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Analysis of Elective Surgical Cancellations Due to ICU Bed Unavailability

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Abstract

Background: The cancellation of non-urgent surgical procedures due to the unavailability of Intensive Care Unit (ICU) beds remains a prominent issue that affects the healthcare system This study aims to investigate the extent of cancellations of non-urgent surgical procedures due to the unavailability of Intensive Care Unit (ICU) beds and to examine the associated clinical and operational implications for anesthesia and intensive care.

Methods: The retrospective study at the Military Instruction Hospital Mohammed V investigated non-urgent surgical cancellations due to ICU bed unavailability from March 2021 to April 2022. Inclusive criteria covered all non-urgent surgeries, excluding emergencies and patients under 18 with incomplete records. Data collection included patient demographics, clinical details, and ICU bed documentation. Trained personnel ensured consistency and confidentiality during data extraction. Statistical analyses, featuring descriptive statistics and logistic regression, assessed cancellation impacts on various patient populations and specialties. Thematic analysis provided insights into challenges associated with surgical scheduling and resource allocation, suggesting potential strategies for optimizing ICU capacity management,

Results: The study at Military Instruction Hospital Mohammed V in Rabat investigated 3023 scheduled surgeries from March 2021 to April 2022. Of these, 78 surgeries were canceled due to insufficient ICU beds, indicating a 2.5% prevalence. The median age of canceled surgery patients was 64, with a slight female predominance (56.4%). High-risk procedures constituted 52.5% of cancellations. Orthopedic surgeries had the highest cancellation rate (29.49%), followed by visceral (24.36%) and neurosurgery (19.23%). Gynecological surgeries exhibited a lower cancellation rate (7.69%). Variations across specialties suggest influences from procedure complexity or preoperative factors.

Conclusion: The study underscores the ongoing challenge of managing high-risk surgical patients in intensive care units in developed countries, emphasizing the complex interplay of pre-, intra-, and postoperative variables affecting patient outcomes. Concerns arise regarding the lack of effective triage systems, leading to potential underutilization or overutilization of intensive care resources. The findings stress the necessity for a more targeted approach to optimize care for vulnerable patients, highlighting the importance of further research to leverage available perioperative data for improved post-surgical management.

Keywords: Cancellation; Elective surgery; Postoperative Admission; Unavailability; ICU beds

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Introduction

Surgical interventions require a coordinated effort from various medical professionals and resources, spanning the preoperative, intraoperative, and postoperative phases. The availability of these resources is crucial, especially for surgeries that may necessitate postoperative Intensive Care Unit (ICU) admission. However, the cancellation of scheduled surgeries due to a lack of ICU beds poses a significant challenge in modern healthcare systems.

This issue has far-reaching implications, including increased healthcare costs, compromised patient outcomes, and disruptions to surgical scheduling. Existing literature, including Poeran's study [1] on surgical cancellations in New York during the COVID-19 pandemic, highlights a substantial link between cancellations and ICU bed availability. Sahraoui [2] have also explored late cancellations of elective surgeries, proposing solutions using constraint theory and emphasizing the role of capacity management in addressing bed crises.

This article aims to comprehensively investigate the cancellation of non-urgent surgeries due to ICU bed unavailability. Building upon previous studies, our objective is to quantify the frequency of cancellations, identify associated factors, and evaluate the direct impact on patients and healthcare structures. Through this exploration, we seek to contribute valuable insights into the challenges posed by the unavailability of ICU beds in the context of elective surgeries.

Methods

Study Design: This retrospective study focuses on the cancellation of non-urgent surgical procedures due to the unavailability of Intensive Care Unit (ICU) beds at the Surgical Block of the Mohammed V Military Teaching Hospital in Rabat. The method involves collecting and analyzing historical data from medical records and surgical databases over a one-year period from March 2021 to April 2022. The study protocol was approved by the Local Hospital Ethics and conducted according to the Declaration of Helsinki

Data Collection: Inclusion and exclusion criteria are clearly outlined. All non-urgent surgical interventions within the specified period at the Surgical Block were included, excluding urgent cases, patients under 18, and those with incomplete records. The data variables encompass patient demographics, clinical details, surgical severity, and documentation of ICU bed unavailability leading to cancellations.

