Original Article

Knowledge and Implementation Practices of Standard Intensive Care Services: Underlying Characteristics of Bangladeshi Healthcare Providers Context

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Abstract

The concept of intensive care is emerging in Bangladesh, but it needs more attention.The aim of this study is to determine the knowledge and implementation practices of standard intensive care services among healthcare providers in Bangladesh. From February to May 2023, a cross-sectional research of doctors and nurses running the intensive care unit (ICU) in Bangladesh's Barisal district was carried out. Participants filled out confidential, self-administered knowledge and practice questionnaires. There were 80 respondents, including 86.3% of young people (aged less than 40) and 73.8% of female respondents. It was found that physicians (AOR/p=13.16/0.02; 95% CI: 1.41-122.92) who had less ICU work experience (5 years) (AOR/p=13.98/0.01; 95% CI: 2.35-83.26) were found to have significantly poor knowledge. It was found that doctors with less than five years of experience working in an intensive care unit (AOR/p=6.07/0.03; 95% CI: 1.16-31.64) and no ICU training (AOR/p=5.82/0.04; 95% CI: 1.09-30.81) performed poorly when providing ICU services.Standard intensive care education to gain better knowledge should be strengthened.

Keywords: Knowledge, Implementation Practices, Standard Intensive Care Services, Healthcare Providers.

Introduction

It is imperative to make the most efficient use of intensive-care units (ICUs).[1] Hospitals have dramatically varying morbidity and mortality rates in ICUs. This discrepancy is most likely caused by variations in ICU setup and healthcare practices.[2] The recovery of critically ill patients is facilitated by combination of expert knowledge, experience, and high-quality critical care, high-tech equipment, strong clinical competence staff, and a great ability to work with group decision-making are responsible.[3,4] Emergency care knowledge gaps in junior doctors transitioning from undergraduate to postgraduate training are particularly prevalent in critical care.[5]

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In developed countries, physical assessment skills are easily included by nurses in the USA, and more recently, in Canada and Australia, as a part of health assessment, which is dependent on clinical decision-making that can have the most significant impact on the quality of care in ICU.[3] Nurses are likely to be exposed to germs throughout their regular practice; consequently, nurses must demonstrate the ability to effectively apply infection control principles.[6] Furthermore, standard precautions are intended to protect healthcare staff and patients by utilizing the basic concepts of infection prevention.[6] Data from Hunan Province, China, participants revealed that half of them were familiar with every standard backup procedure.[7] Additionally, the findings from Korea's study showed that the intensive care unit's and nurses' compliance with standard safeguards was high.[7]

In Bangladesh, the national Intensive Care Unit (ICU) Quality Improvement (QI) Framework, 2019, stated that the ICU facilities and rooms allocated for patients are frequently insufficient.[8] The high death rate among ICU patients generally may be decreased by providing better quality critical care that incorporates best practices in structure, organization, and care delivery.[9] The close unit model[10] and nurse-to-patient ratio[9] including architectural design to support infection control[9] have also been linked to better patient outcomes.It is necessary to conduct additional research with a more practical focus onintensive care nurses' technological and human knowledge.[11,12] We are barely aware of any studies that have explored physicians' opinions toward the use of quality indicators in the intensive care setting. Research isneededto know the level of knowledge and compliance with the standard intensive care services in the intensive care unit among Bangladeshi healthcare providers. Hence, the purpose of this paper is to study knowledge and implementation practices of standard intensive care services among Bangladeshi healthcare providers.

Methods

Study design

A quantitative cross-sectional study was carried out from February to May 2023. Semi-structured data were collected in this study to obtain information on socio-demographic characteristics, professional indicators, and knowledge of implementation practices on standard implementation care services among healthcare providersof Barisal district of Bangladesh.

Study participants, sample size, and sampling

This study considered 80 healthcare professionals, namely physicians and nurses, responsible for managing the Intensive Care Unit (ICU) of Barisal district in Bangladesh.

