

## Cardiothoracic Care Nurses' Practice and Beliefs toward Endotracheal Suction Post Coronary Artery Bypass Graft at Teaching Hospital

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### Abstract

**Background:** Although endotracheal suction (ETS) is a crucial practice, it is not free of complications and hazards particularly when operated improperly or/and critical condition. Therefore, it is particularly important to perform this procedure with professional competence, especially among high risky groups with threatening conditions. **Aim:** This study aimed to assess cardiothoracic care nurses' practice and beliefs toward endotracheal suction post coronary artery bypass graft at teaching hospital. **Materials and Method:** A cross-sectional descriptive study conducted at cardiothoracic care unit (CTCU) at the teaching hospital. A convenience sample of forty-six nurses utilized nurses' beliefs scale to assess the nurses' demographic characteristics and level of beliefs as well as observational checklist to assess their level of practice toward endotracheal suction post coronary artery bypass graft at teaching hospital. **Results:** Mostly of the studied nurses were female and had technical institutions. Most of them (56%) had a moderate level of practice and adequate beliefs toward suction post coronary artery bypass graft. However, there was a statistically significant correlation between their level of practice and beliefs. **Conclusions:** Approximately all the studied nurses had a moderate level of practice in terms of ET suctioning with adequate level of beliefs, and mostly of them did not attend training courses toward endotracheal suction post coronary artery bypass graft at teaching hospital. **Recommendations:** An in-service trainer must conduct periodical continuous training programs to increase the studied nurses' level of practice and enhance their beliefs toward endotracheal suction. Cardiothoracic care nurses should be updated with nursing guidelines and advanced suction equipment and technique to promote the provided practice and their beliefs.

**Keywords:** Cardiothoracic care, coronary artery bypass graft, endotracheal suction, nurses' beliefs, practice.

### Introduction

Cardiothoracic care nurses are essential members of a multidisciplinary team who care for hospitalized patients with cardiac surgeries [1]. Coronary artery bypass grafting is a frequent surgery to treat coronary artery disease and requires highly qualified nurses for competent nursing care. The coronary heart disease deaths in Egypt reached 107, 232 or 23.14% of total deaths that ranks Egypt 23 in the world. Postoperative care is emergent and crucial management of a patient after this threaten life of surgery. This includes the care given during the immediate post operation to promote recovery level and/or accompanied complications [2,3].

Endotracheal tube suction can be life-threatening and should be used in accordance with established protocols and guidelines. It is essential considerations to reduce of mortality, morbidity, hospital expenditures, and length of

stay, as well as to improve quality outcomes by hastening patient recovery among this group [4]. Furthermore, approximately 20% or more of people are expected to receive potentially harmful care. Endotracheal tube (ETT) insertion is a life-saving procedure that can improve and protect the natural airway while also allowing mechanical ventilation to be delivered [5].

It is the most common invasive procedure performed by critical care nurses for patients who require mechanical ventilation. Unfortunately, when a patient is connected to a ventilator, the normal airway is disrupted, coughing occurs, and secretory accumulation in the lungs and tube occurs, which can lead to microbial activity, airway obstruction, hypoxia, bronchospasm, bronchiectasis, increased intracranial pressure, tachycardia, cardiac arrest, and death [6,7].

Suctioning via the ET tube is usually in two forms: open suction and closed suction. Many recent studies do not recommend the use of normal saline instillation prior to the suctioning episode. The open suction system, which is amenable to traditional suction, requires the ventilator to be detached from the patient and the use of a single-use catheter [8]. During ETS, however, a closed suction system can remain in line for 24 hours with a multiple-use catheter through the plastic sheath of multiple use drains [9]. Closed suction is now very popular and is partially the most used type of treatment in intensive care units because ventilation continues during the suction procedure, reducing lung volume loss and avoiding gas exchange impairment, preserving positive end-expiratory pressure (PEEP), reducing environmental pollution, and potentially lowering costs. One advantage of this approach is that setting up and cleaning the equipment takes less time, and patients experience less anxiety [10].

