistically significant predictor of mortality in the PICU population. This is significant as 40-50% of pediatric patients experience delirium in the PICU (Pandharipande et al., 2017). Without standardization of mobility protocols for pediatric patients, critically ill children are at higher risk for preventable complications from their ICU stay. The purpose of this quality improvement project is to implement a pediatric specific mobility guideline, and educate staff on the guideline, in the pediatric ICU at an urban, tertiary, academic medical center, to determine if the standardized guideline results in an increase in nursing led mobilization of patients and an increase in nurses' knowledge, attitudes, and beliefs about mobilizing patients.

Review of Literature

The evidence strongly supports the safety and feasibility of implementing an early mobility protocol in the pediatric intensive care unit (PICU), the importance of a standardized, multidisciplinary approach, and the many benefits of early mobility previously discussed (Betters et al., 2017; Cameron et al., 2015; Colwell et al., 2018; Gornitzky et al., 2016; Hollander et al., 2014; Norman et al., 2017; Ortmann & Dey, 2019; Simone et al., 2017; Wieczorek et al., 2016). Importantly, the literature demonstrates key components of a successful and sustainable mobility program include adequate staff resources for nursing as well as physical and occupational therapies, appropriate pediatric mobilization tools and equipment, and a standardized approach to mobilization (Gornitzky et al., 2016; Hollander et al., 2014; Parchem et al., 2018; Wieczorek et al., 2016).

Implementation of a standardized approach to mobility is varied in the literature, with some studies utilizing a bundle style approach to early mobility and others using a clinical guideline or policy (Wieczorek et al., 2016; Hollander et al., 2014). Utilizing a standardized

approach to the mobility protocol allows for uniform implementation and expectations within a care environment (Wieczorek et al., 2016; Owens & Tapley, 2018; Van Damme, Flori, & Owens, 2018). One study found varied practices within the same unit based on patient's baseline functional status (Miura, Wieczorek, Lenker, & Kudchadkar, 2018); with proper utilization of a comprehensive standardized guideline, these types of disparities could be prevented. The evidence shows greater adherence to mobility practices and improved multidisciplinary collaboration when guidelines are clearly defined and implemented (Colwell et al., 2018; Cuello-Garcia, Mai, Simpson, Al-Harbi, & Choong, 2018). In addition to greater adherence, studies show the clinical benefits of standardized mobility guidelines for patient outcomes including decreased delirium and decreased length of stay (Hollander et al., 2014; Simone et al., 2017).

Translational Framework

This quality improvement project utilized the translational framework of the Rosswurm and Larrabee Model to guide development and implementation (See Appendix A for application of model). The Rosswurm and Larrabee Model consists of six steps, beginning with assessing a need for change in current practice and ending with integration and adoption of the implemented change into practice (Rosswurm & Larrabee, 1999). Assessing the need for practice change, the first step of the model, was accomplished by informal survey of nursing staff regarding current mobility practices. Nursing staff in the PICU expressed concern about the lack of clarity and guidelines for mobilizing patients. This initial step of identifying and bringing in stakeholders early in the process is key to progressing through the translational framework.

The next step in the model is to link the problem with outcome measures. In collaboration with the PICU educator and physical and occupational therapies, we established the patient focused outcome measure of increasing number of patient mobilizations per day. From a nursing

perspective, the second outcome measure is to increase nursing behaviors, beliefs, and knowledge about mobilizing patients. Designing the practice change based on the synthesis of evidence and identified problem and outcomes was an interdisciplinary task. Together with physical therapy (PT), occupational therapy (OT), and the PICU nursing educator, we identified a pediatric mobility guideline to inform practice.

Implementation and evaluation occurred within the PICU over a six-week period. The Rossworm and Larrabee Model calls for continued monitoring of the intervention and outcomes throughout implementation and evaluation. Following this framework, adjustments were made as needed to location of mobility resources and just in time education was provided to bedside staff. The final step of the translational framework is to integrate and maintain the practice change. This is being accomplished by continued follow up with stakeholders including PT/OT, PICU nursing staff, and PICU providers to determine the best sustainability plan for this initiative including integration with the electronic medical record and the addition of early mobilization to nursing rounding scripts.