Healthcare professionals of eight divisions (Dhaka, Chittagong, Rajshahi, Khulna, Rangpur, My mensingh, Sylhet, and Barisal) of Bangladesh were considered as the study population. Barisal division was selected through multi-stage random sampling as a study place. Barisal district was considered for this study under the division concerning as divisional district. Initially, a potential standard sample size was assumed as 384 calculated by using the formula "n= 'Z^2pq/d^2" where Z (standard normal deviate) was considered as 1.96; p (as no prevalence found regarding this issue, so 50% was considered) as 0.50 and margin of error was considered as 0.05. Finally, all healthcare providers serving for ICU in the Barisal district, i.e., 80 participants, were considered for this study.

Quantitative information for this study was collected from the respondents' who were signified physicians and nurses managing ICUs in Barisal district and provided their consent to participate in this study.

Data collection

Data was collected from the study participants using a pre-tested and semi-structured questionnaire through the interviewer-administered method. Respondents were interviewed according to their convenience on March 2023 and onwards. The survey took only 10 to 15 minutes for the interviewer to complete. All authors had access to the collection and preserving participants' information during or after data collection. The survey was administered in Bengali with the utmost support from the hospital authority.

Ethical considerations

This study was approved by the Ethical Review Committee of the Department of Public Health of Northern University Bangladesh (NUB/DPH/

EC/2022/21-a) and conformed to the Declaration of Helsinki. The respondentsparticipation was anonymous and voluntary. Written informed consent was taken from the respondents at the beginning of the survey. Participants could withdraw from the survey at any time, and their autonomy has been ensured.

Questionnaire design

Two independent reviewers pre-validated the questionnaire and pre-tested among 5% of the study participants. The quality of the questionnaire addressed the responses of the pre-test. The dependent variables of the questionnaire were considered from the standard guidelines for ICU of Bangladesh 'National Manual on Basic ICU Skills'.[13] The pivotal components of the questionnaire were: (i) Socio-demographic information: age, gender, marital status, religion, education, income, number of children, family type, and family size (ii) Professional information: work experience, profession, ICU training, ICU work experience (iii) Knowledge and implementation practices of standard intensive care services: Initial assessment and management on critically ill patient, Airway oxygenation, Oxygen therapy, Ventilation, Infection prevention control in ICU, Sterility maintenance in ICU, Patient monitoring, Care of the patient on ventilation, Endotracheal/ Tracheostomy tube suction, Cardio-pulmonary resuscitation (CPR), Nutrition in critical care, Bedsore management in ICU.

Data analysis

Collected data was checked and analyzed employing the Statistical Package for the Social Sciences (SPSS) software. Study characteristics were subjected to descriptive statistics (frequency and proportions) to summarize the obtained data.

Relevant continuous data were categorized followingmid values of the percentage scores cut points.[14] A multinomial logistic regression analysis was performed followed by a modelling procedure considering a backward elimination process, including pre-specified confounders, i.e., age, gender, marital status, religion, education, income, number of children, family type, family size work experience, profession, ICU training, ICU work experience. Odds Ratios with 95% confidence intervals concerning knowledge and implementation practices of standard intensive care services (poor and good) were calculated for the specified exposures.

Results

Participant's characteristics

A total of 80 respondents were selected as a sample to conduct this study wherethe majority (73.8%) of the respondents were female and 86.3% were young adults (<40 years). More than half of the respondents (65%, n = 52/80) had graduation as their education and had >35000 BDT as their monthly family income (52.5%, n=42/80). In addition, most of the study subjects (63.8%, n = 51/80) were nurses, while 68.8% had training in standard intensive care services. Moreover, the study revealed that most of the study subjects (88.8%, n=71/80) had <5 years of experience in the Intensive Care Unit (ICU). (Table-1)

Level of knowledge and implementation practice of standard intensive care services among the respondents

The study revealed that most of the respondents (80%) had poor knowledge of standard intensive care services. In addition, the study also delineates that the majority (76.20%) of the study subjects had poor implementation practices due to having poor knowledge.

