

ORIGINAL ARTICLES

Critically ill patient safety in nursing education: Students' practices and perception

Samah Anwar Shalaby*¹, Mohamed M. Seweid², Azza H. El-soussi¹

¹ *Critical Care and Emergency Nursing, Faculty of Nursing, Alexandria University, Alexandria, Egypt*

² *Critical Care and Emergency Nursing, Faculty of Nursing, Beni-Suef University, Beni-Suef, Egypt*

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ABSTRACT

Background: Patient safety is the cornerstone for better quality health care and nursing education. There is limited evidence about how patient safety is addressed in healthcare professional curricula and how organizations develop safe practitioners.

Aim: To assess the practices and perception of nursing students regarding the safety of critically ill patients.

Materials and methods: Participants of this descriptive correlation exploratory study were 100 nursing students conveniently from the students enrolled in Critical Care Nursing course during academic year 2013-2014 in faculty of nursing, Alexandria University. The study was conducted in the critical care units affiliated to Alexandria Main University Hospital namely (Unit I, Unit III, and Triage). The first tool was Critical Care Practices of Safety Measures Observational Checklist and the second tool was Students' Unsafe Clinical Practices Perception questionnaire.

Results: It was found that 49% of the nursing students had poor perception regarding their unsatisfactory clinical performance. In addition, 55% of the nursing students have poor perception regarding their poor documentation. Furthermore, 44% of them have poor perception regarding lack of clinical educators' role competency.

Conclusions: Nursing students' perception was poor regarding their clinical performance, cognitive performance and critical thinking skills and documentation. In addition, nursing students reported that they have poor perception regarding nurse educators' role competency. Therefore, nursing curriculum should incorporate concepts and principles that guide nursing students in developing caring, safe, competent and professional behavior and should be developed for the nursing students based on the WHO patient safety topics which will focus on patient safety.

Key Words: Patient safety, Safety practice, Nursing students, Critically ill patients

1. INTRODUCTION

1.1 Introduce the problem

There has been increasing attention to patient safety and human errors issues in health care, specifically in the critical care context.^[1] Adverse events have often been used as quality and safety indicators in the delivery of health service.^[2] This has resulted in necessitating the continuous monitoring of patient safety and searching for new strategies.

Patient safety is defined as the prevention of patient injuries or adverse events resulting from the processes of health care delivery.^[3] Patient safety is considered as a shared responsibility among the multidisciplinary team within the health care system.^[4] Further to this, patient safety practices are viewed as the interventions which decrease the risk of adverse events related to exposure to health care across a range of diagnoses or conditions. But this context is incomplete be-

***Correspondence:** Samah Anwar Shalaby; Email: samahanwar1@gmail.com; Address: Faculty of Nursing, Edmon Fremon St. Smouha, 21527, Alexandria, Egypt.

cause the effectiveness of such practices in preventing harm or remedying harm has not been well studied.^[5]

Reducing errors and adverse events whilst maintaining patients' safety is dependent on a precise and timely evaluation of patients and interventions, which includes patient's risk assessment for developing both inevitable and non-inevitable complications.^[6] The process of assessment and evaluation of patients' safety risk is often challenging because of the vulnerable nature of acutely or critically ill patients combined with the stressful critical care environment.^[7]

Patient safety is considered a keystone for better quality health care and must be taught to students as a part of their nursing education. But evidences regarding how patient safety is highlighted in the healthcare curricula and professional organizations goals to establish safe practices is limited.^[8] Gaps currently exist in nursing education regarding the exact scope of nursing education role in promoting patient safety in addition to limited evidence of the process and tools of evaluating health care providers' safety knowledge, skills and attitudes. Further to this, there is also a paucity of evidence regarding health care professionals' preparation for the promotion of patient safety.^[9] Hence, this study was undertaken to assess the practices and perception of nursing students regarding the safety of critically ill patients during clinical procedures.