Methods

Design

This pre-post design quality improvement project aimed to increase patient mobilization in the pediatric intensive care unit and to increase nurses' knowledge, attitudes, and beliefs regarding mobilization of critically ill patients. The project was implemented over a six-week period. The pre-implementation period included September 28, 2019 through October 28, 2019 and the post-implementation period was December 11, 2019 through January 11, 2020. Comparison mobility data were collected from the previous year for the post-implementation period, December 11, 2018 through January 11, 2019.

Setting

This project was implemented on a 19-bed pediatric intensive care unit at an urban, tertiary, academic medical center in the Mid-Atlantic region. The PICU cares for patients ranging in age from day one of life to 21 years old. The unit cares for high acuity patients including ECMO, congenital cardiac surgery, and critical medical/surgical illnesses.

Sample

Patients admitted to the PICU requiring mechanical ventilation were included in data collection for this project. All patients admitted to the PICU received the intervention. All registered nurses working in the PICU received education on the intervention and were surveyed. This project was reviewed by the institutional review board and acknowledged as quality improvement.

Intervention

In conjunction with representatives from physical and occupational therapies, an early mobility guideline was implemented to provide developmentally appropriate mobilization protocols for patients in the PICU. Education on the guideline was provided to PICU nursing staff. The guideline included an early mobility algorithm, age based screening tool, age based goals and activities for each mobility level, and a special considerations reference for populations with specific mobility needs.

Measures

To measure mobilization in the PICU, patients requiring mechanical ventilation during the pre-intervention, comparison, and post-intervention time periods were identified. Chart audits were completed to obtain the following information: age, gender, diagnosis, type of airway, length of mechanical ventilation (MV), ICU length of stay (LOS), hospital LOS, amount and

types of mobilizations while mechanically ventilated, and bedrest orders while mechanically ventilated.

To measure nurses' knowledge, attitudes, and beliefs about mobilizing patients, a ten-question survey was administered before education began and after the implementation period. The survey was adapted from the Patient Mobilization Attitudes and Beliefs Survey (Hoyer, Brotman, Chan, & Needham, 2015). Questions were on a 5-point Likert scale (5, strongly agree; 4, agree; 3, neutral; 2, disagree; 1, strongly disagree). Scores were summed with a range from 5 to 50. Demographic data, including number of years as practicing registered nurse and number of years working in the PICU, were collected in terms of ranges of less than two years, between two and three years, between three and five years, between five and ten years, and greater than ten years.

Procedures

Pre-implementation surveys were distributed to all PICU nurses four weeks prior to the implementation date. The surveys were distributed on paper, completed anonymously, and returned to a central location in the PICU. The surveys were collected before beginning the education phase. Two weeks prior to the implementation date, multiple inservices were held in the PICU providing information on the benefits of early mobility and introduction to the new guideline. Approximately 70% of staff received in person education. All staff received email education and resources were posted around the unit and in high traffic areas. Additionally, all components of the mobility guideline were placed in the resource section of the bedside chart for reference as needed.

Following implementation of the new guideline, biweekly check ins with staff and key stakeholders in the PICU were implemented to address issues in real time, troubleshoot, and

adapt as needed. Screening tool use was audited biweekly to assess the utilization of the new guideline. During the implementation phase, the multidisciplinary PICU team was updated on the progress of the mobility guideline at quality and safety meetings. Upon completion of the implementation period, post-intervention surveys were distributed to the nurses in the same manner previously described. Data collection was accomplished through electronic medical record chart audits.

Data Analysis

After running tests of normality on the mobility data, it was determined the data were not normally distributed; therefore, the original analysis plan to use a t-test was changed to the non-parametric Mann-Whitney U test. Comparisons between the pre-and post-intervention groups and between the comparison and post-intervention groups were completed. Descriptive statistics, means and standard deviations for continuous variables and percentages for nominal variables, were used to evaluate patient characteristics between the three groups.

The second aim for this study was to increase pediatric ICU nurses' knowledge, attitudes, and behaviors related to early mobility. The summary scores for both the pre- and post-intervention surveys were found to be normally distributed; therefore, an independent t-test was used to compare mean summary scores from both groups. The pre/post-intervention change for individual items from the survey were analyzed using the Mann-Whitney U test. Descriptive statistics, percentiles, were employed to evaluate the years of nursing experience and years of PICU experience.