Furthermore, the study revealed a significant association between the level of knowledge and the implementation practiceof standard intensive care services among the respondents (χ^2/p= 56.59/0.01 at 95% CI). (Figure 1)

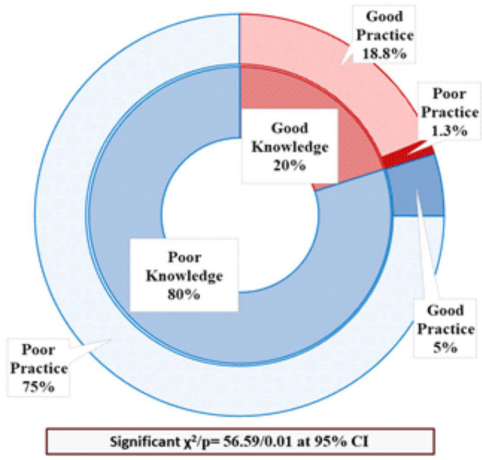

Fig 1: Status of knowledge and implementation practice of standard intensive care services among the respondents (n=80)

The level of knowledge and implementation practice was assessed by considering 12 components of standard intensive care services among the respondents.

Initial assessment and management of critically ill patient, Airway oxygenation, Oxygen therapy, Ventilation, Infection prevention control in ICU, Sterility maintenance in ICU, Patient Monitoring, Care of the patient on ventilation, Endotracheal/ Tracheostomy tube suction, Cardio-pulmonary resuscitation (CPR), Nutrition in critical care, Bedsore management in ICU

Respondent's characteristics associated with their knowledge and practice of standard intensive care services

Results of bivariate (cross table) analysis revealed that respondents' gender (p=0.04), monthly income (p=0.01), profession (p=0.01), ICU training (p=0.01), and ICU work experience (p=0.01) are significantly associated with their level of knowledge on standard intensive care services. In other words, it is observed that the poor level of knowledge of the study subjects was significant among the males who had BDT 35000 or more monthly income, did not have ICU training, and had less (<5 years) ICU work experience compared to their counters.

In addition, poor implementation practice of standard intensive care services was predominantly found among the younger male professionals who had educatonup to graduation and had BDT 35000 or more monthly income. Furthermore, respondents, who showed significant poor practice in the ICU services were mostly physicians who did not have ICU training and had less (<5 years) ICU work experience. This scenario represents the poor ICU services provided in the hospitals in such areas of Bangladesh. (Table-1)

Table 1: Characteristics of the respondents according to the level of knowledge and implementation practices of standard intensive care services (n=80)

Characteristics	Knowledge				Practice		
	Number of participants, n (%)	Good, n (%)	Poor, n (%)	χ^2/p-value (≤0.05)	Good, n (%)	Poor, n (%)	χ^2/p-value (≤0.05)
Socio-demographic information							
Age (In Years)							
<40	69 (86.3)	13 (16.3)	56 (70.0)	0.42/0.52	14 (17.5)	55 (68.8)	3.32/0.06
>40	11 (13.8)	3 (3.8)	8 (10.0)		5 (6.3)	6 (7.5)	
Gender							
Male	21 (26.3)	1 (1.3)	20 (25.0)	4.13/0.04*	2 (2.5)	19 (23.8)	3.18/0.07
Female	59 (73.8)	15 (18.8)	44 (55.0)		17 (21.3)	42 (52.5)	
Education							
Up to graduation	52 (65.0)	12 (15.0)	40 (50.0)	0.88/0.35	16 (20.0)	36 (45.0)	4.02/0.04*
Post-graduation	28 (35.0)	4 (5.0)	24 (30.0)		3 (3.8)	25 (31.3)	
Monthly income (In USD)							
<330	38 (47.5)	12 (15.0)	26 (32.5)	6.07/<0.01*	13 (16.3)	25 (31.3)	4.37/0.04*
>330	42 (52.5)	4 (5.0)	36 (47.5)		6 (7.5)	36 (45.0)	
Profession related information							
Profession							
Physician	29 (36.3)	1 (1.3)	28 (35.0)	7.79/<0.01*	2 (2.5)	27 (33.8)	7.14/0.01*
Nurse	51 (63.8)	15 (18.8)	36 (45.0)		17 (21.3)	34 (42.5)	
ICU training							
Yes	55 (68.8)	16 (20.0)	39 (48.8)	9.09/<0.01*	18 (22.5)	37 (46.3)	7.83/0.01*
No	25 (31.3)	0 (0)	25 (31.3)		1 (1.3)	24 (30.0)	
ICU work experience (In Years)							
<5	71 (88.8)	10 (12.5)	61 (76.3)	13.80/<0.01*	13 (16.3)	58 (72.5)	10.31/0.01*
>5	9 (11.3)	6 (7.5)	3 (3.8)		6 (7.5)	3 (3.8)	

