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ORIGINAL ARTICLE

Frequency of the clinical indicators of 'ineffective airway clearance' among patients after coronary artery bypass grafting at tertiary care hospitals Karachi, Pakistan.

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ABSTRACT… Objective: To determine the frequency of the clinical indicators of ineffective airway clearance among patients after Coronary Artery Bypass Grafting at tertiary care hospitals in Karachi, Pakistan. **Study Design:** Cross-sectional study. **Setting:** Dow University Hospital (DUH), Ojha Campus, and Tabba Heart Institute (THI) Karachi. **Period:** December 2019 to July 2020. **Material & Methods:** A total of 113 patients were enrolled after CABG surgery through purposive sampling nine clinical indicators were assessed in post-CABG patients for the presence of Ineffective Airway Clearance (IAC). A data collection tool with demographic variables and nine clinical indicators (defining characteristics) of IAC was used. The association of clinical indicators with IAC was determined through the Fisher Exact Test. **Results:** The mean age of study patients was 57.50± 9.107 years. IAC was found in 105 (92.9%) patients in post-CABG surgery patients within 24 hours of intubating of the ventilator. The most frequent clinical indicator was adventitious breath sounds (ABS) which has shown up in 90 (79.6%) patients of the study population. The majority of the indicators were found to be statistically significantly associated with IAC. **Conclusion:** This study concludes high incidence of IAC 92.2% among the study population of post CABG patients. The most frequent clinical indicator were Adventitious Breath Sound, excessive sputum, and ineffective cough.

Key words: CABG, Clinical Indicators, Ineffective Airway Clearance, Nursing Diagnose.

INTRODUCTION

Identification of a health problem of a patient according to described indicators is a skill of a nurse who works at the clinical site. In nursing language, a health problem of a patient is named as a Nursing Diagnosis by North American Nursing Diagnosis Association (NANDA-I). Nursing diagnosis is a clinical judgment about the patients' response to actual or potential health conditions or their needs. Nursing diagnosis is an identifiable problem by published clinical indicators to guide nurses towards an achievable goal to solve patients' problems by applying specific nursing interventions and preventing the patient from unwanted effects.[1]

Recent studies reported an increase in the incidence of respiratory complications from 20% to 60% in post cardiothoracic surgeries. However, the disability incidence 5.4%, and mortality incidence 3.7% reported in the literature.[2]

One study claimed that the incidence of respiratory complications including prolonged mechanical ventilation, pleural effusion, atelectasis, diaphragmatic paralysis, and pneumonia in post-CABG has reached up to 40%.[3]

The contribution of the nursing care in a critical care post-operative unit plays a major role in the speedy recovery of a patient. Many researchers justified the speedy recovery and prevention of postoperative complications; if the health problem would be identified timely and accurately in post-cardio-thoracic surgeries.[2,4-9]

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Most of the cardiothoracic surgeries are being conducted in coronary heart disease. Though, there are several surgical interventions are included in the management to preserve life from a heart attack immediately. Coronary Artery Bypass Grafting (CABG) is a major surgical procedure performed by a cardiothoracic surgeon. In the postoperative period of CABG patients may develop multiple health problems which need to identify timely and accurately. The pulmonary system may be at risk of injury due to lung collapse and disruption of pleural functions.[9,10]

In Post CABG unit nurses are the first person who recognizes patients' health problems. They repeatedly interact with the patients and assess them frequently to report their condition with the cardiac surgeon collaboratively.[1-4]

After CABG surgery there is a restriction of chest movement due to sternal incision which results in the inability of coughing appropriately to clear up the secretion plugged into the respiratory tract. It ultimately leads to ineffective airway clearance (IA[7]

C). Since this problem can give severe respiratory complication which causes mortality it needs to identify as early as possible. Common factors that can cause IAC are prolonged surgery, prolonged intubation, and the effects of general anesthesia medications. If IAC is not identified timely and reversed immediately may lead to respiratory complications or death. Since the CABG is major surgery; postoperative care is also very important to bring back the patient to a normal healthy lifestyle without complications.[5,7,11]

Since IAC is a nursing diagnosis and has been claimed as one of the most occurring problems in recent studies that have shown a great impact on patient and organizational outcomes.[3]

Few recent studies suggest that IAC has become one of the most serious problems if not reversed; it causes severe breathing difficulties and may lead to death.[3,12]

Studies suggested a significant relationship between cardiac surgery and postoperative pulmonary complications.[13,14]

Identification of these complications is practiced differently in various hospitals in Pakistan. Since the nurses can identify the clinical indicators of IAC timely, they can appropriately manage and prevent patients before getting into a worse state. The utilization of frequent clinical indicators with higher predictive power contributes to the true classification of nursing diagnoses.[4,5,15]

A paucity of studies conducted on IAC in the Asian region motivated us to conduct this research study to find out the incident of IAC in the Study Population. Another purpose to conduct this study is to know the frequently occurring clinical indicators among post-CABG patients diagnosed with IAC.