Data Collection Process: Trained research personnel ensured consistency and accuracy during data extraction from electronic medical records and surgical databases. An exploitation form was utilized, emphasizing the secure handling of depersonalized data to maintain patient confidentiality.

Data Analysis: Descriptive statistical analysis summarized the collected data. Frequencies and percentages were calculated to discern the frequency of cancellations and reasons for ICU bed unavailability. Subgroup analyses were conducted to explore the impact on different patient populations and surgical specialties. This chapter serves as a foundation for the subsequent investigation into the dynamics of non-urgent surgical cancellations in relation to ICU bed availability.

Results

The overall prevalence of cancellations due to the unavailability of Intensive Care Unit (ICU) beds was 2.5% among the 3023 scheduled patients from March 2021 to April 2022, underscoring its impact on various demographic aspects, procedural complexities, and surgical specialties.

The median age of patients whose surgeries were canceled due to a lack of ICU bedswas 64 years, indicating a generally older population. This cancellation trend affected more females (56.4%) than males (43.6%), revealing a slight female predominance with a sex ratio (F/M) of 1.3. Regarding the ASA Physical Status classification, 68.7% of the canceled surgery patients were classified as ASA I or II, indicating better overall health. Meanwhile, 28.5% were ASA III (indicating moderate health), and 2.8% were ASA IV or V (indicating impaired overall health). The severity of the canceled interventions varied, with 3.5% categorized as minor, 10.6% as intermediate, 33.5% as major, and 52.5% deemed high-risk procedures.

Table 1: Comparison of Patient Characteristics in 2 Distinct Groups Based on Postoperative ICU Admission.

Patient Characteristics	Previously Canceled due to Lack of ICU Beds (N=78)	Not Canceled due to Lack of ICU Beds (N=176)
N	78	176
Age (Median [IQR])	64 [54–74]	63 [54–74]
Gender = Male (%)	43.6% (34)	43.75% (77)
ASA Physical Status (%)		
I or II	68.7% (53)	67.04% (118)
III	28.5% (22)	28.4% (50)
IV or V	2.8% (3)	4.5% (8)
Severity of Intervention (%)		
Minor	3.8% (3)	3.5% (6)
Intermediate	10.25% (8)	10.6% (19)
Major	33.3% (26)	33.5% (59)
High risk	52.5% (41)	52.5% (92)
Specialty (%)		
Abdominqll Surgery	24.36% (19)	25% (44)
Gynecology	7.69% (6)	7.38% (13)
Neurosurgery	19.23% (15)	19.31% (34)
Orthopedic Surgery	29.49% (23)	29.54% (52)
Thoracic Surgery	3.85% (3)	3.40% (6)
Urology	8.97% (7)	9.09% (16)
Other Specialty	6.41% (5)	6.25% (11)

Table 2: Prevalence of Planned ICU Admission in Post operative Elective Surgery.

Authors	Country	Year	Scheduled Surgeries	Admitted Intensive Care Unit	Percentage
Bhat [3]	India	2006	13,170	204	1.54%
Ejiro [4]	Nigeria	2012	7,724	257	3.30%
Patel [5]	India	2014	5,284	238	4.50%
Our Study	Morocco	2023	3,023	176	5.80%

These cancellations had a notable impact on diverse surgical specialties. Orthopedic Surgery was the most affected, constituting 29.49% of cancellations, possibly due to the complexity of certain orthopedic interventions or specific preoperative factors. Abdominal Surgery recorded a significant proportion of 24.36%, indicating possible underlying medical conditions in patients. Neurosurgery was impacted at 19.23%, highlighting the delicate nature of these interventions. Conversely, Gynecological Surgery had a relatively low cancellation rate of 7.69%, suggesting better planning or fewer preoperative complications. Specialties such as Urology, Thoracic surgery, and others displayed moderate cancellation rates, namely 8.97%, 3.85%, and 6.41%, respectively, suggesting effective case management or lower risk factors.