The ETS procedure for critically ill patients' nursing practice varies greatly between organizations and practitioners. This could be due to resistance to change or a lack of resources. Nurses' beliefs can be broadly described as a subjective attitude that a proposition is true or as a situation that can influence nurses' ability to provide care for patients [11,12]. Recently, Endotracheal suction has been assumed new guidelines' technique to be a new challenge in plus traditional technique. Hence, the present observational study was necessary to assess cardiothoracic care nurses' practices and beliefs toward endotracheal suction post coronary artery bypass graft at teaching hospital.

### **Significance of the study:**

Investigation cardiothoracic care nurses' practice and beliefs toward life threaten conditions closely as post coronary artery bypass graft and play a pivotal role in fostering a sense of preparedness and safety among both patients, their families, hospitals, and healthcare workers directly those nurses. Furthermore, in the same line of national Egyptian vision 2030 goal (3) to identify health dipartites and promote the delivery of care [13].

Frequent support initiatives led toward nurses in critical care area can significantly enhance the effectiveness and competencies

toward directed care to hospitalized patients. Artificial airway suctioning is a key component of airway management and a core skill for clinicians and nurses charged with assuring airway patency. Suctioning of the artificial airway is a common procedure performed worldwide daily. As such, it is imperative that nurses are familiar with the most effective and efficient methods to perform the procedure [14].

### **Aim of the study:**

This study aimed to assess cardiothoracic care nurses' practices and beliefs toward endotracheal suction post coronary artery bypass graft at teaching hospital. To achieve this overarching goal, the following specific objectives were pursued:

1. To evaluate the level of practice among nurses toward endotracheal suction post coronary artery bypass graft.
2. To determine the level of beliefs among nurses toward endotracheal suction post coronary artery bypass graft.
3. To Identify relation between nurses' practice, beliefs among nurses with demographic profile.

### **Research questions:**

1. What is the level of practice among nurses toward endotracheal suction post coronary artery bypass graft.
2. What are the levels of beliefs among nurses toward endotracheal suction post coronary artery bypass graft?
3. What is the relation between nurses' practice, beliefs among nurses with demographic profile.

### **Subject and Methods**

**Design of the study:** A cross sectional descriptive research design was employed to fulfill the study's objectives.

**Setting:** The study was conducted from August to November 2022 in cardiothoracic care unit affiliated with teaching hospital in Ismailia city, Egypt.

**Sampling:** A non-probability convenience sample technique of participants in the current study included forty-six nurses from the previously mentioned setting. Using an epidemiological information system, the sample size and power were estimated with a 90% confidence interval, a 15% dropout rate for each group, and a 90% power of the study [15, 16].

**The data collection process of this research involved the utilization of two tools:**

**Tool I:** Nurses' beliefs scale: It was meticulously developed through an in-depth review of pertinent literature and related previous studies. This questionnaire consisted of three distinct sections:

**Part A:** This section comprises 8- items designed to capture the demographic characteristics of the participating nurses. These items encompassed closed-ended inquiries concerning age, gender, marital status, educational level, years of experience, hospital affiliation, and prior attendance of training programs ET suction and availability of guidelines or/and policies in the unit. **Part B:** To assess the nurses' level of belief (7-items) about endotracheal suction post coronary artery bypass graft. This scale was shaped by the researchers' insights and guided by [17,18].

**Scoring system:** The response was considered on the Likert scale from zero to four as strongly disagree, disagree, neutral, agree, strongly agree. The researchers collected the total and estimated to percentages. The percentage scores classified as less than 75% are categorized as inadequate level, while the scores surpassing 75% are regarded as adequate level.

**Tool II:** Nurses' observational checklist: This tool was adopted by researchers from clinical textbooks and related previous studies [19,20,21]. It consisted of sixty steps to assess the studied nurses' level of practice with respect to ET system suction preprocedural, procedure, and post-procedure. The studied nurses were observed at the time of applying the utilized procedures.