The de-identified data for this project was stored on the Hopkins One Drive. The data was de-identified after removal of medical record number (MRN), names, and admission/discharge dates. The survey data was submitted anonymously and required no de-

identification. This project is quality improvement, not human subjects research; therefore, data will be destroyed following the completion of the project.

Discussion

Prolonged immobilization of critically ill patients increases risk of hospital acquired conditions, prolonged mechanical ventilation, and prolonged ICU stay. The literature on this topic is robust for the adult population; however, pediatric mobility practices are not standardized in the literature, placing this vulnerable population at risk. This quality improvement project studied the use of an age based mobility guideline in a 19-bed PICU. Using a pre- and post-intervention survey we identified a statistically significant increase in PICU nurses' knowledge, attitudes, and behaviors regarding mobilization of critically ill pediatric patients after implementation of the standardized mobility guideline.

While the existing literature largely reports patient outcome metrics related to mobility, this significant change in nurses' perceptions of mobilization after implementation of standardized approach is also demonstrated (Betters et al., 2017). Mobilizations did not show an increase after the intervention when comparing the comparison data to the post-implementation data. However, there was an increase in mean mobilizations per day, and mean active mobilizations per day between the pre-implementation and post-implementation groups that was not statistically significant. Similarly, there was no statistically significant change in length of mechanical ventilation or length of ICU stay after the intervention. These findings are contrary to the current literature which supports the use of a standardized mobility tool to increase mobilizations (Betters et al., 2017; Cameron et al., 2015; Colwell et al., 2018; Gornitzky et al., 2016; Hollander et al., 2014; Norman et al., 2017; Ortmann & Dey, 2019; Simone et al., 2017; Wieczorek et al., 2016). While not statistically significant, there was an increase in active

mobilizations between the comparison group and the post-implementation group in patients admitted with respiratory distress which comprises over half of mechanically ventilated patients in both of those groups. This could be indicative of a focused effect in this population.

Limitations to this project include the brevity of implementation with only a six-week implementation phase and the possibility of incorrectly entered or un-entered data into the medical record. A larger sample size could have been accrued with a longer implementation period. Additionally, the mobility guideline was not integrated into the electronic medical record at the time of implementation. This could have impacted the documentation of mobility practices as the screening tools and guidelines were on paper, but recording of mobilizations were electronic.

Moving forward, additional education and deeper integration of early mobility must continue in the PICU to increase the number of active mobilizations for patients. This includes obtaining feedback from staff regarding this initiative and full integration of the mobility screening and guidelines in the electronic medical record. Consideration should be given to a targeted effort for patients admitted with respiratory distress during the months of respiratory season, as this group did show an increase in active mobilizations. In subsequent initiatives, data should be collected quantifying time to first mobilization to determine if the intervention results in more prompt mobility.

Despite the stated limitations, the impact of the standardized tool was shown in the staff survey responses and with increases in active mobilizations for certain populations. The change in nursing perceptions of mobilization of critically ill patients should positively impact the patient population and influence the culture of mobility in the PICU. While there was no change in length of mechanical ventilation or length of ICU stay, the data is encouraging that over time

and with further integration, the patients in the PICU will benefit from the implementation of the standardized mobilization guideline.

Conclusion

Utilizing a standardized, pediatric specific, mobility guideline in a pediatric ICU provides a framework to support consistent early mobilization of patients. The clinical benefits from early, safe, mobilization for this population include decreased length of stay and decreased length of mechanical ventilation. Providing a thorough screening and action mobility guideline can improve knowledge and behaviors of clinical staff regarding mobilization of critically ill patients.

Dissemination

The results of this quality improvement project will be shared with the multidisciplinary PICU team, including physical and occupational therapy, attendings, fellows, nurse practitioners, educators, PICU nurse leaders, and managers through a virtual presentation. Additionally, the results will be presented to the Nursing Practice Council Committee, which has capabilities to move this guideline through the approval process to become integrated into the electronic medical record.

An annual poster presentation at the implementation site is another avenue for dissemination that will be used. Similarly, a poster will be submitted to the American Association of Critical Care Nurses annual National Teaching Institute conference. A manuscript will be submitted to the journal *Intensive and Critical Care Nursing* for review and publication.