Data are presented as frequency (n), percentage (%);

**Statistical significance at p-value ≤0.05.*

A chi-square test was used to observe the association.

Identified predictors for the knowledge and practice of standard intensive care services

The regression analysis revealed some significant predictors associated with poor knowledge status among the respondents. The outcome is illustrated in Figure 2. In the initial screening of regression analysis, male physicians (male: COR/p=6.82/0.05; 95% CI: 0.84-55.24, physician: COR/p=11.67/0.02; 95% CI: 1.45-93.73) with higher monthly income (BDT>35000: COR/p=4.39/0.02; 95% CI: 1.27-15.10) and less ICU work experience (<5 years: COR/p=12.20/0.01; 95% CI: 2.62-56.84) showed higher odds of poor knowledge compared to their reference group. The study revealed the final predictors associated with the poor knowledge of intensive care services after adjustment of regression modeling with the significant variables of crude odds and elimination of the confounders in a backward manner. After all, it was identified that physicians (AOR/p=13.16/0.02; 95% CI: 1.41-122.92) who had less ICU work experience (<5 years) (AOR/p=13.98/0.01; 95% CI: 2.35-83.26) were found to have significantly poor knowledge, which made them vulnerable for the poor practice during providing the ICU services in their hospital. (Figure 2)

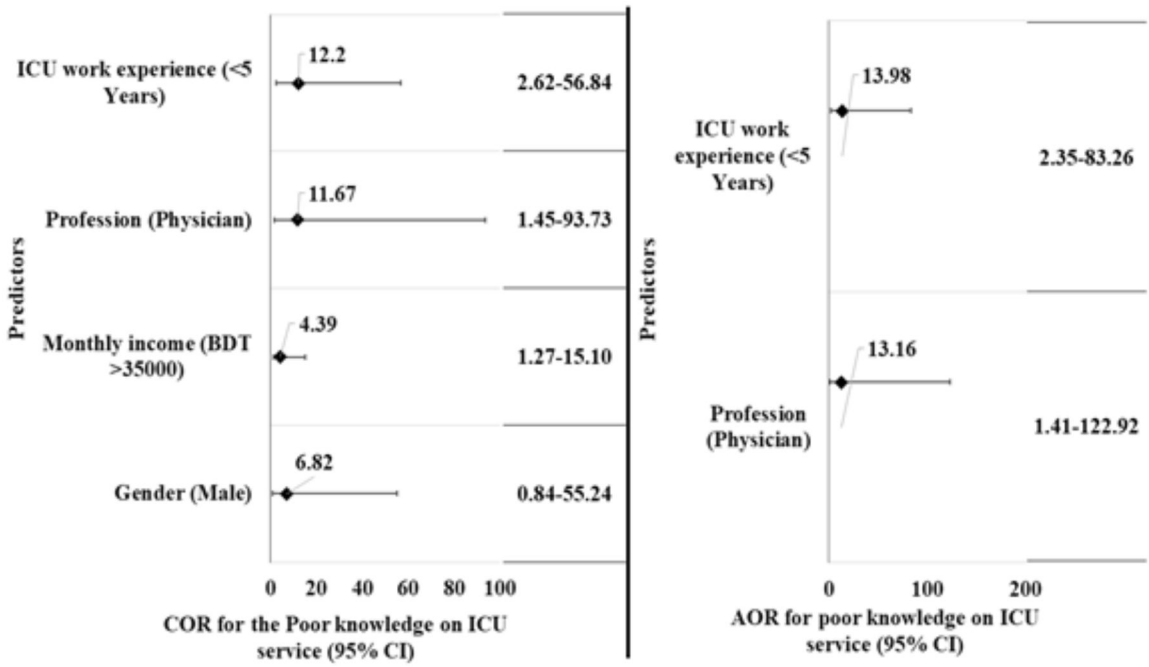

Fig 2: Predictors associated with the level of knowledge on ICU service among the respondents (n=80)