**Scoring system:** The right phase was given one grade, while the wrong phase was given zero. Totally, the score varies from zero to sixteen. A score indicated to a low level of practice with less than or equal to 50%, while moderate level if fluctuated concerning 51% to less than 75, and high level if more than or equal 75%

**Tools developments:** The researchers made some modifications to the tools after reviewing recent literature and previous related studies in the same concern of the research variables.

**Content Validity and Reliability:** Assessing the content validity, the present study underwent evaluation by five academic nursing experts specialized in Critical care Nursing, Medical Surgical Nursing, and cardiothoracic medicine at Suez Canal University teaching hospital and

Faculty of Nursing. These experts scrutinized the study's content for appropriateness and clarity, providing valuable recommendations for refinement. The suggested modifications were subsequently incorporated into the study materials.

Furthermore, to measure the internal consistency of the questionnaires, Cronbach's alpha values were calculated. Its values for the tools were as follows: 0.89 for nurses' beliefs, and 0.91 for nurses' practices. These alpha values indicate strong internal consistency, suggesting that the questions within each domain of the questionnaires were reliably measuring the intended constructs.

**Ethical Considerations:**

Upon being provided with a clear explanation of the study's objectives, the nurses expressed their willingness to participate and before initiating the data collection process, they were thoroughly briefed about the study's purpose and its overall nature. They were explicitly informed about their right to decline participation or withdraw from the study at any stage or to give any reasons without any obligations. Furthermore, a crucial emphasis was placed on maintaining the confidentiality of the information they provided, ensuring that the collected data would be used solely for research purposes.

It is important to underscore that participation in this study was entirely voluntary, and the researchers took measures to preserve the anonymity of the participants by encoding their data. The study received ethical approval from the Ethics Committee of the Faculty of Nursing at Suez Canal University coded 139 (1-2022). This ethical clearance validated the study's adherence to ethical standards and the safeguarding of participants' rights and confidentiality.

**Fieldwork:** The researchers carried out the study in the following manner:

**Pilot study:**

Prior to initiating the primary study, a pilot study was conducted involving 5 nurses from the prementioned setting. These participants were subsequently excluded from the main study sample. The pilot study served multiple purposes, including providing valuable insights into the questionnaire administration process and aiding the researchers in estimating the time needed for participants to complete the forms.

The comprehensive data collection process spanned a duration of approximately six months,

commencing in August to November 2022. This extensive timeframe enabled the researchers to effectively collect data from the participants and ensure the accuracy and reliability of the findings. The researcher was always available to answer any questions or concerns. The researcher observed the nurses' practices twice using an observational checklist to evaluate the nurses' practices during procedure preparation, during the actual procedure, and after the procedure for closed-system suctioning.

The researcher observed each nurse for 5-10 minutes for each practice. A total of fifty-five data collection sessions were included, with an average of eight hours for belief assessment and nine hours for observing nurses' practices. Following the data collection, the researcher rechecked the collected data, provided simple feedback on the questionnaire results, and greeted the participating nurses and healthcare workers in the study setting.

**Statistical Design:** The data were statistically analyzed, tabulated, and analyzed using the statistical program SPSS (version 20). The Kolmogorov-Smirnov test was used to determine if the acquired data were normal, and it was determined that the data were parametric. To describe patient characteristics, the collected data were reviewed for frequency and distribution. Variable differences were measured using independent sample t tests (t) for related groups, and the Pearson correlation coefficient (r) was used to determine how closely two variables were related. The significance level was set at p 0.05.

### **Results:**

**Table 1:** explain that among the participants' mean (SD) age was 27.8 (6.4) and their range was 19-34 years. About more than half (62.5%) of the nurses were female. Furthermore, half (50%) of them had technical experience, and approximately more than half (53.2%) had 4:6 years of experience.

**Figure 1:** displays that the more than two-quarters (72%) of the studied nurses at cardiothoracic care unit did not receive related training courses of ET suction post coronary artery bypass graft. Approximately, three quarter (75%) of the studied nurses expressed available polices or procedures in the unit.

