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EVALUATION OF RISK FACTORS FOR PROLONGED STAY IN POST ANESTHESIA CARE UNIT (PACU)

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Abstract

Background

The Post Anesthesia Care Units in the hospital are specific areas in which patients are temporarily monitored after their surgery has been completed, they recover from the effects of anaesthesia. It provides critical care, including pain management and vital sign monitoring, until patients are stable and meet the discharge criteria (Aldrete Score).

Materials and methods

Descriptive observational study was conducted at the University of Lahore Teaching Hospital. Non-Probability ,purposive sampling technique was used for the study. A standardized questionnaire was used to collect the data. Patients who had to stay in PACU > 2 hours were included in this study. While the patients admitted in OPDs and those who did not consent to be involved in the research were excluded. The study duration was four months after the approval from departmental research committee. The sample size was 156.

Objective

To find out the clinical and non clinical factors associated with prolonged PACU stay.

Results

One hundred fifty six patients (156) stayed post-operatively in Post Anesthesia Care Units of the hospital. Hemodynamic instability (Hypotension/Tachycardia and hypertension) and respiratory events were strongly associated with prolonged PACU Stay. While the neurological and surgical effects had low impact on PACU stay as compared to cardiovascular effects. Post-op pain management had minimal impact on the PACU stay. While the non clinical factors had microscopic contribution to prolonged stay in PACU.

Conclusion

This four-month study of 156 cases depicted that clinical factors were the major contributors that caused prolong PACU stay, among them the most prevalent elements were postoperative hemodynamic instability, followed by airway events and pain requiring management. While the neurological deficits and surgical variables were also present but their occurrence was minimal. Non clinical factors were rare in our population.

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INTRODUCTION

The Post-Anesthesia Care Units were debuted with the single goal of minimizing post-operative complications. It is a dedicated space where care is centralized and managed by anaesthetists and specially trained nursing staff, all professionals in recognizing and navigating the immediate physiological changes following anesthesia and surgery. (Ahmed et al,. 2022)

The length of stay (LOS) in PACUs is considered as a clinical benchmark and usually 2 hours are considered as standard time because there have been number of researches that have shown that patients achieve a acceptable discharge score during the initial 2 hours of post-operative phase in majority of cases. Ahmed et al in an observational study mentioned risk factors for prolonged LOS in PACU which included non clinical factors such as umavailibility of ward beds and lack of patient transport age.

Post-Anesthesia Care Units (PACUs) are a significant part of routine anesthesia practice, especially in first world countries. Their primary function is to ensure the safe recovery of patients following surgical or interventional procedures performed under anesthesia. PACUs provide a setting for structured clinical oversight and continuous monitoring, allowing for the early and quick recognition and treatment of discomfort and complications. . (Zollinger et al,. 2014)

Surgical patients are particularly prone to complications in the immediate period following surgery. These exclusive areas offer a setting with a high nurse-to-patient ratio, allowing for continuous monitoring until the patient achieves a satisfactory level of physiological stability to be safely transferred to a hospital ward. Their location near operating and anesthesia areas also ensures that any early signs of clinical deterioration can be addressed promptly. (Marhoon et al,. 2022)

Samad et al in their research indicated that the significant reasons for increased length of stay in PACU involve the necessity for post-operative monitoring, lack of special care beds, pain management, delayed recovery from residual anesthesia and unanticipated post-operative ventilation. Given these considerations there is a critical need to characterize the clinical and non clinical factors that are responsible for prolonging PACU stay, which do not only increase the chance of developing hospital acquired diseases and infections but also increase the healthcare associated costs in management of patients. The main objective of this study is to recognize the clinical and non-clinical variables that increase the length of stay in post anesthesia care unit.

Materials and methods

We organized a descriptive observational study at the University of Lahore Teaching Hospital. Participants were recruited through non-probability; purposeful sampling over a period of four months following approval of the study synopsis. The inclusion criteria encompassed adult patients who had elective surgeries under general or spinal anesthesia, stayed post-operatively in post anesthesia care unit for more than 2 hours. Exclusion criteria included OPD and ED cases and those who did not consent to be part of the study. Only those patients were included in the study in who fulfilled the eligibility criteria and provided informed consent. We collected the data of patients having surgical procedures June 2025 to October 2025.