MATERIAL & METHODS

This analytical cross-sectional study was conducted among 113 post-CABG surgery patients within 24 hours of extubating at Dow University Hospital (DUH) and Tabba Heart Institute (THI) Karachi. Patients with pre-existing lung conditions such as COPD, chronic bronchitis, bronchial asthma, cystic fibrosis, lung cancer, were excluded. Data were collected through non-probability purposive sampling from December 2019 to July 2020. Nine clinical indicators were assessed in post-CABG patients for the presence of ineffective airway clearance. Five indicators are dependent on other clinical indicators including cyanosis, adventitious breath sounds, alteration in the respiratory pattern, restlessness, and orthopnea. However independent clinical indicators are ineffective cough, dyspnea, excessive sputum, and alteration in respiratory rate. These clinical indicators were assessed through physical assessment of post-operative CABG surgery. Patient with the presence of any of the nine clinical indicators was labeled as Ineffective Airway Clearance.[7,15-18]

A modified data collection tool was applied according to the regional implementation to collect the required information.[2,15-18]

The tool was consisting of three demographic variables and nine clinical indicators (defining characteristics) of IAC. The defining characteristic is also known as clinical indicators.

Ethical approval for this research was taken from the Institutional Review Board (IRB)-the Dow University of Health Science, Ref: IRB-921/DUHS/ Approval/2017/142 and Tabba Heart Institute, Ref: THI/IRB/ 26.03.18. Data were collected after IRB approval from both hospitals, through relevant history taking and specific physical assessments related to the IAC determination process during their routine physical assessment. Consents were taken from the patients before the surgery. The standard assessment techniques of the respiratory system were followed. It consisted of inspection, palpation, percussion, and auscultation. Special consideration was given to the well-lighted, private, warm, and quiet environment, to examine each patient while maintaining a comfortable and suitable position throughout the assessment. Statistical Package of Social Sciences (SPSS) 26.0 version was used for data analysis. The association of clinical indicators with ineffective airway clearance was determined through the Fisher Exact Test. P-value ≤ 0.05 was considered significant.

RESULTS

The mean age of study patients was 57.50± 9.107 years. Patients were predominantly male (72.6%) and belonged to the age group 41-50 years (28.3%). Ineffective Airway Clearance was found in 105 (92.9%) patients in post-CABG surgery patients within 24 hours of extubation of the ventilator. Whereas there were only eight (7.1%) patients without IAC.

The most frequent clinical indicator was adventitious breath sounds (ABS) which have shown up in 90 (79.6%) patients of the total population. In contrast, the least frequent clinical indicator is cyanosis which was found in only 4 (3.5 %) patients. Excessive Sputum (ES) and Ineffective cough have shown an almost similar pattern. These were present in 87 (77 %) and 86 (76.1 %) patients respectively. Others clinical indicators, Restlessness Altered Respiratory Rate, Dyspnea, Orthopnea, Alteration in respiratory rate found in 56 (49.6), 53 (46.9%), 51 (45.1%), 46 (40.7%), and 43 (38.1%) patients (Table-I).

Clinical Indicators	Present Frequency (%)	Absent Frequency (%)
Adventitious breath sounds	90 (79.6%)	23 (20.4%)
Excessive sputum	87 (77%)	26 (23%)
Ineffective Cough	86 (76.1%)	27 (23.9%)
Restlessness	56 (49.6%)	57 (50.4%)
Alteration in respiratory pattern	53 (46.9%)	60 (53.1%)
Dyspnea	51 (45.1%)	62 (54.9%)
Orthopnea	46 (40.7%)	67 (59.3%)
Alteration in respiratory rate	43 (38.1%)	70 (61.9%)
Cyanosis	04 (3.5.0%)	109 (96.5%)

Table-I. Frequency of clinical indicators.

Table-II shows the association between all nine clinical indicators and IAC. As shown above, that 97.7% of patients with adventitious breath sounds had IAC whereas only 2.3% of such patients did not have IAC. There were 73.9% of patients without adventitious breath sounds had IAC and 26.1% of patients were not found with IAC. Of the patient who did not have excessive sputum 77% presented with IAC however only 23% presented without IAC. Furthermore, out of all patients presented with ineffective cough; almost 98.8% of patients had IAC whereas only 1.2% of patients were without IAC. Statistical association of clinical indicators with ineffective airway clearance was identified using the non-parametric Fisher Exact Test. All indicators stated in above Table-II except Cyanosis and Alteration in Respiratory Rate were found to be statistically significantly associated with IAC with p-values < 0.05.

DISCUSSION

The present-day nurses need to be more efficient in caring for patients and to make nursing care plans effectively. This study has contributed to the quick assessment of the post-CABG surgery patients in the diagnosis of IAC.

