Published in final edited form as:

Dimens Crit Care Nurs. 2018 ; 37(6): 318–323. doi:10.1097/DCC.0000000000000320.

Nurse-Initiated Mobilization Practices in Two Community ICUs: A Pilot Study

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Abstract

Background—Critical care nurses play a vital role in promoting safe early mobilization in Intensive Care Unit (ICU) settings to reduce the risks associated with immobility in ICUs, including the risk for delirium, ICU-acquired weakness and functional decline.

Objective—The purpose of this study was to describe nurse-led mobilization practices in two community hospital ICUs and to report differences and similarities between the two settings.

Methods—A cross-sectional exploratory study of 18 nurses (ICUA: n=12, ICUB: n=6) and 124 patients (ICUA: n=50, ICUB: n=74). Patient-specific therapeutic intervention needs and nurse-initiated mobilization practices were tracked over a one-month period.

Results—Differences in patient characteristics and nurse-led mobilization activities were observed between ICUs. After controlling for patient characteristics, we found statistically significant differences in nurse-led mobilization activities between the two units, suggesting that factors other than patient characteristics may explain differences in nurse-led mobilization practices.

Keywords

Nurses; Critical Care; Mobilization; Early Mobilization; Intensive Care

BACKGROUND AND SIGNIFICANCE

The early mobilization of patients in Intensive Care Unit (ICU) settings are imperative for patient safety and the quality of ICU care. Early mobilization is an important component of the **A**wakening and **B**reathing Coordination, **D**elirium Monitoring and Management, and

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Agree with manuscript being submitted including results and conclusions: DPS, TC, MM, CM. Conceptualized, designed, and conducted the study: TC, MM, CM analyzed the data and wrote up the results: DPS, MSD. Wrote the first draft of the manuscript: DPS. Contributed to and provided oversight over the design and execution of the study: CM. Reviewed the first draft and contributed to additional revisions: CM, MSD.

No conflict of interest of financial disclosures to report.

Early Mobility (ABCDE) bundle, an evidence-based approach to reduce ICU acquired delirium, immobility, sedation, and ventilator management in ICU settings.¹ Early mobilization can prevent the physiological changes and associated short- and long-term consequences for patients and their families that result from immobility.^{2,3} Immobility is associated with an increased risk for delirium, weakness, increased days of mechanical ventilation, and increased hospital length-of-stay in ICU patients.^{3–7} Also, immobility is a significant predictor of hospital readmission and mortality within the first year following critical care hospitalization.⁸

ICU nurses are uniquely positioned to promote early mobilization of ICU patients. As bedside clinicians, nurses initiate mobilization, implement protocols, serve as champions of mobilization, and coordinate the mobilization of patients with other team members.⁹ Nurses are also an integral part of an ICU's interdisciplinary mobilization team¹⁰ and are instrumental in implementing patient mobilization.¹¹

Despite the important role ICU nurses play in patient mobilization, little is known about specific nurse-initiated practices regarding early mobilization. Descriptions of ICU mobility practices are predominantly reported from single or multi-site quality improvement (QI) projects^{12–15} or review articles,^{16,17} both considered to be less rigorous than research studies. Mobilization practices employed at a sample of U.S. hospitals was reported,¹⁸ but lacked descriptions of the specific nurse-led mobilization practices. Reports from direct care ICU nurses are also underrepresented in studies related to mobilization of ICU patients. For example, Bakhru et al.¹⁸ surveyed ICU nurse managers and clinical nurse specialists while Hoyer et al.¹⁹ sampled nurses in non-ICU settings. We were interested in *actual* nurse-initiated and reported mobilization practices among ICU nurses.

Mobilization practices are influenced by patient acuity (e.g., presence of vasoactive drips), comorbid conditions (e.g., COPD),²⁰ unit-based protocols (e.g., measures of instability), and critical therapies (e.g., renal replacement therapy).^{13,20} In light of identified gaps in the literature and an awareness of other factors that influence mobilization practices, the aim of our study was to describe nurse-led mobilization practices in two community hospital ICUs and to report differences and similarities between the two settings after controlling for influencing factors. This was particularly important to us as variability in mobilization activities independent of other patient-related influencing factors would suggest that non-patient factors might be drivers of ICU nurses' mobilization activities.

METHODS

Study Design

A cross-sectional exploratory study.

Setting and Sample

The study was conducted in two medical/surgical ICUs (30 beds and 24 beds) in two southeastern cities in the United States from January 1st to January 31st, 2013. ICU A was a surgical ICU that had many cardiovascular patients. Surgeons were strong advocates for mobilization. More nurses participated in the study at ICU A, but were less consistent in

study participation. . ICU B was a general ICU that received a broad range of patients and diverse diagnoses. The nurses at ICU B had an active unit-based nursing council that promoted best practices.

