

## Knowledge, Attitude and Practice of Oral Care of Critically Ill Child by Intensive Care Nurses at Pediatric Critical Care Unit

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### Abstract

**Background:** Oral care is a critical aspect of nursing for critically ill children in Pediatric Intensive Care Units (PICU). Poor oral hygiene in intubated patients can lead to complications such as biofilm buildup, ventilator-associated pneumonia (VAP) and impacting patient outcomes. An effective oral care program influence overall good intensive care outcome and influenced by several factors regarding the understating, belief and importance of good oral environment. Assessing nurses' knowledge, attitudes, and practices towards oral hygiene is vital to identify gaps and enhance training efforts for optimal patient care.

**Methods:** A cross-sectional study was conducted with 80 nurse sat National Heart Foundation Hospital and Research Institute, Mirpur, Dhaka who were working in Pediatric cardiac ICU. The data were collected from November 2023 to December 2023.

**Results:** This study examines the knowledge, attitudes, and practices of intensive care nurses regarding oral care for critically ill children in a Pediatric Cardiac Intensive Care Unit (PCICU). The mean age of nurses was 25.43±2.83 years, with most aged 25-29 and having an average nursing experience of 3.44±2.84 years but most of them have less experience in PICU. Although 95% recognized oral care as essential, knowledge gaps were noted, particularly about oral biofilm (35%) and VAP (70%). Barriers to care included patient non-cooperation (61.3%), intubation (45%), and limited staff (27.5%). While 71.3% used forceps and gauze, and 83.8% used normal saline, more than 50% of nurses expressed a need for biannual training to improve care delivery. The findings underscore the need for regular training to address barriers and improve oral care quality in PCICU settings.

**Conclusion:** The study provided useful findings regarding oral hygiene knowledge, thought and practices of nurses caring for critically ill patients. The study highlights gaps in oral care knowledge, attitudes, and practices among intensive care nurses, emphasizing the need for regular training.

[Shaheed Syed Nazrul Islam Med Col J 2025, Jan; 10 (1):54-62]  
DOI: <https://www.doi.org/10.69699/ssnimej2025v10i1s8>

**Keywords:** Oral care, critical care nurses, knowledge, attitudes and practice, pediatric intensive care unit (PICU), PCICU

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## Introduction

Oral health care, is an essential care that may influence the patient health and sense of general well-being.<sup>1</sup> The biological, psychological, emotional, and developmental variables are interrelated with oral and overall health.<sup>2</sup> Nurses are the first line care giver of very sick child at pediatric intensive care unit (PICU). The oral cavity is the largest microorganism houses of human body and maintaining good oral care for reduce the incidence of infection and ensure patient better comfort and satisfaction.<sup>3</sup> In PICU, ensuring good oral hygiene of critically sick child is very challenging as oral cavity are more compromised by several medical conditions and intervention.<sup>4</sup> Individuals with chronic medical disorders are more susceptible to bacterial and fungal colonization of the oral cavity and these oral pathogens are transported to the lungs by oral secretions and the potential to cause respiratory infections.<sup>5-6</sup> Hemodynamic unstable patient often need sedation with mechanical ventilation and associated with risk of ventilator-associated pneumonia (VAP).<sup>7</sup> VAP significantly associated with prolong length of PICU as well as hospital stay and increases mortality.<sup>8</sup> Maintaining oral hygiene is a key part of good nursing care for all critically ill patients but is overshadowed in view by other serious needs. Due to lack of appreciating the oral health importance and not have a clear understanding of the complex characteristics of bacterial colonization, nursing staff focus it as a low-priority intervention and also thought as time-consuming and difficult part of their work.<sup>9-11</sup> There are multiple factors related to intubated patient keep away nurses to providing good oral care.<sup>12</sup> Moreover, there is no evidence-based definite standardize protocol in PICU, no structural training or education for doing oral care.<sup>13-15</sup> Furthermore, oral assessment tools that are not mostly available and adapted from adult

ICU to paediatric ICU. Therefore, existing oral care assessment practices have wide variability, the British Association of Critical Nurses (BACCN) recently developed a consensus tool for oral health care.<sup>11,16</sup> International health care organizations, such as the Institute of Health Improvement (IHI) and the Centers for Disease Control and Prevention (CDC), have come to realize the need of providing oral hygiene in critical care.<sup>17</sup>

The patients care in PICU mostly depend on the caregiver's nurses and good care ensure the rapid recovery of patients to a great extent. To date, no studies have been carried about knowledge, attitude and practice of oral care of pediatric critical care patient in Bangladesh. This study sought to ascertain the oral care practices, attitudes, and knowledge of paediatric critical care nurses and the findings of the study would help to create and successfully incorporate evidence-based oral care into paediatric critical care in future.