**Figure 2:** shows that the overall level of practice was moderate for more than half of the participants (56%), while less than one-fourth (14%) of the participants had a high level of practice regarding the suction system.

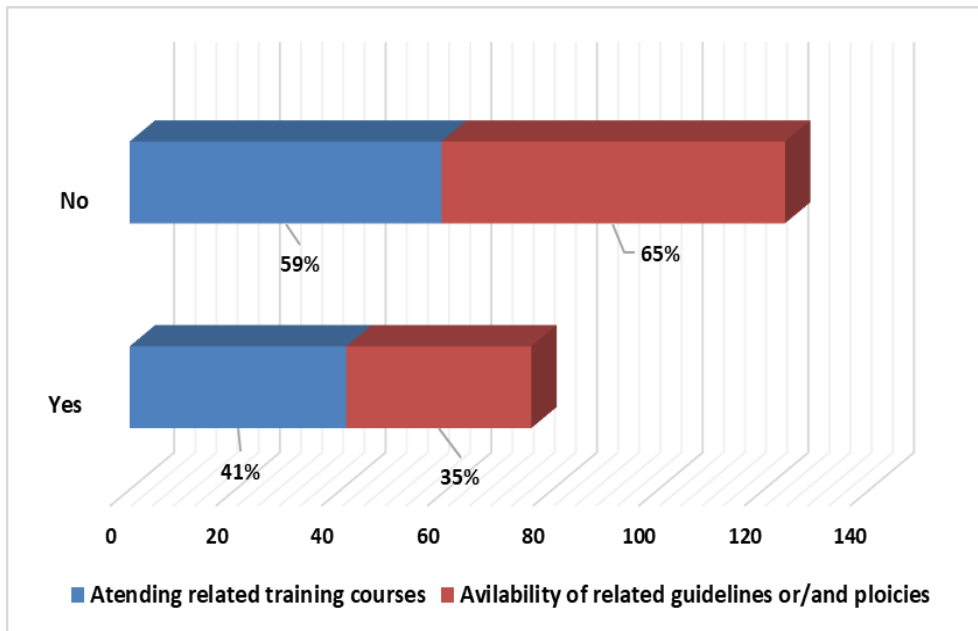
**Figure 3:** Approximately two-quarters (61%) of the studied nurses had an adequate level of beliefs, while more than one-third (39%) had an inadequate level of beliefs.

However, based on the Pearson correlation coefficient test results in the present study, there was a statistically significant correlation between nurses' practice score and nurses' beliefs score, with a p value  $\leq 0.05$ . This process is described in Table 2.

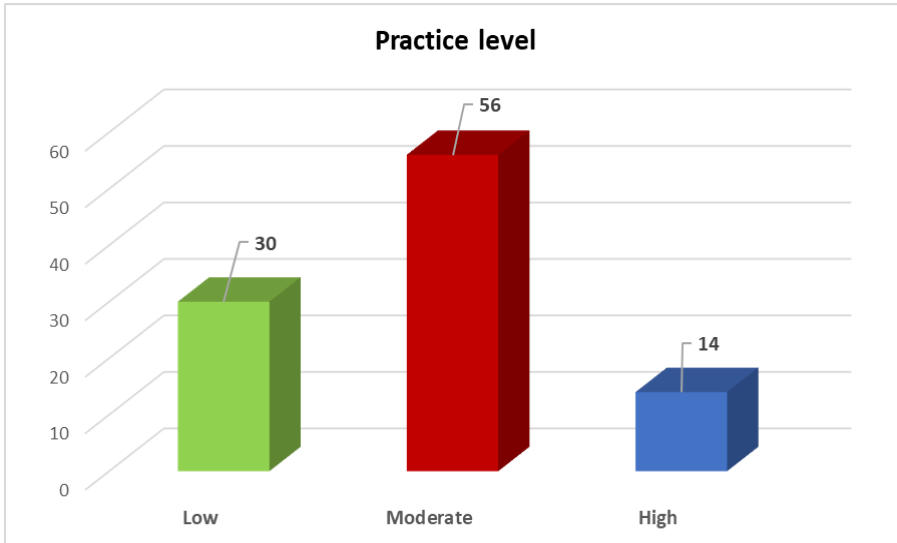
**Table 3:** shows that there was a statistically significant correlation between nurses' practice score and demographic characteristics (education) with p value  $\leq 0.05$ . Furthermore, there was a statistically significant correlation between nurses' level of beliefs and demographic characteristics, with P values  $\leq 0.05$  indicating age and experience.