The population studied included critical care nurses and their patients. A convenience sample of nurses employed in the critical care units of two hospitals reported on 177 shifts (12 hour) (Hospital A: N=12 nurses making 60 reports; Hospital B: N=6 nurses making 117 reports).

Measurement of Study Variables

All study data were obtained using the Mobilization Initiatives & Levels of Exercise (MOBILE) tracking tool. Nurses self-reported their mobilization practices and the associated patients' demographics and therapeutic intervention scores.

Nurse-led mobilization practices—The primary outcome of the study, i.e., nurse-led mobilization practices, was measured using the Mobilization Initiatives & Levels of Exercise (MOBILE) tracking tool. Nurses self-reported their mobilization practices for one month using the (MOBILE) tracking tool specifically developed and tested (face validity) for the study. The MOBILE tool assessed the nurse mobilization practices as: (a) whether a specific mobilization activity of high-fowlers, semi-fowlers, beach/cardiac chair, dangle, transfer to chair, stood, ambulate, active versus passive range of motion (ROM) and turning occurred ("Yes" indicated by an "X" indicating and "No" indicated by circling the activity on the form); and, (b) the number of occurrences (i.e., frequency) per shift of each specified mobilization activity. The MOBILE tool also provided a free text space where nurses could provide comments, indicate if patients refused to be mobilized, and if they were sedated or were bariatric patients.

Patient demographics and temporal measures—Patient characteristics of age, gender, admitting diagnosis, comorbidities as well as temporal measures of the date, the patient's ICU admit/discharge dates and their intubation and extubation dates were collected using the MOBILE tracking tool.

(a) and b)

Therapeutic interventions—Patient acuity scores were derived from the Simplified Therapeutic Intervention Scoring System (TISS-28). The TISS-28 assesses severity of illness^{21,22} based on 28 indicators (interventions) with point values ranging from 1 to 5 (maximum score: 85). Validity (content validity index = 0.93) and reliability (ICC = 0.99, $p < 0.001$, when compared with the original TISS-76 instrument) of the Therapeutic Intervention Scoring System 28 (TISS) is reported in prior studies.^{22–25} A TISS score was derived as the sum of all scores for each of the indicators that were marked as present. For example, for patients who were on enteral feeding, a score of two was assigned, for respiratory interventions such as suctioning or spirometry a score of one was assigned. Hourly vitals and intake and output, mechanical ventilation, and assisted non-invasive ventilation each scored five points. Because the TISS-28 consists of various indicators (i.e., interventions), we were able to obtain descriptive information on the types of interventions

nurses conducted during their shifts such as tube care, respiratory interventions, fluid replacement, or care of an arterial line.

Ethical Considerations

We received approval to conduct the study from the University Institutional Review Board (IRB) affiliated with the medical center where the study was conducted, as well as ethics boards for each hospital.

Procedures

Recruitment and training—Unit based meetings were held and nurses were given a full description of the study. Nurse anonymity was guaranteed by assigning blinded identification numbers to nurses who volunteered to participate in the study. After obtaining informed consent, participating nurses received a one-hour training session on utilization of the MOBILE tracking tool. Investigators (TC & MM) worked one-on-one with nurse participants to ensure expertise in accurate utilization the MOBILE tool. Practice assessments were completed and submitted by each nurse prior to study implementation; and the importance of accurate documentation was emphasized. A waiver of consent for patient participation was obtained since no patient identifiers were collected.

Data Collection—From January 1, 2013 to January 31, 2013, participating nurses completed the MOBILE tracking tool on patients assigned to their care. The tracking tool was maintained with other bedside chart materials and nurses were encouraged to document at intervals versus waiting until the end of the shift. Nurses in the study completed the MOBILE tool on each patient that they provided care for on a given shift. The form became a completed “shift episode.” They deposited the completed forms in a secure (tamper-free) box in a secure location. The student investigators collected the MOBILE forms and logged the results into an Excel spreadsheet and they cross-checked each other’s data entry to ensure accuracy. One investigator (CAM) downloaded the Excel data into SPSS (version 18) and MSD prepared it for data analysis.

Data Analysis

Descriptive statistics [median, 25th and 75th Interquartile range (IQR), N, %] were generated for all variables. Mann-Whitney tests and Chi-square tests of independence were used to compare measures between ICUs. Given that data were collected from the same nurse (e.g., the same patient reported on by the same nurse multiple times) and in some cases the same patient by different nurses (e.g., the sample patient on different shifts with different nurse) this lack of independence of assessment needed to be controlled for in the analysis. Thus a mixed-level general linear modeling approach that adjusted the standard errors used for determining statistical significance for lack of independence was used. An α level of 0.05 ($p < 0.05$) was utilized for determining statistical significance.