## Methods

This was a cross-sectional study where data has been collected from the PCICU of National Heart Foundation Hospital and Research Institute, Dhaka over a period on November to December 2023. This is one of the largest PCICU with total 28 beds and 86 staff nurses work as a critical care nurse with having all level of nursing education. All nurses were invited to participate the study, among them 80 staff nurses voluntarily participated in the survey and answered the questionnaire. Informed consent taken from all participants to participate in the study. Participation in this survey did not adversely affect the care of patients in the PCICUs. Maximum allocated time to answer the questionnaire were 60 minutes for each participant.

A structured questionnaire was developed in English for data collection with the consideration of all variables of the study and then it converted in Bangla. After surveying some previous studies dealing with the same subject and focused group discussion, the questionnaire was constructed by a team of experienced ICU nurses including ICU in-charge, nurse educator, pediatric intensivist, dental surgeon and public health specialist. After construction feedback were taken from previously PICU working nurses regarding the design, content and appropriateness questions and refined based on their feedback. The final 25-item questionnaire were developed, focused on the knowledge of oral hygiene protocol, oral care belief, oral care practiced, frequency of oral hygiene and the equipment use for oral hygiene. A basic demographic data of the pediatric critical care nurses also added in the questionnaire.

Oral health knowledge was measured by using 7 items and a combination of multiple-choice questions (yes/no/no answer) and open-ended questions. It focused on nurses' point of view about oral care in sick child and about their source of information including period and duration training like knowledge of importance of oral care, formation of biofilm and coating in tongue due to lack of care and microbial reservoir in oropharynx leads to developed ventilator associated pneumonia. Attitudes were assessed by using 6 items based on timing, difficulty as well as barriers facing during oral care. The practice domains were built up by using 5 items and focused on frequency, methods, instrument

and solutions used during the oral care by multiple-choice questions and multiple entry questions (select all that apply). They also responded to questions regarding the support provided by the hospital.

Data were entered electronically on a secure storage system and data quality management ensured in the all phases of the research. Data were analyzed using the SPSS version 27.0 software (SPSS Inc., Chicago, IL, USA). Data regarding the oral health knowledge, attitudes and practices of nursing staff was summarized by using descriptive statistics including frequencies, means and standard deviations. Open-ended knowledge items were scored according to the number of responses provided.

## Results

The study sample consisted of 80 pediatric critical care nurses, who are working in the PCICUs of the hospital. 100% nurses were female and among nurses, majority (56.3%) were from 25-29 years age group (mean,  $25.43 \pm 2.83$  years). Almost 88.8 % nurses had completed their diploma nursing course and the mean duration of experience of the nurses and paediatric ICUs were  $3.44 \pm 2.84$  and  $1.09 \pm 1.26$  years respectively. Only 12.5% of the nurses had the experience to work in PICU for >3 years but most of them have less than 1 yrs experience and almost 2/3 (60%) of the nurses were staff nurse. Table-1 showed the demographic characteristics of the nurses who were surveyed.

Table I: Demographic and characteristics of the pediatric critical care nurses responding to the study (Total number 80)

Characteristics		Number (n)	Frequency (%)
Age	20-24 years	30	37.5
	25-29 years	45	56.3
	≥30 years	5	6.3
	Median (range)		25 (21-35)
Educational qualifications	Certificate course	1	1.3
	Diploma	71	88.8
	Graduate	7	8.8
	Masters	1	1.3
Job position	Senior Staff nurse	18	22.5
	Staff nurse	48	60.0
	Nurse	14	17.5
Working experience as nurse (years)	< 1 year	8	10.0
	1-5 years	64	80.0
	>5 years	8	10.0
	Mean ±SD		3.44±2.84
	Median (range)		3.0 (0.17-15.00)
Working experience as nurse in PICU (years)	< 1 year	60	75.0
	1-3 years	10	12.5
	>3 years	10	12.5
	Mean ±SD		1.09±1.26
	Median (range)		0.67 (0.08-6.00)
Work shift	6 hours/day	63	78.8
	12 hours/day	17	21.3

Table II: Knowledge regarding oral care of pediatric critical care nurses (number 80)