**Table 1:** Demographic characteristics of the studied cardiothoracic care nurses (n=46).

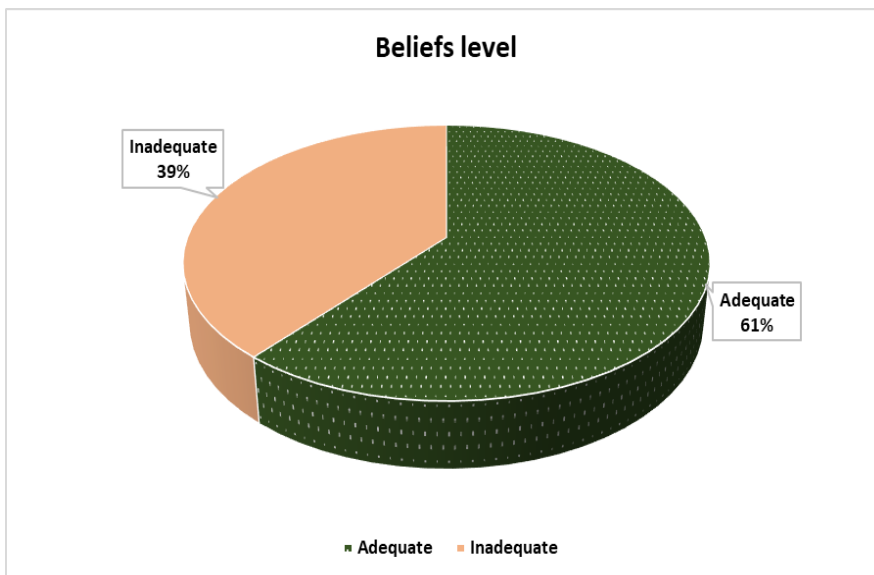
Items	Frequency	
	No.	%
<b>Age years</b>		
• <25	22	48
• ≥25	24	52
Mean±SD.	25.9 ±1.0	
Range	20.9-36.1	
<b>Gender</b>		
• Males	15	33
• Females	31	67
<b>Education level</b>		
• 1-3 years	11	24
• 4- 6years	23	50
• 7- years	12	26
<b>Experience years</b>		
• Bachelors	5	11
• Diploma	15	33
• Technical institute	20	43
• Technical bachelors	6	13
Mean ± SD	4.06±2.18	



**Figure 1:** Frequencies and percentage of the studied nurses regarding receiving related training courses and availability of related guidelines or/and policies in the unit (n=46).



**Figure 2:** Overall practice level of the studied nurses toward endotracheal suction post coronary artery bypass graft (n=46).



**Figure 3:** Overall beliefs level of the studied nurses toward endotracheal suction post coronary artery bypass graft at teaching hospital. (n=46).

**Table 2:** Correlation matrix between the overall practice level of endotracheal suction and beliefs scores of the studied nurses (n=64).

Variables	Overall nurses' beliefs score	
	r	P
Overall ET system suction practice score	0.19	0.001*
(r) Pearson Correlation coefficient		
*significant at the 0.05 level		

**Table 3:** Correlation matrix between overall practices, beliefs toward endotracheal suction and demographic characteristics of the studied nurses (n=46).

