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Cross-sectional Study

Magnitude and associated non-clinical factors of delayed discharge of patients from post-anesthesia care unit in a comprehensive specialized referral hospital in Ethiopia, 2022

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ABSTRACT

Background: Patients are kept in the post anesthesia care unit until their condition is stabilized before transfer to the clinical areas. Prolonged length of stay in the PACU leads to increased health care cost and patient dissatisfaction.

Objective: The aim of this study was to determine the magnitude and to identify the non-clinical factors that lead to delay discharge from the post anesthesia care unit.

Method: This prospective observational study was conducted from April 1, 2022 to June 5, 2022. Patients were considered ready for discharge after they had achieved a satisfactory discharge score. The data obtained were presented as descriptive statistic and were analyzed using SPSS version 20.

Results: A total of 307 patients admitted to in the post anesthesia care were included in this study with a response rate of 100%. Majority of patients, 188 (61.2%), had prolonged length of stay in the PACU because of non-clinical factors. The most common non-clinical factor for delayed discharge was unavailability of beds in the respective ward (n = 69, 22.5%) followed by lack of available hospital patient transport (n = 34, 11.1%).

Conclusion: and recommendations: The proportion of delayed discharge of patients from the post anesthesia care unit (PACU) was significant. Non-clinical related delays contributed for a considerable extension of a patient's time in PACU. Delay discharge for non-medical reasons put patients at unnecessary risk for hospital-acquired infections and prolonged hospital stay and increased health care costs. Thus, understanding and addressing the causes of delayed discharge from PACU is essential.

1. Introduction

Post anesthesia care unit (PACU) was designed for the primary aim of reducing postoperative morbidity and mortality [1]. The post-anesthesia care unit (PACU) is an area where centralization of care by anesthetists and trained nurses who are skilled in interpreting and responding to the events occurring during recovery from the immediate effects of anesthesia and surgery is established [2]. Post anesthesia care unit (PACU) is a special area where intensive observation and care to post surgical patients were provided. Patients are kept in PACU until their condition is stabilized before transfer to the clinical areas [3]. Patients after surgery under anesthesia usually stayed in this area until they are deemed fit for discharge to a specialized care unit or to a general ward.

Discharge time indicates the length of time elapsed from the completion of surgery until the patient is discharged to the clinical area after surgery [4]. The post-anesthesia care unit (PACU), an integral component of the surgical care system, is reserved for patients after surgery to receive an appropriate level of care. The capacity of PACU to accommodate patients immediately after surgery is crucial for efficient operating room (OR) activity [5].

Delayed discharge from PACU occurs frequently, and its etiology is complex as it may be affected by both anesthesia and non-anesthesia or clinical related factors [4,6]. Prolonged stay in the PACU could be related to clinical and non-clinical factors [6,7]. The availability of beds in special care units or clinical areas played a significant role in unplanned patient delay in the PACU [8].

Delayed discharges have been recognized to be a source of additional cost to the National Health Service (NHS). In the current economic

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climate with hospital trusts in financial deficits, ways to reduce cost without harming patient care or the quality of care are being sought. Transferring patients efficiently to the appropriate care setting once the acute illness has been treated is one potential way that hospitals can realize cost saving [9].

Quantifying factors that can prolong length of stay (LOS) in the PACU is difficult because appropriate and average discharge times have not been established.

A practice guideline by the American Society of Anesthesiologist Task Force on post anesthetic care shows that discharge should occur after patients have met specified criteria. Use of scoring systems may assist in documentation of fitness for discharge [10].

Postoperative care is a complex system involving multiple clinical areas and health care providers. The post anesthesia care unit is the lynchpin of this system and where patients undergo immediate phase I recovery from anesthesia before discharge to phase II recovery (in ambulatory settings, postoperative wards, and advanced monitoring wards). Effective movement of patients through the postoperative care system is critical to avoid patient flow bottlenecks and disruption of surgical practices [11].

The constant pattern of patient delays to the clinical areas because of non-clinical reasons is a frequent occurrence that ultimately contributes to the poor flow of patients throughout the department, and this has significant implications for productivity and efficiency. Patient delays lead to interruptions to follow up cases and affects nurse-patient ratio, which ultimately influences patient, family, and nurse satisfaction [3].