Clinical Indicators		Ineffective Airway Clearance (IAC)		P-value
		Present	Absent	
		F (%)	F (%)	
Adventitious Breath Sounds	Present	88 (97.7)	2 (2.3)	0.001*
	Absent	17 (73.9)	6 (26.1)	
Excessive Sputum	Present	85 (97.7)	2 (2.3)	0.002*
	Absent	20 (76.9)	6 (23.1)	
Ineffective Cough	Present	85 (98.8)	1 (1.2)	0.000*
	Absent	20 (74.0)	7 (26)	
Restlessness	Present	56 (100)	0 (0)	0.006*
	Absent	49 (85.9)	8 (14.1)	
Alteration in Respiratory Pattern	Present	53 (100)	0 (0)	0.007*
	Absent	52 (86.6)	8 (13.4)	
Dyspnea	Present	51 (100)	0 (0)	0.008*
	Absent	54 (87.0)	8 (13)	
Orthopnea	Present	46 (100)	0 (0)	0.02*
	Absent	59 (88.8)	8 (11.2)	
Cyanosis	Present	4 (100)	0 (0)	1
	Absent	101 (92.6)	8 (7.4)	
Alteration in Respiratory Rate	Present	42 (97.6)	1 (2.4)	0.153
	Absent	63 (90)	7 (10)	

Table-II. Association of clinical indicators with IAC
*p-value ≤ 0.05 considered as significant (Fisher exact test)

Nine clinical indicators of IAC related to post-cardiac surgery patients were assessed which are categorized by NANDA-I. These indicators were assessed for frequent occurrence in post-CABG patients.

In this study, we found the incidence of IAC as 92.9%, in contrast, Pascoal L.M., et al. found IAC in 46.73% of the sample in patients after thoracic or abdominal surgery.[4] However, De Sousa VE. et al. also studied post-cardiac surgery patients; and claimed 29.6% sample positive for IAC.[2] Moreover, another study[19] was conducted by de Silva et al. showed that IAC was present in 49.5% of the sample who underwent abdominal surgeries and thoracic operations. A study conducted by Rocha et al. found a 63.6% prevalence of IAC in patients after CABG in the postoperative.[20] The incidence of IAC among post-cardiac patients found in the current study is at the higher side concerning previous studies. One reason for the higher incidence might be the greater number of patients above 60 years of age in comparison to previously published studies. Advanced age is one of the reasons for slow recovery after surgery. In addition, another reason may be due to different clinical setup or the protocol of the patient assessment/management in the local medical facility.

Sun et al have explained in their study that cardiothoracic surgeries have major contributions of causing airway obstruction, superficial ventilation due to chest pain, abdominal breathing pattern, hyper-secretion, muscle dysfunctions, and chest and lung restriction.[21] De Sousa VE et al. clarified by relating the previous study that the management of clinical indicators of IAC may elicit further complications.[2] Due to the scarcity of research studies conducted on this topic, it is difficult to relate current study findings with other studies.

Nine clinical indicators were analyzed in this study to assess frequency in patients either with IAC or without IAC. Previous studies have shown that the high prevalence of clinical indicators of IAC were found as excessive sputum present in 54.1%, adventitious breath sounds present in 36.7%, diminished breath sounds present in 34.7%, and dyspnea present in 27.6%3, 5. In contrast, this study found a higher incidence of adventitious

breath sounds, excessive sputum, and ineffective cough as 79.6%, 77.0 %, and 76.1% respectively.

LIMITATION

One of the limitations of this study was that few patients who were enrolled and gave consent before the surgery came up with critical conditions So, we were not able to perform the respiratory assessment as per the protocol. Therefore, those participants were excluded from the study which led to the extended duration of the study.

Comparative analysis of the data with the local or Asian articles was very limited because of limited studies published in this area from the Asian region.

CONCLUSION

This study concludes high incidence of IAC 92.2% among the study population of post CABG patients. The most frequent clinical indicators were found to be adventitious breath sounds, excessive sputum, and ineffective cough. These three indicators are also statistically significant to be good indicators to diagnose IAC.

This study will lead Health care professionals to take prompt action based on frequently observed clinical indicators of IAC in post CABG patients. Furthermore, this will lead as parent study of IAC conducted in Asian region, ultimately will contribute and give birth to relevant studies in future.

RECOMMENDATION

It is highly important for medical professionals, nurses to determine which clinical indicator is most important to look for the individual response to determine respiratory problems. It is recommended that more attention need to be provided for preoperative teaching of deep breathing and coughing techniques. Furthermore, there is a need to conduct a similar type of studies in other regions of Pakistan.

CONFLICT OF INTEREST

The authors declared no conflict of interest and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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1	Abida Razzaq	Conceptualization, Orignal draft preparation, Methodology, Software SPSS. Data collection, Investigation, and Writing.	
2	Abdur Rasheed	Supervision, Software, Validation, Reviewing and formatting.	
3	Salman Ahmed	Supervision and Revising.	
4	Hakim Shah	Supervision and Revising.	