Overall nurse'	Demographic characteristics					
	Age		Education		Experience	
	r	p	r	p	r	p
• Practice score	0.41	0.12	0.39	0.05*	0.18	0.70
• Beliefs score	0.13	0.05*	0.26	0.59	0.19	0.05*
(r) Pearson Correlation coefficient						*significant at the 0.05 level

## Discussion

Endotracheal suction is a core secretion management technique used in the cardiothoracic care unit (CTCU). This physical, augmented method by nurses of secretion clearance is necessary to ensure endotracheal tube (ETT) patency, preventing mucous plugging and airway obstruction [1]. Current evidence suggests the patients will receive an average of seven suction per day, or 7–42 suction per episode of mechanical ventilation, depending on diagnosis, pathology, and comorbid factors [7].

Although necessary, ETT suction is a noxious airway intervention associated with hypoxia (secondary to alveolar collapse), cardiac arrhythmia, changes in blood pressure, raised intracranial pressure, and ventilator-associated pneumonia (VAP) across a variety of populations [18,19]. Standardizing ETT practice is difficult because of the heterogeneous nature of the patients and the broad interpretation of recommendations, such as 'clinically indicated. The nurses are essential before the procedure to assess baseline screening for signs of respiratory distress and monitoring for common problems such as bradycardia and hypoxia [1,21]. Therefore, the current study was conducted to assess cardiothoracic care nurses' practice and beliefs

in endotracheal suction post coronary artery bypass graft at teaching hospital.

Examining nurses' competencies of ET suction plays a crucial role for early identification. It becomes possible to promote the directed area especially among critically ill cases as post coronary artery bypass graft. This can result in quicker implementation of robust care, curbing the transmission of the hazards and to be compatible with national role by Sustainable Development Goal 3's aim of reducing the global burden of diseases and preventing avoidable complications [7,13].

The finding of the present study revealed that the demographic characteristics of the studied nurses (Table 1), which more than half (52%) had age  $\geq 25$  with Mean $\pm$ SD 25.9 $\pm$ 1.0 years and range 20.9-36.1 Furthermore, the findings revealed that less than three-quarters (67%) were female and experience years 4-6years. About more than one-quarter (43%) had technical institute experience.

Additionally, (Figure 1) clarified that more than two-quarters of the studied nurses did not attend related training endotracheal suction courses, while more than one-third (41%) had attended related training courses. Moreover, more than one-quarter of them revealed availability of related guidelines

or/and polices of endotracheal tube suction at above mentioned study settings. The researchers indicate of view confirm that most of the Egyptian nurses were female and that the recruited nurses graduated from nursing institutes post graduating 6months.

In response to these concerns, El Desouky, et al., clarified that their findings are in line with their study, which revealed that over half of the participants were men with greater levels of experience and married status [1]. The results of this study, however, conflict with those of Chen, et al. [16], who found that nurses between the ages of 22 and 31 had more than eight years of experience in higher education, most of them holding diplomas. This is in line with Kadhim & Mhabes' assertion that the study participants' degree of continuous training course receipt was insufficient [9]. On the other hand, Bulbul et al. made it clear that the study sites had up-to-date policies and procedures for endotracheal suction [19].

Regarding to the study findings of participants' level of practice Figure (2) illustrate that the overall level of practice of the studied nurses was moderate among more than two-quarters of them, while less than one fourth of the nurses had a low level of practice toward endotracheal tube suctioning practice. As a result, the researchers' perspective in this field may be influenced by the nurses' wealth of experience, academic achievement, advanced education, use of conventional suction techniques, and resource accessibility.

These results corroborated those of Dastdadeh, et al., on the same topic, indicating that the study's findings are comparable enough to suggest that nurses are performing at a level appropriate for endotracheal tube suction [22]. Furthermore, Aboalizm, & Elhy, and Mwakanyanga et al. disapproved with these conclusions and reported that nurses' level of practice regarding endotracheal suction at a low level [23-24].