The aim of this study was to determine the proportion and to identify non-clinical factors contributed for delayed discharge from the Post Anesthesia Care Unit (PACU) at comprehensive specialized referral hospital in Ethiopia.

2. Rationale of the study

Identifying and addressing the modifiable factors that affect discharge of a patient from the PACU may increase the efficiency of the healthcare system and decrease costs for both the patient and the hospital. Delay discharge in the PACU is affected by clinical and non-clinical factors. Clinical factors are determined by pre-existing, intra-operative, and post-operative medical conditions but, non clinical factors are independent of the patient.

Delayed discharge causes cancellations of elective operations, delays in operations, increase in hospital stay and costs. In addition, delay discharge increases cost, compromised patient safety, quality care and dissatisfaction of patient when patients are held longer than necessary. Thus, Identifying non-clinical factors for delayed discharge of patients from PACU increases understanding of PACU activities and help to design initiatives aimed at improving cares provided in the PACU.

3. Objective

3.1. General objective

To determine the magnitude and to identify the factors that leads to delay discharge from the post anesthesia care unit.

3.2. Specific objective

To determine the magnitude of delayed discharge from PACU.

To identify the non-clinical factors contributed for delayed discharge from PACU.

4. Methods

4.1. Study design and setting

This prospective observational study was conducted as part of our continuing quality improvement program in our comprehensive and specialized referral hospital from April 1, 2022 to June 5, 2022. The main operating room suite has eight operating rooms attached to a 10 bedded PACU.

After operation, patients pass through the PACU and some patients are sent directly to pediatric or adult surgical intensive care units. All patients bypassing the PACU were excluded. Patients operated in the surgical day care unit and obstetric suites were also excluded because these areas have their own PACU.

Our PACU is staffed around the clock. The nurse to patient ratio varies from 1: 3 to 1: 5, depending on staffing, patient condition and load. Assigned anesthetist is available in the PACU at all times. We routinely use Aldrete Scoring System for discharging patients from our unit. Patients are assessed every 15 min and kept in recovery until the score is equal to or greater than 9. After stabilization in the PACU, patients are discharged either to special care units or to the ward depending upon their status.

Majority of elective surgical patients had a dedicated bed prior to surgery. However, sometimes, patients underwent surgery without a dedicated bed before operation and will stay in the post-anesthesia care unit until a free bed is available in the ward. In our setting, all emergency patients underwent surgical interventions without a dedicated bed prior to operation and therefore, will stay in the PACU until a free bed is available. In our practice, the bed manager identifies and determines the number of free available beds before calling patients who are not admitted in the hospital prior to operation.

This research was registered in research registry with unique identifying number of researchregistry8192 and was reported in accordance with STROCSS 2021 checklist [12].

4.2. Study population

All patients who were transferred from operating theatres to the post anesthesia care unit after completion of surgery were study population.

4.3. Sample population

All patients transferred to the post-anesthesia care unit from operation theatres immediately after elective or emergency procedures were consecutively sampled and included in this study. A total of 307 patients admitted in the post anesthesia care unit who fulfilled the discharging score were sample of the study.

4.4. Data collection procedure and analysis

Structured questionnaire was prepared. Data were collected by a trained collector. The data were checked, coded, entered, and cleaned using SPSS version 20. Descriptive analysis was performed. Results were expressed in frequencies and percentage.

All the data were collected using modified Aldrete Score data collection formats and directly changed into question forms with two integral checking components, “Yes”, and “No” (Table 1).

The non-clinical factors for the delay such as: bed availability, ward staff readiness, transport availability, awaiting review (waiting for physician orders), cleaner availability, meal breaks, and unavailability of porter were identified and recorded in the questionnaire (Table 2).

5. Results

During the data collection period, 307 patients were admitted in the post anesthesia care unit. Data were collected from all of 307 patients with a response rate of 100%. More than half of patients, 182(59.3%), were males. The median age of the patients was 33.8 years. More than half, 57.7%, procedures were elective cases. Fifty six percent of procedures were performed under general anesthesia where as only 0.7% procedures were done under sedation. Only 1.6% of patients had

Table 1
Aldrete scoring system for discharging patients from the post anesthesia care unit.