Sustainability

To sustain this intervention, integration into the electronic medical record is paramount. This has been part of the sustainability plan from the inception of this endeavor. Presentation to

the applicable committees will aid in moving this project forward and cementing the guideline into the PICU standards of care. Further, buy in from advanced practice leadership and nursing leadership in the PICU has allowed for the new guidelines to be incorporated into the orientation and continued education of both providers and PICU nursing staff. Updates are being made to the nursing rounding script to facilitate a clear discussion of mobility plans and expectations for patients.

Discussion of early mobility trajectory in the PICU includes focusing on specific populations and tracking other metrics such as number of PRN medications given before implementation of the early mobility guidelines compared to after implementation. There are many iterations of the plan-do-study-act cycle that can be applied to this topic of standardized mobility. With strong buy in from advanced practice nursing leadership, integration into the electronic charting system, and clear expectations or goals set during rounds this project will continue to thrive in the PICU for years to come.

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Appendix A

Application of Rossworm and Larrabee Model

Assess Need for Practice Change	Link Problem, Interventions, Outcomes	Synthesize Best Evidence	Design Practice Change	Implement and Evaluate	Integrate and Maintain
<p>Project Site: Urban, tertiary, academic hospital; 19 bed PICU</p> <p>Informal survey of PICU RNs: lack of guidelines to inform mobility practices</p> <p>Investigation: search of hospital policies and procedures, unit specific education protocols, meetings with PICU manager and educator, meetings with senior PICU RN staff</p> <p>Results: no pediatric mobility</p>	<p>Problem: lack of standardized protocol for mobilization of pediatric patients</p> <p>Intervention: create standardized protocol for pediatric mobilization in the PICU</p> <p>Activities: <i>screening tool, mobility levels, activities associated with mobility levels, integration with electronic medical record</i></p>	<p>Literature search accomplished through PubMed, CINAHL, and Cochrane Library</p> <p><i>Keywords: pediatric, children, critical care, intensive care, mobility, early mobility, mobilization, standardize</i></p> <p>Utilizing the PRISMA flow diagram, a group of less than 30 articles were included for the literature review</p>	<p>Finalized proposed intervention is pediatric specific/age range mobility screening tool and action tool</p> <p>Planning Implementation Process: staff education for mobility screen, leveling, and corresponding activities; pre-implementation PICU RN survey to assess knowledge, beliefs, and attitudes about mobilizing patients; data gathering on number</p>	<p>This intervention occurred only in the PICU</p> <p>Unit champions will be identified to serve as bedside resources to staff as this new protocol is initiated</p> <p>Measurements for both defined outcomes will be taken at six weeks post implementation to assess impact of the intervention</p> <p>Additionally, ventilator days and length of ICU stay were analyzed</p>	<p>Communicate recommended change to stakeholders</p> <p>Integrate into standards of care and electronic medical record</p> <p>Monitor process and outcomes: continued monitoring of outcomes at the three and six-month interval post implementation will assess the sustainability of the intervention</p>

<p>policy/procedure or clinical guidelines exists</p> <p>Stakeholders: PICU manager PICU Educator PICU nursing staff Patients and families PT/OT Standards of Care Committee</p> <p>Problem identified (collaboratively with stakeholders) as need for standardized approach to mobility in the PICU</p>	<p>Aims: increase number of mobilizations per patient per day Increase nursing knowledge, beliefs, and attitudes about mobilizing patients</p> <p>Other outcome measures that could be analyzed: number of ventilator day and length of ICU stay</p>	<p>Evidence shows safety and feasibility of mobilizing critically ill pediatric patients (Wieczorek et al., 2016).</p>	<p>of mobilizations per patient per day; baseline data on average length of ICU stay, average number of days of mechanical ventilation, and delirium scores</p> <p>Define outcomes: PICU RN knowledge, beliefs, and attitudes about mobility Number of mobilizations per patient per day</p>	<p>Decision to adopt/reject/adapt the practice change: the data will be analyzed with an interdisciplinary team of this DNP student, PICU manager, PICU educator, PT/OT, and PICU medical providers to determine the next steps.</p>	<p>and allow adaptations to increase sustainability and adherence.</p>
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