1.2 Significance of the study

The critical care setting is a highly complex environment.^[10] Critically ill patients are at a greater risk for poor prognosis and clinical outcomes when compared to other patients in the general ward context.^[11] Critical patients may be at risk for procedural injury or error due to their complex physiological problems, cognitive deficits, and complicated therapeutic regimens.^[12] Also, critically ill patients are more prone to adverse events than other hospitalized patients, whereas they had life threatening health problems with associated comorbidities which initiate the patient's stress response and interfere with the normal recovery process against the consequences of human errors.^[13] Thus, it is a challenge to maintain critically ill patients' safety while receiving high-quality care in the intensive care unit (ICU) environment.^[14]

Many studies describe unsafe clinical practice as events or patterns of behavior involving unacceptable risks.^[15,16] Unsafe practice is also defined as behaviors that physically or emotionally jeopardized the patients or hospital either by physical harm or emotional harm through creating anxious or stressful environment for the patient and/or family.^[17] Furthermore, unsafe practices in clinical nursing education include acts or behaviors that reflect a lack of knowledge,

skills, and clinical judgments, in addition to any unprofessional or unethical conduct by a student which may actually or potentially jeopardize the bio-psychosocial wellbeing or environmental safety of patients or other health care providers.^[15]

Nursing students express feelings of vulnerability during their clinical training, so it's not surprising that learning within the clinical area encompasses a complex threat to students rather than learning within the classroom context.^[18] In addition, student activities are unplanned in the clinical area and not all practice settings are sufficiently equipped to assist students with a positive learning environment.^[19]

In order to improve safety of critically ill patients in ICU, the healthcare systems across differential managerial levels include; unit supervisors, administrators, and direct health care providers must highlight patient safety issues.^[20] The undergraduate students are part of the individuals who deal with the critically ill patients. Attention should be kept for those students to have safe and better quality of care delivered to those patients therefore the aim of this study was to assess the practices and perception of nursing students regarding the safety of critically ill patients during clinical procedures.

1.3 Research questions

- (1) What is the perception of nursing students regarding safety of critically ill patients during three clinical procedures?
- (2) What safety practices are adopted by nursing students while performing clinical procedures including tracheal suctioning, nasogastric tube feeding, and central venous pressure monitoring for critically ill patients?

2. METHODS

2.1 Study design

A descriptive correlation exploratory design was used to conduct the current study.

2.2 Sample and setting

This study was conducted in critical care units affiliated to Alexandria Main University Hospital namely; Unit I, Unit III, and the triage unit. A convenient sampling technique was used to recruit the participants in the current study. Whereas, the current population included 100 nursing students in BSN nursing program at level three comprised all students enrolled in critical care nursing (I) course at spring semesters 2014 in faculty of nursing, Alexandria University, trained in the previously mentioned settings and accepted to participate in the current study.

3. STUDY TOOL

Two tools were used in data collection of this study: Tool 1 titled “Critical Care Practices of Safety Measures Observational Checklist”. This tool was developed by the researchers after reviewing the relevant literature.^[21-23] It is used to assess nursing students’ practices for promoting patients’ safety namely, measures to maintain patients’ safety that prevent the occurrence of the most common adverse events that might occur during the training of nursing students within the critical care context.

This tool consists of three parts, namely one for each of the following procedures; Tracheal suctioning (TS), Central Venous Pressure (CVP) monitoring, and nasogastric tube feeding (NGF). The score of each item was allotted on a dichotomous scale. Items done correctly were scored one grade while items done incorrectly or not done were scored zero. The tool also consisted of a demographic section with details such as age, gender and academic achievement grade point average (GPA).

Tool 2 namely “Students’ Clinical Practices Perception”, which was developed by Killam et al.^[13] and was modified by the researcher based on the relevant literature^[5] to record the safety perception of students regarding their clinical performance within the critical care context.

This tool comprises 43 statements on the nursing students’ perception on safety practice during their clinical training and is subdivided under six main categories included; unsatisfactory clinical performance, cognitive performance, social and behavioral performance, poor documentation, lack of the competency of clinical educators, and finally inconsistency nursing curricula. Each statement was scored on a 5 point Likert scale ranging from strongly disagrees to strongly agree. The scores ranged from 5 for strongly disagree to a score of 1 for strongly agree.

3.1 Data collection & ethical consideration

An official permission to conduct the current study was approved by the ethics committee of the Faculty of Nursing, Alexandria University, Egypt. The study was conducted during spring semester 2014.

All students received orientation training for two weeks regarding the most common procedures performed for critically ill patients including; TS, CVP monitoring, NGF and then practiced their clinical skills in the simulation skill lab before going to the clinical settings.

In each clinical site, the students were under the supervision of the faculty clinical instructors and course coordinators by a ratio of 1:8.