Fig 2 Footnote: Statistically significant predictor is considered at p ≤0.05. The reference category for Gender is female, for monthly family income is <35000 BDT, for profession is nurses, and for ICU work experience is >5 years. (Regression Analysis)

Similarly, this study also revealed some significant predictors for poor practice of intensive care services through the regression analysis. The initial crude outcome revealed that post-graduate physicians (physicians: COR/p=6.75/0.02; 95% CI: 1.43-31.79, post-graduate: COR/p=3.70/0.05; 95% CI: 0.98-14.07) with higher monthly income (BDT>35000: COR/p=3.12/0.04; 95% CI: 1.05-9.31) did not have ICU training (COR/p=11.68/0.02; 95% CI: 1.46-93.92) and less ICU work experience (<5 years: COR/p=8.92/0.01; 95% CI: 1.97-40.42) showed higher odds of poor implementation practice compared to their reference group. After adjustment of regression modeling with the significant variables of crude odds and elimination of the confounders in a backward manner, the study revealed the final predictors for poor practice of intensive care services. As final determinants, it was identified that physicians (AOR/p=5.82/0.04; 95% CI: 1.09-30.81) who did not have ICU training (AOR/p=6.87/0.05; 95% CI: 0.81-58.16) and had less ICU work experience (<5 years) (AOR/p=6.07/0.03; 95% CI: 1.16-31.64) had significant poor practice of ICU services. (Figure 3)

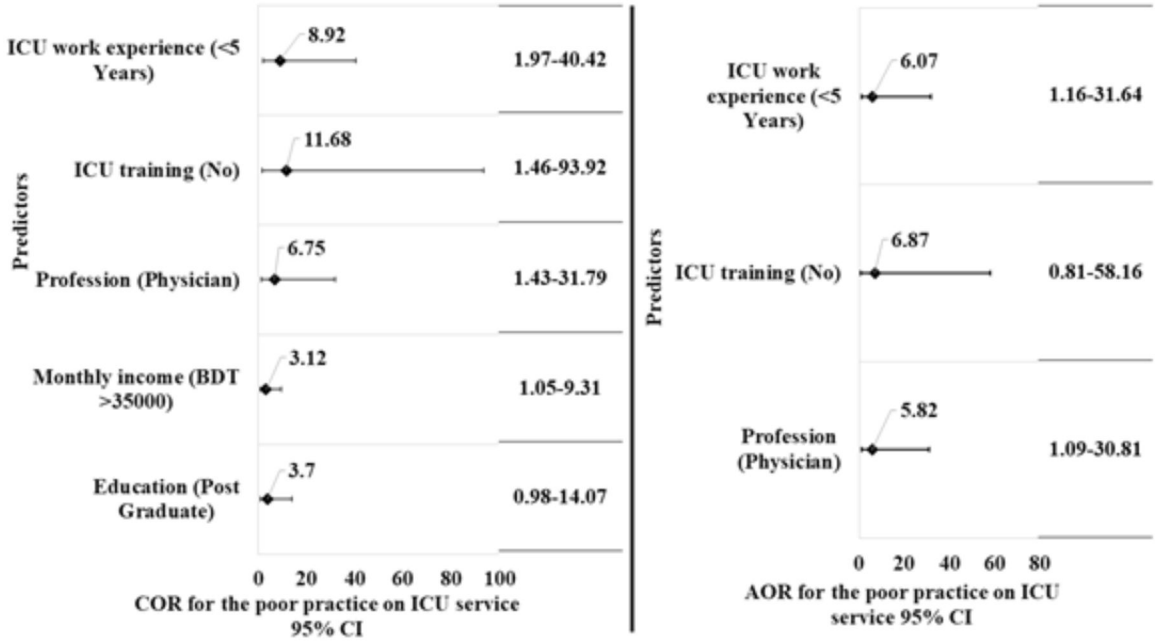

Fig 3: Predictors associated with the implementation practice on ICU service among the respondents (n=80)

Fig 3 Footnote: Statistically significant predictor is considered at p ≤0.05. The reference category for education is graduation, monthly family income is <35000 BDT, for profession is nurses, for ICU training years, and for ICU work experience is >5 years.