Discharge criteria	Score	
Activity: Able to move voluntarily or on command		
Four extremities	2	
Two extremities	1	
Zero extremities	0	
Respiration		
Able to deep breath and cough freely	2	
Dyspnea, shallow or limited breathing	1	
Apneic	0	
Circulation		
Blood pressure ± 20% of pre-anesthetic level	2	
Blood pressure ± 20–50% pre-anesthetic level	1	
Blood pressure ± 50% of pre-anesthetic level	0	
Consciousness		
Fully awake	2	
Arousable on calling	1	
Not responding	0	
O2 saturation		
Able to maintain O2 saturation >92% on room air	2	
Needs O2 inhalation to maintain O2 saturation >90%	1	
O2 saturation <90% even with O2 supplementation	0	
A score 9 or 10 was required for discharge	**Total score:**	___.
	Yes	No
Delayed discharge		
Total		

Table 2
Non-clinical contributing factors for delayed discharge from the post anesthesia care unit at a comprehensive specialized referral hospital in Ethiopia, (N = 307), 2022.

1. Ward nurse busy/not available to accept patient
2. Unavailability of beds in the respective ward
3. Waiting for physician orders
4. Lack of available hospital patient transport
5. Meal break
6. Unavailability of porter
7. Room not ready/clean
8. Discharge appropriately

received combined regional block and general anesthesia. Majority of patients, 82.7%, were ASA class I where as only 2.9% of patients were ASA class III (Table 3).

Majority of patients, 188 (61.2%), had prolonged length of stay (LOS) in the PACU because of non-clinical factors. Only one hundred nineteen (38.8%) patients were discharged appropriately after fulfilling the aldrete discharge score (Table 4).

The reasons for delayed discharge due to non-clinical reasons were identified and documented during the study period. The first most common reason in which the majority of patients, 69 (22.5), had prolonged length of stay in the post anesthesia care unit was due to unavailability of beds in their respective ward. The second most common documented factor in which 34 (11.1%) patients had prolonged length of stay documented reason for delayed discharge was lack of available hospital patient transport. Only 3.9% of patients were discharged lately from the post anesthesia care unit due to meal break (Table 5).

Table 3
Socio-demographic characteristics of patients at a post anesthesia care unit of a Comprehensive specialized referral hospital in Ethiopia, (N = 307), 2022.

Characteristics	Frequency	Percentage (%)
Gender		
Female	125	40.7
Male	182	59.3
Age (year)		
0–14	85	27.7
15–65	141	45.9
>65	81	26.4
Type of surgery		
Elective	177	57.7
Emergency	130	42.3
Type of anesthesia		
Sedation	2	0.7
Spinal anesthesia	128	41.7
General anesthesia	172	56.0
Combined	5	1.6
ASA		
I	254	82.7
II	44	14.3
III	9	2.9

6. Discussion

The post anesthesia care unit a clinical area where intensive monitoring and care is provided for the patients after operation until they can safely be discharged to a general ward or home in an awake and stable condition, or transferred to a special care unit or intensive care unit (ICU) if further close monitoring and care is necessary [8]. However, significant proportion of patients after operation had unplanned prolonged length of stay which leads to increased health care cost and dissatisfaction. This study aimed at determining the magnitude of prolonged length of stay due to non-clinical reasons.

In our study, majority of patients, 61.8%, had prolonged length of stay in the post anesthesia care unit. This proportion was lower than a report by a prospective observational study conducted in 2017, in which 76% of patients had delayed discharge from the PACU due to non-clinical reasons [3].

The set of factors affecting the PACU delay discharge identified in this study is similar to some of the factors documented by the previous studies such as: unavailability of a porter for transportation, unavailability of PACU nurses, and unavailability of beds [13,14].