The researcher observed nursing students’ practices regarding critically ill patients’ safety twice; at the second week and at the thirteenth week during their training in hospital settings. Students were observed during their performance of the following procedures (TS, CVP, and NGF) using tool one.

The researcher conducted a structured interview with each nursing student for her/his perceptions of practices regarding safety of critically ill patients during their training in within critical care using tool two.

The collected data were analyzed using the appropriate statistical test to assess nursing students’ practices and perception regarding the safety of critically ill patients.

The study tools were tested for content validity by seven experts in the field. A pilot study was conducted using ten nursing students in order to ensure the clarity, feasibility and applicability of the tools and necessary modification were done accordingly. The reliability was established using Kappa agreement test for tool I and Cronbach’s Alpha test for tool II. The correlation coefficient were; 0.95 and 0.85 respectively. Students in pilot study were excluded from the current study. Students’ consent for participation in the study was obtained after explaining the purpose of the study. Nursing students were assured for confidentiality and autonomy with their right to withdraw at any time.

3.2 Data analysis

Data were analyzed using the statistical package for the social science 20 (SPSS). The distribution was analyzed using the Kolmogorov-Smirnov test. For normally distributed data, the results were described as mean and standard deviation and for abnormally distributed data as median and range. Quantitative normally distributed variables were analyzed using an independent *t*-test and abnormally distributed variables using the Mann-Whitney *U* test. Qualitative variables were analyzed with the Chi-square test. Two-tailed *p* values of < .05 were used to indicate statistical significance.

4. RESULTS

Table 1 displays the students’ demographic characteristics. It was found that 66% were females. Moreover, the majority of the participants (62%) had academic achievement (GPA) ranging from C+ to B-.

Table 2 presents the distribution of students according to their mean scores of the three clinical procedures (TS, CVP monitoring and NGF) safety elements in the first and second observations. Apparently, it was found that the mean scores of all three procedures’ safety elements in the second observation were significantly higher than that in the first observation,

whereas $p < .01$ in all safety elements. Regarding suctioning safety elements, it was found that the majority of nursing students (71%) had fair performance while approximately half of the students (45%) had fair performance regarding suction induced trauma prevention and approximately two third of the students (59%) had poor documentation.

Concerning CVP monitoring safety elements, it was found that two third of the nursing students (65%) had fair performance. Moreover, it was found that the majority of the students (83%) had good performance regarding reading accuracy and approximately half of the students (46%) had poor documentation.

Table 1. Distribution of nursing students according to demographic characteristics

Demographic Characteristics		No. (n = 100)	% (100%)
- Gender	Male	34	34
	Female	66	66
- GPA	B+	2	2
	B	10	10
	B-	29	29
	C+	33	33
	C	17	17
	C-	8	8
	D	1	1

Table 2. Mean scores of students' practices regarding procedures' safety elements

Procedures' safety elements	1 st observation Mean ± SD	2 nd observation Mean ± SD	t-test (p)	Level of Practice			
				Good (n%)	Fair (n%)	Poor (n%)	
TS	Infection control	6.9±0.6	8.3±0.7	10.3 (.00 [*])	28%	71%	1%
	Trauma prevention	1.8±0.6	2.9±0.3	10 (.00 [*])	39%	45%	16%
	Hypoxia prevention	6.6±0.9	9.4±0.6	10.8 (.00 [*])	56%	43%	1%
	Documentation	1.8±2	2.1±0.2	3.8 (.00 [*])	14%	27%	59%
CVP[#]	Infection control	2.1±0.7	2.8±0.5	9.9 (.00 [*])	29%	65%	6%
	Reading accuracy	5.4±1.6	6.9±0.3	1.5 (.00 [*])	83%	17%	0%
	Adverse events prevention	5.2±3.8	7.4±3	1.9 (.00 [*])	100%	0%	0%
	Documentation	1.2±1	1.7±0.7	5.7 (.00 [*])	54%	0%	46%
NGF[§]	Infection control	8.5±0.8	9.1±0.3	6.8 (.00 [*])	100%	0%	0%
	Aspiration	4.2±1.3	4.7±0.7	8 (.00 [*])	85%	11%	4%
	Documentation	1.3±1.5	2.3±1.4	7.9 (.00 [*])	36%	11%	53%

Note. Fair performance (50- < 75%); Poor performance (< 50%); [#] Central venous pressure monitoring; [§] Nasogastric feeding; ^{*} p significant if < .05

In relation to NGF safety elements, it was found that the majority of the nursing students (85%) had good performance. Moreover, it was found that approximately half of the students (53%) had poor documentation regarding NGF.