Data collection was performed using a structured, pre-tested questionnaire designed to note the factors that contributed to prolonged PACU stay. Data was analyzed using SPSS software. Descriptive statistics were employed to summarize patient characteristics and clinical factors, presented as frequencies and percentages. results were interpreted in the context of relevant clinical and demographic factors

Literature Review

In 2022, Ahmed et al. conducted a prospective observational study at Yanet General Hospital in Addis Ababa, Ethiopia to evaluate the non-clinical variables leading to increased length of stay in post-anesthesia care units. The study, spanning from March 1 to July 25, 2022, included 307 participants with a 100% response rate. Patients were deemed ready for discharge based on achieving a satisfactory Aldrete score (9 or 10). Results showed that 188 patients (61.2%) had prolonged PACU stays due to non-clinical factors. The primary reason for delay was the absence of beds in the respective ward (22.5%, n=69), then the unavailability of patient transport (11.1%, n=34). Other contributing factors included ward nurse unavailability (7.2%), waiting for physician orders (7.5%), unprepared ward rooms (6.2%), unavailability of porters (3.6%), and meal breaks

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(3.9%). Only 38.8% of patients were discharged from PACU after meeting the Aldrete discharge criteria. The study highlighted that non-clinical delays significantly extend PACU stays, significantly increasing the healthcare associated costs and patient frustration, and increasing the risk of nosocomial infections. Compared to a 2017 study reporting a 76% delay rate, this study found a lessened but still significant proportion of delays. The authors suggest addressing these non-clinical barriers through improved discharge planning and coordination to streamline the patient flow and care optimization. (Ahmed et al., 2022)

In 2023, Duan et al. conducted a large retrospective cohort study at Lu'an Civil Hospital and Shanghai Jiahui hospital, analyzing 38,796 patients who had undergone general anaesthesia from 2016 to 2021 to recognize the risk factors which increase the length of stay in PACU and therefore delaying the patient recovery, explained as a stay exceeding 2 hours. Of the 44,767 initially identified patients, 38,796 were included after applying exclusion criteria (e.g. ASA grade ≥IV, no extubation).

The study outlined a delayed recovery incidence of 1.38%. Using a generalized model, most contributing risk factors included old age, neurosurgery, long anesthesia duration, ASA grade III, antibiotic use during surgery, and use of analgesics postoperatively. A nomogram was developed, showing old age and neurosurgery as the topmost contributors. Internal and external validations confirmed good discrimination (C-index 0.78 and 0.70, respectively) and calibration. Post hoc analysis indicated a positive correlation between age and recovery time after 26.5 years. The study highlights the need for enhanced recovery protocols, particularly for elderly neurosurgery patients, and notes drug consumption (e.g antibiotics, opioids) as minor but still noteworthy contributors to increased length of stay in PACU. (Duan et al., 2023)

Results

In our study, 3516 surgical procedures were performed in which 156 (4.44%) patients had prolonged stays in PACU. 33 (21.2%) of these stays happened due to high risked surgical procedures, 83 (53.2%) due to intermediate risked surgical procedures and 40 (25.6%) due to low risked surgical procedures. With regard to comorbidities, 19 (12.2%) occurred in ASA 1, 75 (48.2%) in ASA 2, 56 (35.9%) in ASA 3 and 6 (3.8%) in ASA 4 cases. The distribution of the cases among different specialities were as follow; 44 (28.2%) general surgery, 33 (21.2%) orthopaedics, 32 (20.5%) gynaecological, 23 (14.7%) urology, 17 (10.9%) ENT, 7 (4.5%) Plastics. Out of 156, 70 (44.9%) prolonged stays happened after General Anesthesia, 73 (46.8%) after Spinal Anesthesia, 13 (8.3%) after Epidural Anesthesia. There were 48 (30.8%) airway/respiratory adverse events. 75 (48.1%) had postoperative hypotension/ tachycardia, 38 (24.4%) had hypertension while 4 (2.6%) had chest pain which resulted in prolonged PACU stay. Out of these adverse events, 83 (53.2%) occurred in intermediate risk surgeries and 32 (21.2 %) in high risk surgeries. The distribution of adverse events in different ASA classes is mentioned in graph 2. 70 (44.9%) events occurred in patients having General Anesthesia and 73 (46.8%) in regional anesthesia. All respiratory events occurred in patients having General Anesthesia. Bleeding occurred in gynaecological cases. 44 (28.2%) had prolonged stay due to postoperative pain requiring management. Furthermore, there were 8 patients who had increased LOS in PACU was due to non-clinical variables. Among those, 2 (1.3%) had to stay due to unavailibility of ward nurse and 6 (3.8%) were waiting for surgeon's order.