RESULTS

Patient Characteristics

The characteristics of the patients (N=124) in each of the two ICUs are summarized in Table 1. Patients were a median 66 years of age (IQR: 57–74) with a median Charlson Comorbidity Index (CCI) of 4 (IQR: 3–7) and were approximately equally represented by gender (female: 52%; male: 48%). The TISS scores for patients on ICU “A” were considerably higher than those scores for patients on ICU “B” [median=26.5 (IQR: 18–33) vs. 17.5 (IQR: 10–17), $p < 0.001$]. (see Table 1).

Patient Therapeutic Interventions

Therapeutic interventions administered by the nurses (N=18) in this study are also summarized in Table 1. The nurses reported that approximately 30% of the patients received more than one intervention during their shift. The most commonly reported types of interventions were mechanical ventilation (41%), tube care (39%), enteral feeding (29%), and fluid replacement (27%). The units varied in the number and types of interventions that the patients required during the nurses’ respective shifts. Specific interventions required by a higher proportion of the patients on ICU “A” included: mechanical ventilation (56% vs. 31%, $p=0.006$), tube care (50% vs. 31%, $p=0.034$), enteral feeds (42% vs. 20%, $p=0.009$), and arterial line (14% vs. 4%, $p=0.046$) (see Table 1).

Mobilization Activities

Mobilization activities for the patients during each shift in the two ICUs are summarized in Table 2. The most commonly reported mobilization activities conducted per patient per shift were turning of the patient at least 6 times (82%) and placing the patient in semi-fowlers position (68%). After controlling for patient age, CCI, and TISS, patients in ICU “B” were more likely to be placed in semi-fowlers (88% vs. 30%, $p < .001$) whereas patients in ICU “A” were more likely to be placed in a beach/cardiac chair (33% vs. 3%, $p=0.015$), be transferred to a chair (35% vs. 16%, $p < .001$), and be ambulated (30% vs. 22%, $p < .001$) (see Table 2).

DISCUSSION

Our study revealed statistically significant differences in nurse-led mobilization practices between two community ICUs after controlling for patient age, acuity, and therapeutic interventions. More specifically, activities that are vital in promoting early mobilization were key areas of difference, including beach/cardiac chair positioning, transfer to a chair, and ambulation. These findings suggest that factors other than patient-specific characteristics may be associated with nurse-led mobilization practices. Potential factors within the literature come to mind.

The unit culture influences how staff response to and prioritize a practice change such as early mobilization.¹⁶ Unit cultures that foster communication and collaboration across disciplines through daily interdisciplinary rounds facilitates the early identification of patients eligible for mobilization, the activation of mobilization protocols, and the early

involvement of physical therapists.^{3,11,13,26} Teamwork and a clinical champion who can promote early mobilization are essential to successful implementation of early mobilization.^{3,11}

In contrast, successful implementation of early mobilization is limited on units where staff are concerned about personal or patient safety, have knowledge deficits related to mobilization, or perceive early mobilization documentation as a burden.^{18,26} Unit nurses perceive early mobilization to increase their workload which can, especially when coupled with nursing staff shortages, hamper nurse-led mobilization initiatives.^{26,27} The use of registry staff and nurse turnover are destabilizing factors that can influence nurse-led mobilization efforts and a unit's culture.^{26,27}

Our study has several limitations. First, as a pilot study, our participants (nurses and patients) represented a small convenience sample, thus limiting generalizability. Despite this limitation, the study does provide a window into the daily practices of bedside ICU nurses. Second, data was obtained through self-report without objective observations by investigators. Although this presented the possibility for inaccuracy and bias, the investigators were diligent in emphasizing the need for rigor and accuracy. Blinding of investigators to nurse identification provided an additional measure to prevent bias. Finally, the study was conducted over a relatively short period of time and may not reflect the broader picture for each of the ICUs in the study. We applaud the hospitals for their willingness to provide the settings for this research, and the nurses for their enthusiasm and commitment to nursing research.