Table 3 compares the clinical three procedures' safety elements mean scores according to students' gender and GPA. It was found that the mean scores in the three observed procedures were significantly higher in females than in the males. Moreover, it was found that students who have a GPA of B+ have the highest safety elements mean scores in suction (55 ± 0.2) ($p = .00$), CVP (55 ± 0.1) ($p = .00$) and NGF (61 ± 0.2) ($p = .00$) compared with other nursing students who have a lower GPA.

Table 4 displays the description of different levels of students' perception regarding unsafe clinical practices. It was found that 49% of the nursing students have poor perception regarding their unsatisfactory clinical performance. In addition, 55% of the Nursing students have poor perception regarding their poor documentation. Furthermore, 44% of them have poor perception regarding the lack of clinical educators' role competency. A statistical significant difference

was found between students' level of perception regarding their unsatisfactory clinical, cognitive, poor documentation and behavioral performance, and lack of clinical educators role competence, whereas $p < .01$ in all these unsafe clinical practices.

Table 5 displays the relationship between demographic data of nursing students and their perception regarding unsafe clinical practices related to the following factors; clinical, cognitive, and behavioral performance, documentation, clinical educators' role and nursing curricula. Regarding students' clinical performance, there was no significant differences between students' perception of their unsatisfactory clinical performance and their gender ($p = .96$). On the other hand, there was a significant difference between students perception regarding their unsatisfactory clinical performance and their academic achievement ($p = .04$).

Also this table shows a significant relationship between demographic data of students and their perception regarding clinical educators' role competence. Students perception varied significantly between males and females ($p = .04$).

Table 3. Comparison of procedures safety elements means scores according to students' demographics

Students' demographics		TS [†] safety elements		CVP [#] safety elements		NGF [‡] safety elements	
		mean±SD	t-test (p)	mean±SD	t-test (p)	mean±SD	t-test (p)
Gender	Male	41.3±10.4	2.57 (.01*)	44±9.7	2.58 (.01*)	51.5±8	2.7 (.008*)
	Female	47.2±10.9		49.4±9.7		56.1±7.9	
GPA	B+	55±0.2	40.9 (.00*)	55±0.1	47.5 (.00*)	61±0.2	65.7 (.00*)
	B	45.9±1.4		47.9±0.2		55.5±0.6	
	B-	45.1±0.6		47.6±0.2		54.6±0.8	
	C+	44.5±0.3		47.5±0.3		53.9±0.7	
	C	44.7±0.7		46±0.5		53.2±0.2	
	C -	47.2±0.9		49.5±1.3		58.1±0.4	
	D+	37±0		41±0		43±0	

Note. *p significant if < .05; † Tracheal suction; # Central venous pressure; ‡ Nasogastric feeding

Table 4. Distribution of students' perception level regarding unsafe clinical practices

Students' Perception	Good (≥ 75%) n (%)	Fair (50- < 75%) n (%)	Poor (< 50%) n (%)	χ ² (p)
Unsatisfactory clinical performance	11 (11%)	40 (40%)	49 (49%)	23.6 (.00*)
Unsatisfactory cognitive performance	14 (14%)	52 (52%)	34 (34%)	21.6 (.00*)
Unsatisfactory social & behavioral performance	98 (98%)	2 (2%)	0 (0%)	92.1 (.00*)
Poor documentation	14 (14%)	31 (31%)	55 (55%)	25.4 (.00*)
Lack of clinical educators role competence	5 (51%)	51 (51%)	44 (44%)	36.8 (.00*)
Inconsistent nursing curricula	21 (21%)	56 (56%)	23 (23%)	23.1 (.00*)

Note. *p significant if < .05

Table 5. Relationship between demographic data of students and their safety perception