Characteristics		Frequency-number (%)
Received training for assessment of oral cavity of critically ill patient	Yes	80 (100.0)
	No	0 (0.0)
Time of received oral care training	Nursing degree	70 (87.5)
	Post-graduation	2 (2.5)
	During job period	37 (46.3)
	Others time	1 (1.3)
Is oral care in essential?	Yes	76 (95.0)
	No	4 (5.0)
Do you think lack of oral care lead to oral and systemic disease?	Yes	78 (97.5)
	No	6 (7.5)
Knowledge about coated tongue	Yes	63 (78.8)
	No	17 (21.2)
Knowledge about biofilm in oral cavity	Yes	28 (35.0)
	No	52 (65.0)
Knowledge about VAP (ventilator associated pneumonia)	Yes	56 (70.0)
	No	24 (30.0)

Table II showing that, all the nurses received the oral assessment training where 87.5% got it during completing of their nursing degree and almost half reported that they got the training during their job period. Ninety five percent of the nurses think the oral care essential for the critically ill child and lack of oral care may lead to systemic disease. Almost 78% has known about coated tongue whereas only 35% of the study population knows about the biofilm in the oral cavity. And 70 %

nurses have belief that lack of oral care in critically ill child may developed VAP (ventilator associated pneumonia).

Table III: Professionals' attitude towards oral care practices in Intensive Care Units

Attitude characteristics		Number (80)	Frequency (%)
I have adequate training to provide oral care	Agree	49	61.3
	Disagree	21	28.7
I have adequate time to provide oral care	Agree	68	85.0
	Disagree	12	15
Oral care is high priority for intubated patient	Agree	77	96.3
	Disagree	3	3.7
Oral cavity cleaning is an unpleasant task	Agree	13	16.3
	Disagree	67	83.7
Oral cavity is difficult to clean	Agree	31	41.25
	Disagree	49	58.75

Table III, summarizes the nurses' responses on their beliefs and attitudes on oral hygiene. More than 60% nurses believed that they have proper training to provide good oral care, whereas 15% percent nurses did not get adequate time to serve the oral care. Almost all of the nurses agreed that good oral hygiene was high priority for mechanically ventilated patients. About 41.25% participant nurses perceived that cleaning oral cavity properly was a difficult work and although 16.3% of the nurses found cleaning oral cavity to be an unpleasant task.

Table IV: Oral care practices in patients in Intensive Care Units (number=80)\*

Characteristics	Multiple answer	Frequency (%)
Number of assessments of oral cavity done in patients	In every shift	59 (73.8)
	Once per day	8 (10.0)
	Twice per day	4 (5.0)
	Trice per day	17 (21.3)
	Any others	14 (17.5)
Number of oral cares perform in patients	In every shift	52 (65.0)
	Once per day	14 (17.5)
	Twice per day	7 (8.8)
	Trice per day	17 (21.3)
	Any others	7 (8.8)
Common technique used for oral hygiene procedure	Forceps and cotton	15 (18.8)
	Forceps and gauze	57 (71.3)
	Gauze only	18 (22.5)
	Tooth brush	6 (7.5)
	Tooth paste	4 (5.0)
	Tooth brush with tooth paste	46 (57.5)
Solution used for oral care	Normal saline	67 (83.8)
	Chlorhexidine mouthwash	7 (8.8)
	Clean water	27 (33.8)
	Povidone Iodine mouthwash	15 (18.8)
	Any others	2 (2.5)
	Nothing	1 (1.3)

\* Multiple responses possible

Table IV showing that, in every shift more than seventy percent nurses assess the oral cavity and almost two-third nurses provides the oral care in every shift. For oral care, forceps and gauze were used by 71.3% and 57.5% used tooth brush with tooth paste were the most prevalent technique nurses use for providing oral care of the patients. Most of the critical nurses used normal saline (83.8%) followed by 2<sup>nd</sup> mostly clean water (33.8%) were used as the solutions for oral care in critically ill child.

Table V: Barrier to performing oral care in critically ill children\*

Barriers	Number (80)	Percentage (%)
Uncooperative patient	49	61.3
Hemodynamically ill patient	6	7.5
Inadequate staffing	22	27.5
Mechanically ventilated patients	36	45.0
Lack of oral care equipment's	10	12.5
Lack of knowledge	5	6.3

\*Multiple responses possible

Table V shows the perceived barriers for performing oral care in critically ill patients. The top two perceived barriers were patients' refusal to cooperate (61.37%) and mechanically ventilated patients (45.0%) hemodynamic instability (28.0%). About one fourth nurses also faced inadequate staffing (27.5%) in PICU and lack of oral care equipment's (12.5%) were the major barriers to performing oral care PICU admitted patients.

We also survey among the participant how to improve the situation 52 percent want to arrange training 6 monthly 41.3 percent Quarterly and rest of them 6.3 percent agree to participate yearly.