Delayed discharge from PACU to the clinical areas is indeed a significant occurrence in our hospital. The highest incidence of delay discharge, (22.5%, n = 69), in our setup was because of unavailability of bed in the respective ward. A similar study also documented that 20% of delayed discharge from PACU were attributed to unavailability of beds [3]. Another prospective observational study in a tertiary care hospital in Karachi, Pakistan, 264 cases (23.7%) experienced prolonged stay because of unavailability of special care beds [8].

Another determining factor contributing to 3.6% discharge delays to the clinical areas in our setup was due to lack of unavailability of a porter for transportation. To enhance discharge planning in the clinical areas, patients' and their significant others must be informed regarding the expected discharge time, in conjunction with the hospital's patient information booklet. Other members of the multidisciplinary team (eg, pharmacy, physiotherapists, and physicians) should also be made aware of the hospital discharge time.

Studies support the role of discharge planning in clinical areas which facilitates patients' discharge and thus allows the surgical patient to be transferred from PACU to the clinical areas more efficiently [1,6,7].

One common non-clinical reason for delay discharge of patients from PACU to clinical areas of the hospital was by the receiving nurse who was unable to accept the transfer of patients from PACU, either because of workloads, absence of the nurse during meal break. This system fault is indeed a universal problem. The proportion of delay discharge due to

Table 4
Proportion of delayed discharge from the post anesthesia care unit at a comprehensive specialized referral hospital in Ethiopia, (N = 307), 2022.

Delayed discharge	Frequency (n)	Percentage (%)
No	119	38.8
Yes	188	61.2
Total	307	100.0

Table 5
Non-clinical contributing factors for delayed discharge from PACU at a comprehensive specialized referral hospital in Ethiopia, (N = 307), 2022.

Non-clinical factors	Frequency (n)	Percentage (%)
Ward nurse busy/not available to accept patient	22	7.2
Unavailability of beds in the respective ward	69	22.5
Waiting for physician orders	23	7.5
Lack of available hospital patient transport	34	11.1
Meal break	12	3.9
Unavailability of porter	11	3.6
Room not ready/clean	19	6.2
Discharge appropriately	117	38.1
Total	307	100.0

nurse unavailability or busy was 7.2% and 3.9% of delay discharge was due to meal break time. In line with our study result, a similar study revealed that a delay in discharge due to the receiving nurse unable to accept the transfer of patients from PACU and during meal breaks was 7.3% and 2.9% respectively [3].

Discharge delay of patients from clinical areas is indeed a long-standing and common problem. The ability to identify barriers to a timely discharge may potentially impact and improve the delivery of effective patient care, thereby improving patient flow within the department [15]. The standard protocol will be achieved by addressing the modifiable variables that affect delay discharge from the PACU, an improvement in the delay of patients in the PACU may be expected and this may translated to reduced cost for the patient and the hospital.

7. Strength and limitation of the study

This study determined the magnitude of delay discharge of patients from PACU due to non-clinical reasons. However, we did not identify the clinical causes of delay discharge and its impact on health care related cost.

8. Conclusion and recommendations

Non-clinical related delays contributed for a considerable extension of a patient's time in PACU. Discharge delays for non-medical reasons put patients at unnecessary risk for hospital-acquired infections, lead to loss of revenue for hospitals and reduce hospital capacity to treat other patients.

Understanding and addressing the causes of delayed discharge in PACU may help to improve patient flow and reduce discharge times. We recommend future researchers to include cost associated with these delays and assess the effectiveness of interventions introduced to eliminate such delays.

Ethical approval

The study was approved by the Ethical Committee of institution.

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Author contributions

Admass BA, Tawye HY, BY Ego and Ahmed SA developed key questions, analyzed the results of the study, prepared and revised the manuscript. All authors approved the final manuscript for publication.

Registration of research studies

Name of the registry: research registry

Unique Identifying number or registration ID: researchregistry8192. Hyperlink to your specific registration (must be publicly accessible and will be checked): https://www.researchregistry.com/browse-the-registry#home/

Guarantor

Biruk Adie Admass, Hailu Yimer Tawye, Berhanu Yilma Ego and Seid Adem Ahmed are all responsible for this work.

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Consent

Personal identifiers in the manuscript and during data collection period were not included. So, consent for publication not applicable.

Declaration of competing interest

No conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2022.104680.

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