Students' Perception		Gender		GPA		
		Male	Female	B	C	D
Unsatisfactory clinical performance	Good	17 (50%)	32 (48.5%)	22 (53.6%)	27 (46.6%)	0 (0%)
	Fair	13 (38.2%)	27 (40.9%)	17 (41.5%)	22 (37.9%)	1 (100%)
	Poor	4 (11.8%)	7 (10.6%)	2 (4.9%)	9 (15.5%)	0 (0%)
	χ ² (p)	0.08 (.96)		22.03 (.04*)		
Unsatisfactory cognitive performance	Good	9 (26.5%)	25 (37.9%)	17 (41.5%)	17 (29.3%)	0 (0%)
	Fair	21 (61.8%)	31 (47%)	22 (53.6%)	19 (32.8%)	1 (100%)
	Poor	4 (11.8%)	10 (15.2%)	2 (4.9%)	22 (37.9%)	0 (0%)
	χ ² (p)	2 (.4)		17.28 (.14)		
Unsatisfactory social/behavioral performance	Good	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Fair	0 (0%)	2 (3%)	0 (0%)	2 (3.4%)	0 (0%)
	Poor	34 (100%)	64 (97%)	41 (100%)	56 (96.6%)	1 (100%)
	χ ² (p)	1.05 (.31)		2.51 (.87)		
Poor documentation	Good	21 (61.8%)	34 (51.5%)	28 (68.3%)	27 (46.6%)	0 (0%)
	Fair	10 (29.4%)	21 (31.8%)	9 (21.9%)	21 (36.2%)	1 (100%)
	Poor	3 (8.8%)	11 (16.7%)	4 (9.8%)	10 (17.2%)	0 (0%)
	χ ² (p)	1.55 (.53)		11.88 (.46)		
Lack of clinical educators role competence	Good	21 (61.8%)	23 (34.8%)	18 (43.9%)	26 (44.8%)	0 (0%)
	Fair	12 (35.3%)	39 (59.1%)	21 (51.2%)	29 (50%)	1 (100%)
	Poor	1 (2.9%)	4 (6.1%)	2 (4.9%)	3 (11.85.2%)	0 (0%)
	χ ² (p)	6.62 (.04*)		9.36 (.78)		
Inconsistent nursing curricula	Good	11 (32.4%)	12 (18.2%)	7 (17.1%)	16 (27.6%)	0 (0%)
	Fair	17 (50%)	39 (59.1%)	23 (56.1%)	32 (55.2%)	1 (100%)
	Poor	6 (17.6%)	15 (22.7%)	11 (26.8%)	10 (17.2%)	0 (0%)
	χ ² (p)	2.66 (.38)		6.09 (.91)		

Note. *p significant if < .05; Good (≥ 75%); Fair (50-< 75%); Poor (< 50%)

5. DISCUSSION

Over the last decades, patient safety concept has developed as a key priority on both a national and international health-care systems focusing on policy modifications, organizational adjustments and enlargement of care standards by quality improvement strategies. Patient safety is often viewed as a responsibility shared by all participants in the health care system.^[24]

Nursing students constitute a distinct subgroup of care providers in the complex health care systems. The assessment of their practice and perception about the patient safety can give an opportunity for improvement in the clinical and educational settings.^[25] In addition, attention should be given to those nursing students to have better quality of care delivered to those patients.

TS, CVP measurement and NGF are the main procedures taught in the Critical Care Nursing I course inclusive of other procedures. However, these three procedures are practiced by nursing students more than one time at faculty of nursing, Alexandria University.

Regarding tracheal suctioning safety practices, the current study revealed that suctioning was not implemented with complete safety measures. Whereas, the current study findings illustrated that two thirds of nursing students had fair performance regarding infection control and sterility safety practices. This might be related to nursing students devaluing the importance of standard precautions, lack of knowledge, training and supervision of the nursing students. Similar to these findings, Day et al.^[26] reported that practice of nursing staff for TS was poor regarding infection control and sterility safety practices which are congruent with the current study findings.

Furthermore, Jansson et al.^[27] found that nurses' performance was poor regarding infection control practices. While Thompson et al. (2007) documented contradicting findings to the current study regarding infection control and sterility safety practices. The majority of nurses in that study performed these safety measures.

The current study findings illustrate that about half of the nursing students had fair scores concerning suction induced hypoxemia prevention practices. This may be contributed to the anxiety provoking nature of that procedure. Contradictory results have been documented by Day et al.^[26] and Jansson et al.^[27] All these studies reported that critical care nurses' implementation of hypoxia preventive safety measures was generally good.