Future Research

Future research studies could address the limitations of this study by replicating the study in larger, heterogeneous samples to increase generalizability. In future, researchers could enhance the rigor of studies by using a multi-method approach of data collection that includes the use of the MOBILE tracking device, direct observation of nurses in the ICU, and chart review. The use of a multi-method approach would allow for a comparison of actual mobilization practices as observed with self-reported mobilization practices. In this current study, patient factors did not account for differences in nurse-led mobilization practices. In the future, researchers should investigate non-patient related factors as potential drivers of differences. A starting place may be the investigation of unit culture, staffing, perceived safety, and the availability of mobilization equipment as these were reported as barriers to patient mobilization practices in studies investigating early mobilization in ICU settings. Last, nurse-led mobilization takes nurses away from other important activities and likely increases their workload. We recommend an assessment of the time to conduct nurse-led mobility activities and the concurrent occurrence of adverse events such as falls during nurse-led mobilization activities.

Implications for Practice

This study found the use of a structured tool to assess nurse-led mobilization practices feasible. Therefore, units who wish to improve their mobilization practices could employ a structured tool like the MOBILE tracking tool to assess their existing mobilization practices.

Such an assessment could potentially indicate areas for improvement and could serve as a baseline assessment to evaluate future improvements on. Hospitals that experience variation in mobilization practices between units, may be well-served by evaluating non-patient factors as potential drivers of variation. Such factors may include unit culture, resources such as the availability of mobilization equipment and staff, and local clinical champions who could advocate for patient mobilization.

CONCLUSIONS

Differences in patient characteristics and nurse-led mobilization activities were observed between ICUs. After controlling for patient characteristics, we found statistically significant differences in nurse-led mobilization activities between the two units. These findings suggest that factors other than patient characteristics may explain differences in nurse-led mobilization activities. Our findings are consistent with other studies indicating that non-patient factors such as safety concerns and workload served as barriers to mobilization in ICU settings. The findings also support prior studies linking nurse-led mobilization to non-patient factors. Further research is needed to investigate specific factors associated with nurse-led mobilization practices, including unit and staff characteristics, nursing workload, and knowledge, skills, and attitude of ICU staff members.

Acknowledgments

Funding: Funding for this project was partially supported by the Agency for Healthcare Research and Quality (1K01HS025486-01).

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Table 1.

Descriptive statistical summaries of patient characteristics and interventions overall and in the two study hospital ICUs.

	ICU "A" (N=50)	ICU "B" (N=74)	Overall (N=124)	<i>p</i> -value ^a
	Median (25 th -75 th IQR)			
Patient Age	66 (59–74)	64 (53–74)	66 (57–74)	.578
CCI	4 (3–6)	5 (3–7)	4 (3–7)	.106
TISS	27 (18–33)	18 (10–27)	21 (13–30)	< .001
	N (%)			
Patient Gender				.939
Male	24(48)	35(47)	59(48)	
Female	26(52)	39(53)	65(52)	
Mechanically Ventilated	28(56)	23(31)	51(41)	.006
Extensive dressing change	0(0)	2(3)	2(2)	.241
Tube Care	25(50)	23(31)	48(39)	.034
BIPAP or CPAP	2(4)	8(11)	10(8)	.172
Active diuresis	3(6)	5(7)	8(7)	.866
Complex metabolic treatment	4(8)	7(10)	11(9)	.779
Enteral Feeds	21(42)	15(20)	36(29)	.009
# Vasoactive drugs				.247
None	37(74)	62(84)	99(84)	
1	5(10)	7(9)	12(9)	
> 1	8(16)	5(7)	5(7)	
Fluid replacement	12(24)	22(30)	34(27)	.483
Arterial line	7(14)	3(4)	10(8)	.046
PA catheter	2(4)	1(1)	3(2)	.346
CPR	2(4)	5(7)	7(6)	.514
# Interventions				.583
None	24(48)	40(54)	64(51)	
1	11(22)	11(15)	22(18)	
> 1	15(30)	23(31)	38(31)	

Note. Mann-Whitney test for continuous data, Chi-square Test of Independence for nominal data.

^a Charlson Comorbidity Index

Table 2.

Descriptive statistical summaries of mobilization activities during shifts by study ICU.

	ICU A (N=50)	ICU B (N=74)	Overall (N=124)	<i>p</i> -value *
	N(%)	N(%)	N(%)	
HOB 30°	18(30)	103(88)	121(68)	< .001
ROM-Passive	37(62)	29(25)	66(37)	.103
ROM-Active	21(35)	56(48)	77(44)	.661
Turned 6 times	43(75)	99(85)	142(82)	.678
High-fowlers	20(33)	43(37)	63(36)	.951
Beach/cardiac chair	20(33)	4(3)	24(14)	.015
Legs dangled	10(17)	14(12)	24(14)	.223
Transferred to chair	21(35)	19(16)	40(23)	< .001
Ambulate	18(30)	26(22)	44(25)	< .001

* Controlling for patient age, Charlson Comorbidity Index, and TISS scores