1: Age & Gender Stats

Age Group	**Male** *(f)*	**Male** (%)	**Female** *(f)*	**Female** *(%)*	**Total** *(f)*	**Total** (%)
18-40 years	32	40.5%	30	39.0%	62	39.7%

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41-60 years	24	30.4%	18	23.4%	42	26.9%
More than 60	23	29.1%	29	37.7%	52	33.3%
Total	79	51.3%	77	48.7%	156	100%

The table shows the age and gender distribution of 156 participants (51.3% male, 48.7% female). The 18–40 age group is the largest (39.7%) and male-dominated, the 41–60 group is (26.9%), and those over 60 (33.3%) are predominantly female. Younger participants tend to be male, while the oldest group is mostly female.

2: ASA Physical Status

ASA Grading	Frequency (f)	Percentage%
ASA-I	19	12.2%
ASA-II	75	48.1%
ASA-III	56	35.9%
ASA-IV	6	3.8%
Total	156	100%

The table shows the ASA physical status classification of 156 patients: 12.2% were ASA-I (healthy), 48.1% ASA-II (mild disease), 35.9% ASA-III (severe disease), and 3.8% ASA-IV (life-threatening disease). The majority (84%) had at least mild systemic disease (ASA-II or higher).

3: Postoperative Cardiovascular Effects

Cardiovascular Effects	Frequency (f)	Percentage%
Hypotension/Tachycardia	75	48.1%
Hypertension	38	24.4%
Chest Pain	4	2.6%
None	39	25.0%
Total	156	100%

The table shows cardiovascular effects in 156 patients: 48.1% experienced hypotension/tachycardia, 24.4% had hypertension, 2.6% reported chest pain, and 25.0% had no cardiovascular effects. Overall, 75% of patients exhibited some form of cardiovascular response.

4: Postoperative Respiratory Effects

Respiratory Events	Frequency (f)	Percentage%
Yes	48	30.8%
No	108	69.2%
Total	156	100%

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The table shows respiratory events in 156 patients: 30.8% experienced respiratory complications, while 69.2% had no respiratory events.

5: Surgical Reasons

Surgical Reasons	Frequency (*f*)	Percentage%
None	149	95.5%
Bleeding/needed transfusion	5	3.2%
Surgical Site Infection	2	1.3%
Total	156	100%

The table shows surgical complications in 156 patients: 95.5% had no surgical issues, 3.2% required transfusion due to bleeding, and 1.3% developed surgical site infection. Overall, 4.5% experienced surgical complications.

Discussion

In our study, we found the incidence of prolonged PACU stays as 4.44%. 33.3% of the patients were aged more than 60 years, 35.3% of the patients had ASA-III physical status, surgery types ranged from general being 28.2%, orthopedic being 21.2%, gynaecological being 19.9%. Spinal anesthesia among 46.2% /General anesthesia among 45.5%of the cohort, 27.6% of the patients required pain management, neurological deficits were minimal involving confusion/restlessness at 5.1% and delayed emergence at 1.3%, Hemodynamic instabilities among 54.5%, 70.5% had no airway event, surgical complications were very little at 4.5%. In 2024, Kayal et al. Organized a retrospective cohort study of 16090 patients from 2019 to 2021 at Al-Salama hospital, Jeddah, Saudi Arabia. They highlighted variables responsible for prolonged stay in PACU: more than two hours in 181 cases (1.19%), deviated neurological state involved drowsiness from anesthesia or medications, and pain, but no connections were associated with patient's age, sex, BMI, preoperative comorbidities, surgical specialty, overall duration of surgery, complications during surgery or exposure to anesthesia and its types, although 93.37% of the patients had undergone general anesthesia and among surgical specialty, general and orthopedic surgeries took the top spot.

Recommendation

Need for further prospective studies that include a larger sample size.

The study area should be broadened to all tertiary care hospitals across Lahore so that results could be generalized to the population.

Limitations

The duration of the study was only 4 months to point out the prevalence.

The data was from one hospital which also limit its scope.

Conclusion

In conclusion, this study identified key clinical factors prolonging PACU stays like cardiovascular instability (most common), respiratory events, neurological issues, and postoperative pain. Non-clinical delays were minimal compared to other cohorts, reflecting efficient management. Findings highlight the need for vigilant monitoring and rapid response to hemodynamic and airway instability. Predictive tools may further improve risk stratification and resource allocation, especially for geriatric and patients with co-morbidities.

Ethical Considerations

The research was conducted in strict adherence to the rules and regulations set by the Ethical Committee of the University of Lahore, ensuring that the rights and welfare of all research participants were respected.

Conflicts of Interest

None

Financial Support and Sponsorship

None

Disclosure

An AI tool was used for the purpose of refining the

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format and improving the grammatical structure of the paragraphs.

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