Moreover, approximately more than half of nursing students had poor documentation. This might be related to limited

training time and being occupied with the demonstration of other procedures. Students might not realize the importance of documentation. This is incongruent with the findings of Bargaje^[28] which highlighted the significance of site source documentation practices in addition to the findings of Thompson et al.^[29] concerning documentation which concluded that approximately half of the nurses documented the effectiveness of the suction procedure in the patients chart.

During CVP monitoring observation of the students' performance, it was found that some students were missing few items that ensured the patient's safety. Whereas, the mean scores of the CVP safety elements regarding infection control, reading accuracy, adverse events prevention and documentation were significantly higher in the second observation than in the first observation. It may be contributed to a high self-confidence derived from re-demonstration and improvement in psychomotor skills which developed in open lab hours and re-demonstration in the clinical setting more than one time.^[30]

The current study findings describe the nursing students' subjective understanding of their unsafe clinical practices which include their perceptions of their clinical performance, cognitive performance, social and behavioral performance and their perception regarding documentation. In addition, learning perspectives include their perceptions of their clinical educator's competency and nursing curricula.

The current study findings shows that around half of the nursing students perceive that they have unsatisfactory clinical performance such as failing to perform care consistent with clinical guidelines and standard procedures. It has been observed that most of the students for example do not wash their hands before and after patient contact and they just wear gloves. They understand that the importance of hand washing however they do not perform this simple step. This might be because they devalue the importance of hand washing in preventing infection transmission. They perceive that gloving achieve that aim. In addition, this might be related to inadequate resources for hand hygiene. This is in line with Belela-Anacleto et al.^[31] study which concluded that the poor perception of undergraduate students regarding hand washing may due to improper infrastructure for recommended hand hygiene practices, which may contribute to lapses in the care process and compromise patient safety. Moreover, Mehta et al.^[32] emphasized on the compliance of nurses to infection control bundles especially hand washing and wearing gloves.

The current study findings display that more than half of nursing students believe that they have poor documentation of patient's condition in relevant, timely manner. This might be related to nursing students had no enough time for docu-

menting their practice inside the ICU. In addition they had negative attitude towards documentation. They also might be unable to see the benefits of nursing documentation and difficulty in formulating thoughts and what to write. These findings are in contrast to Balas et al.^[33] who reported that all critical care nurses performing proper documentation in nursing flow sheet.

Clinical instructors' behaviors play a crucial role in learning process of students. Nursing students' perception of effective clinical teacher characteristics is an important indicator to modify and facilitate clinical instruction.^[34] The clinical educator role is fundamental in clinical teaching as they prepare students to be competent nurses.^[35] The competencies of nurse educators will be reflected on patient safety.^[36] The current study finding highlights that about half of the nursing students moderately perceive that there is a lack of clinical educator role competence such as not giving a constructive feedback.

The current study findings of unsafe practices of the students are reflected by the competencies of the clinical teacher. This is in line with Nouri et al.^[37] study, strongly recommended role modeling as one of the basic roles of the clinical teacher. In addition the current study finding is in line with Kelly^[38] who highlighted the professional competencies of the clinical educators as the most important characteristics for clinical teaching.

6. CONCLUSION

The current study sheds the light on nursing students' practices and perception regarding the implementation of safety measures with the critically ill patients of the Alexandria Main University Hospital. Whereas, in the current study, nursing students had fair level of nursing practice as regard

to infection control strategies in tracheal suctioning and CVP procedures. Moreover, half of the students had poor level of practice regarding documentation in the three observed procedures.

In addition, nursing students' perception was poor regarding their clinical performance, cognitive performance and critical thinking skills and documentation. On the contrary, it was good regarding social and behavioral performance which could possibly means that the students are satisfied about their communication with the patients. In the current study, the nursing students reported that they have poor perceptions regarding nurse educators' competency role.

Based on the study findings, it is recommended that the nursing curriculum incorporates concepts and principles that guide nursing students in developing caring, safe, competent and professional behavior. In addition for clinical teaching, nursing students should spend sufficient time on high fidelity simulators to practice nursing procedures before practicing on real patients. Further to that clinical nurse educators should coordinate with ICU nurses and physicians to promote a positive learning environment for students. Finally, further studies are needed to investigate the relationship between students' procedure associated complications and outcomes for critically ill patients.

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CONFLICTS OF INTEREST DISCLOSURE

The authors of the current study had declared no conflicts of interest.

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