## Discussion

This study demonstrates the knowledge, attitude and practice of nurses working in the pediatric cardiac ICUs of one largest cardiac based hospital in Dhaka, Bangladesh. Table I showing that mean age of nurses was  $25.43 \pm 2.83$  years and majority (56.3%) were between 25-29 years of age group. Almost 90% nurses had completed their diploma nursing course but no one have critical care nursing course. The study done by Philip P. *et al* (2019) also represent the similar demographic result.<sup>18</sup> An European study in 2008 stated that more experienced the nurses, better is the knowledge, attitude, and practice of oral care.<sup>19</sup> While, the mean duration of experience of the nurses was  $3.44 \pm 2.84$  years but most of them experience as a critical care nurses at PICU were less than 1 years. This data reflecting the lack of scarcity of pediatric critical care nurses in Bangladesh like all developing country.<sup>20</sup>

In our survey, Table II showing that majority of the nurses' (88.5%) received the oral condition assessment training during their nursing diploma degree and similar study result also found by Sreenivasan in India (2018).<sup>21</sup> This knowledge should need to be updated to overcome the challenge of caring the oral hygiene of the critically ill children. Inadequate oral hygiene can contribute to the accumulation of microorganism associated with production of biofilm and tongue coatings that lead to systemic illness. Our study found; ninety five percent of the nurses think this oral care is essential for the patient. Almost 67% has knowledge about coated tongue whereas only 35% knows about the biofilm and 70 % nurses have knowledge about VAP which is nearly similar with study by Philip P. *et al* (2018), and Miranda A. *et al* (2016). but is low in comparison to another study by Barnes CM. *et al* (2014).<sup>2,15,18</sup> In

every shift more than seventy percent nurses assess the oral cavity and almost two-third nurses performed oral care (Table IV), this is similar to study reported by Sole et al.<sup>13</sup> Grap MJ. *et al* (2004) found nurses are likely to report providing more care than what they actually did, we also found similar in our study.<sup>9</sup> The difficulty of maintaining oral hygiene in intubated patients was a major problem reported by more than 45% of the respondents. More than 95% of participants think that oral care is high priority for intubated patient. One fifth nurses agreed that cleaning of oral cavity is difficult and 16.3% reported it as a unpleasant task which is nearly similar with an study by Philip P. *et al* (2018) and Miranda A. *et al* (2016).<sup>2,18</sup> Forceps and gauze, tooth brush with tooth paste, normal saline, clean water and povidone iodine solution were the most prevalent technique used by nurses for providing oral care<sup>2,18</sup>. In our survey, 61.3% of the nurses responded that they would choose toothbrushes and Forceps with gauze used 46 % to clean the patients' oral cavity. In our study, normal saline and clean water used as a solution for caring the oral health by 67% and 27%, respectively.

In caring of intubated child, nurses were hesitating to provide oral care due to the fear of tube dislodgement and lack of cooperation. In our study, we found the major barrier for providing good oral care is the uncooperativeness followed by fear of displacement of endotracheal tube in mechanical ventilated (45%) patient reported. The insufficient staff (27%) is also considered as an important factor that was supported by another study.<sup>22</sup> The results of the current study revealed differences in practices and knowledge among the healthcare professionals, indicating the need for additional educational and activities to improve oral health services performed in the ICUs. It is important to seek training on

measures and protocols of promoting oral health of PICU patients. More than 55% of nurses think that they need updated training in every 6 monthly for ensure good oral hygiene.

#### *Limitation*

This was a single center study and sample size was small. Additionally, it relies on self-reported data from nurses, which can introduce bias. The short data collection period and limited PICU experience among participants may also affect.

#### *Conclusion*

This study discoversthe informative insights regarding knowledge, belief and practices of critical care nurses on maintaining good oral health. This survey reveals that most of the intensive care nurses understand the importance of oral care in critically ill pediatric patients but knowledge gaps exist, particularly regarding biofilm and VAP. Despite adequate training, challenges such as patient's non-cooperation, inadequate staffing, and equipment shortages hinder effective care in critically ill children.

#### *Recommendation*

Need to regular, semiannual training for nurses regarding evidence based oral health care to improve oral care in critically ill children. Further research also needed to establish the most effective policies to perform oral care in critically ill pediatric patients.

#### *Conflict of interest*

None

#### *Acknowledgements*

We are very much thankful to all of the nurses of the PCICU at National Heart Foundation Hospital and Research Institute, Dhaka, Bangladesh.