Discussions

Health professionals need to have a clear concept of standard intensive care services for cost-effective quality care delivery to ICU patients with a team effort, especially in acountry with scarce resourceslike Bangladesh. That is why the current study was conducted to understand the underlying factors associated with the knowledge and practice level of standard intensive care services among Bangladeshi health professionals. As revealed from the current study, more than two-thirds of the study subjects were females, young professionals, and nurses. This feature is concurrent with many other studies[6,7] emphasizing young nurses and their knowledge and implementation practice on standard intensive care services in ICUs. The results of our study majority had a previous course on standard intensive care services.

Assessment of health professionals' knowledge and implementation of standard-level intensive care revealed that a greater part of the studied had unsatisfactory knowledge (80%) and practice (75%) levels. On the same line, this significant finding was revealed by some other studies from Asia; China, and Pakistan mentioning a lack of knowledge level about infection control and ventilation among ICU experts.[6,15] However, contradicting findings were revealed by Ibrahim, Said & Hamdy,[16] who found the majority of their studied group aware of what infection is and how it is transmitted.

Concerning specific characteristics, it was found that Bangladeshi male doctors with a monthly income of more than 330 USD and by profession with ICU working experience of less than 5 years were significantly associated with unsatisfactory knowledge level. On the counterpart, ICU-experienced female nurses with a lower monthly income (<330USD) had satisfactory knowledge of standard intensive care indicating a positive scenario. In addition, it was disappointing to explore that health professionals with ICU training experience revealed poor knowledge of standard intensive care services. This unique finding does not coincide with any other study finding. To explore the practice level, it was clear to mention that someone's education, knowledge, and qualification do not always influence their practice level. ICU-experienced doctors with post-graduation degrees with a good monthly

income were significantly associated with poor implementation of standard care for ICU patients.

Finally, the outcome of logistic regression analysis showed all the strong characteristics that influence both knowledge and practice of standard intensive care services among health care providers in Bangladesh. Lack of knowledge was found among doctors (OR/p= 13.16/0.05) who had less ICU work experience (<5 years) (OR/p= 13.98/0.05) regarding standard ICU care, which makes them more susceptible to poor practice. No exceptions were observed about the practice level. Again, doctors who had less ICU work (<5 years) experience with no previous ICU training were identified as final predictors for poor practice. Also, the time frame was very short & this is not the overall scenario of the country. Finally, to explain the strength, this study sorted out a large number of predictors which will help the policymakers in rethinking new dimensions to improve ICU support policies. Our study may also be helpful for introducing a different pattern of intervention on a large scale for reducing the burden of health system in Bangladesh.

Conclusions & Recommendations

The study revealed that physicians having less ICU work experience (<5 years) were significantly responsible for poor knowledge of standard intensive care. Moreover, it was identified that physicians with less work experience and did not have ICU training, did significantly poor practice of standard ICU services. Furthermore, younger male professionals with greater monthly incomes tended to implement standard intensive care services poorly. This incidence serves as an example of the inadequate ICU services offered in hospitals in Bangladesh. Therefore, we advise including critical care education in the curriculum of medical schools in the form of in-service educational programs and practical clinical training. Besides, the Ministry of Health Education, as well as the subsidiary institutions, shouldgive standard intensive care education to gain better knowledge. Future studies are also required to replicate thestudy using a significant number of respondents.

Ethical Clearance: This study was approved by the Ethical Review Committee of the Department of Public Health of Northern University Bangladesh (NUB/DPH/EC/2022/21-a)

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Conflict of interest: None declared.

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