About of the level of the studied nurses' beliefs toward endotracheal tube suction; the exacting findings of this study (Figure3) revealed that about less than two-thirds of the studied nurses had adequate beliefs toward endotracheal suction post coronary artery bypass graft, while more than one-third had inadequate level of beliefs. The moderate level

of the nurses under study, culture, the prevalence of Islam in our nation, educational attainment, and the nurses' personal problems are all connected to the researchers' point of view. On the other hand (Table 2) gives a description of this procedure., a statistically significant link ( $p$  value  $\leq 0.05$ ) was found between the nurses' beliefs score and their practice score, according to the results of the Pearson correlation coefficient test in this investigation,

Yilmaz, et al., and Ncube, C that reported in a similar direction that most of the nurses under the study held a high degree of belief about the use of endotracheal suction on critically ill patients during the study phase [18-20]. In contrast, the study participants' attitudes and beliefs about endotracheal suctioning were found to be low among the nurses under the study, according to Bulbul, et al., and Davies, et al. [19-25]. From the researchers' points of view, a technical institute may have influenced most of the nurses' views on this subject, as well as the study sample's characteristics and the lack of experience toward endotracheal suction.

Regarding the correlation matrix between overall practices, beliefs toward endotracheal suction and demographic profile of the studied nurses. There was a statistically significant correlation between nurses' practice score, beliefs score and demographic characteristics (age, education, and experience). Furthermore, there was a statistically significant correlation between nurses' practice score and demographic characteristics (education) with  $p$  value  $\leq 0.05$ . Furthermore, there was a statistically significant correlation between nurses' level of beliefs and demographic characteristics, with  $p$  values  $\leq 0.05$  indicating age and experience. These results verified those of Dastdadeh, et al., indicating that the study's findings compatible in the current study [22].

The use of the direct observation technique, which has the potential to affect nurses' behavior, was one of the study's limitations. The researcher made two observations and stayed present for multiple work shifts in an effort to lessen this effect.

### **Conclusion**

This study underscores that, mostly of the studied nurses had age  $\geq 25$  years with Mean  $\pm$  SD 27.8  $\pm$  6.4, and less than two third



were female with experience 4-6 years. The patients' overall level of practice with the ET suction system was moderate. Furthermore, their level of belief in the ET suction system was adequate. However, there was a statistically significant relationship between overall nursing practice and beliefs. emergent in-service-led continuous training courses improve nurses' practices in ET suction and enhance their beliefs. cardiothoracic nurses should be attentive. The results support the need for continuous training programs to ensure that nurses remain well-informed and adept in endotracheal suction post coronary artery bypass graft. The findings of this study also hold broader implications for healthcare providers' preparedness and responsiveness to emerging endotracheal suction.

#### **Recommendations:**

1. Allocated the emergent requirement of training sessions on nurses' practices, and beliefs ET suction post coronary artery bypass graft at regular intervals.
2. The dynamic nature of healthcare necessitates continuous updates to keep nurses well-informed by raising their competences about the latest developments in Et Suction practice.
3. Design practical sessions that are tailored to the specific needs and challenges faced by nurses in the field. Incorporate case studies, real-world scenarios, and interactive discussions to engage nurses and enhance their understanding of ET suction practice preparedness, skills, equipment, and types.
4. Expand the scope of continued training sessions to include interdisciplinary collaboration involving nurses, physicians, infection control specialists, and cardiothoracic physicians can lead to a comprehensive approach of practice and beliefs post coronary artery bypass graft.
5. Replication of the study on different settings and the large probability sample for data generalization.

#### **Abbreviations**

Endotracheal Tube (ET), Standard deviation (SD); Endotracheal Tube Suction (ETS), Positive End-Expiratory Pressure (PEEP), Cardiothoracic Care Unit (CTCU).

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#### **Competing interests**

There were no conflicts of interest associated with this study.

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#### **Availability of Data**

The data of the current study is available upon reasonable request.

#### **Author Contribution**

The author industrialized the data assembly, methodology preparation, introduction, interpretation, conceptual framework, and tool conceptualization. Organized the reference, manuscript design, and journal submission.

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