#### **References**

1. Chalmers J, Pearson A. Oral hygiene care for residents with dementia: A literature review. *Journal of Advanced Nursing*. 2005; 52(4): 410–419.
2. Miranda A, de Paula R, de Castro Piau CB, Costa P, Bezerra AB. Oral care practices for patients in Intensive Care Units: A pilot survey. *Indian Journal of Critical Care Medicine* 2016; 20(5):267.
3. Dewhirst FE, Chen T, Izard J, Paster BJ, Tanner ACR, Yu WH, Lakshmanan A, Wade WG. The human oral microbiome. *J Bacteriol*. 2010; 192(19):5002–17.
4. Jones H, Newton J T, Bower E J. A survey of the oral care practices of intensive care nurses. *Intensive and Critical Care Nursing* 2004; 20(2): 69–76.
5. Azarpazhooh A, Leake JL. Systematic review of the association between respiratory diseases and oral health. *J Periodontol*. 2006; 77(9):1465–82.
6. Manger D, Walshaw M, Fitzgerald R, Doughty J, Wanyonyi KL, White S, Gallagher JE. Evidence summary: the relationship between oral health and pulmonary disease. *Br Dent J*. 2017; 222(7):527–33.
7. Oliveira MS, Borges AH, Mattos FZ, Semenoff TA, Segundo AS, Tonetto MR, et al. Evaluation of different methods for removing oral biofilm in patients admitted to the intensive care unit. *J Int Oral Health*. 2014;6:61-4.
8. Zimlichman E, Henderson D, Tamir O, Franz C, Song P, Yamin CK, Keohane C, Denham CR, Bates DW. Health care-associated infections: a metaanalysis of costs and financial impact on the US health care system. *JAMA Intern Med*. 2013; 173(22):2039–46.
9. Grap MJ, Munro CL. Preventing ventilator-associated pneumonia: evidence-based care. *Crit Care Nurs Clin North Am*. 2004; 16(3):349–58.
10. Berry AM, Davidson PM. Beyond comfort: oral hygiene as a critical nursing activity in the intensive care unit. *Intensive Crit Care Nurs*. 2006; 22(6):318–28.
11. Benson CM, Maibusch R, Zimmer SE. Oral health of hospitalized patients. Part 1: An overview of oral hygiene nursing care. *Dent Hyg (Chic)*. 1980; 54:384-6.
12. Grap MJ, Munro CL, Ashtiani B and Bryant S. Oral care interventions in critical care: frequency and documentation. *American Journal of Critical Care*. 2003; 12: 113–119.
13. Sole ML, Byers JF, Ludy JE, Zhang Y, Banta CM and Brummel K. A multisite survey of suctioning techniques and airway management practices. *American Journal of Critical Care* 2003; 12:220-232.
14. Cason CL, Tyner T, Saunders S and Broome L. Nurses' implementation of guidelines for ventilator-associated pneumonia from the Centers for Disease Control and Prevention. *American Journal of Critical Care*. 2007; 16: 28–38.
15. Barnes CM. Dental hygiene intervention to prevent nosocomial pneumonias. *J Evid Based Dent Pract*. 2014; 14 Supl: 103-14.
16. Collins T, Plowright C, Gibson V, Stayt L, Clarke S, Caisley J, Watkins CH, Hodges E, Leaver G, Leyland S, et al. British association of critical care nurses: evidence-based consensus paper for oral care within adult critical care units. *Nurs Crit Care*. 2021; 26(4):224–33.
17. Silva ME, Resende VL, Abreu MH, Dayrell AV, Valle Dde A, de Castilho LS. Oral hygiene protocols in intensive care units in a large Brazilian city. *Am J Infect Control*. 2015; 43:303-4.
18. Philip P, Villarosa A, Gopinath A, Elizabeth C, Norman G, George A. Oral health knowledge, attitude and practices among nurses in a tertiary care hospital in Bangalore, India: a cross-sectional survey. *Contemporary Nurse*. 2019 May 4; 55(2-3):261–74.

19. Labeau S, Vandijck D, Rello J, Adam S, Rosa A, Wenisch C, Bäckman C, et al. Evidence-Based Guidelines for the Prevention of Ventilator-Associated Pneumonia: Results of a Knowledge Test among European Intensive Care Nurses. *J Hosp Infect.* 2008; 70:180-85.
20. Marshall JC, Bosco L, Adhikari NK, Connolly B, Diaz JV, Dorman T et al. What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. *J Crit Care.* 2017; (37): 270-276.
21. Sreenivasan VPD, Ganganna A, Rajashekaraiah PB. Awareness among intensive care nurses regarding oral care in critically ill patients. *J Indian Soc Periodontol.* 2018 Nov-Dec; 22(6):541-545.
22. Adib-Hajbaghery M, Ansari A, Azizi-Fini I. Intensive care nurses' opinions and practice for oral care of mechanically ventilated patients. *Indian J Crit Care Med.* 2013; 17:23-7.