These results shed light on the significant repercussions of cancellations of non-urgent surgeries due to a lack of ICU beds, impacting diverse populations and specialties. This underscores the need for more targeted management to optimize care for vulnerable patients.

In the context of our study, it was crucial for us to understand whether patient characteristics differ between those whose surgery was canceled due to a lack of ICU beds and those who were admitted to the ICU after their procedure. This comparison can provide crucial insights for healthcare professionals and hospital planners to better manage ICU bed availability and optimize patient care. The following table presents a detailed analysis of patient characteristics in these two distinct groups, highlighting significant similarities and differences between them. This comparison will contribute to informing future decisions regarding surgical planning and medical resource management to ensure optimal patient care.

The table above presents the characteristics of two distinct groups of patients based on their postoperative ICU admission. Group 1 includes patients whose surgeries were canceled due to a lack of ICU beds, while Group 2 comprises those who were admitted to the ICU after their surgery.

Both groups of patients demonstrate every similar baseline characteristic, including age, gender, ASA status, severity of intervention, and surgical specialty. These similarities indicate that, from the perspective of patients' basic characteristics, there are no significant differences between patients whose surgeries were canceled due to a lack of ICU beds and those who were admitted to the ICU after their surgery. Other factors or criteria must beconsidered to understand the reasons for surgery cancellations and ICU admission.

Discussion

Incidence of Post-Operative Intensive Care Unit (ICU) Admissions

In the study involving 3023 scheduled surgeries, 176 patients were admitted to the ICU postoperatively, resulting in an incidence of 5.8%. This rate stands comparatively higher than those reported in studies conducted in India [3] and Nigeria [4]. drawing attention to the significant variability in postoperative ICU admissions across different regions. The study underscores the importance of comprehending and effectively managing the factors contributing to ICU admissions after surgery (Table 2).

This table provides information about different studies conducted in various countries, including the number of scheduled surgeries, the number admitted to postoperative intensive care, and the corresponding percentages. The data from "Our Study" pertains to Morocco in the year 2023.

Prevalence of Surgery Cancellations Due to Lack of ICU Beds

The study reveals a 2.5% cancellation rate, emphasizing the pivotal role of ICU bed availability in the successful execution of planned surgeries. To enhance comprehension, comparisons with existing literature, including the work of Dimitriadis [6], underscore the universal challenge healthcare institutions face in managing ICU bed availability for scheduled surgeries.

The findings of our study emphasizing the widespread nature of elective surgery cancellations due to a lack of available beds. Park commentary [7] urges a critical reevaluation of ICU resource allocation policies, aligning with the concerns raised in our study. The collective conclusions from these studies [6,8], coupled with our findings, underscore the intricate challenge of balancing elective surgeries and ICU bed availability. The prevalence of surgery cancellations due to ICU bed shortages serves as a poignant reminder of the need for comprehensive strategies to optimize resource allocation and minimize disruptions to planned surgical procedures.

Age and Gender Distribution of Cancelled Surgeries

Comparative analyses with studies [6,8] reveal similar age distributions, reinforcing the notion that age and gender may not exert a strong influence on elective surgery cancellations caused by shortages in ICU bed availability. This observation contributes to a deeper understanding of the dynamics surrounding surgery cancellations and their correlation with patient demographics amid challenges in ICU resource management

Surgical specialty: In our study, the distribution of patients admitted to the Intensive Care Unit (ICU) after scheduled surgeries varied by specialty, notably with a prevalence in general surgery (36.8%), neurosurgery (22.7%), and orthopedic and trauma procedures (14.1%) A comparison with a study by Uzmann in Turkey [9] revealed differences in specialty distribution, possibly influenced by hospital specificity and the nature of surgical interventions.

Factors such as surgery complexity and hospital resources, including the availability of ICU beds, played crucial roles in specialty-based variations in postoperative ICU admissions. Examining the situation in developing countries, particularly in Morocco highlights challenges related to ICU bed availability and elective surgery cancellations. Factors such as economic development, healthcare infrastructure, and available resources significantly impact the ability to provide adequate ICU services [10]. Despite progress in Morocco's healthcare system, challenges persist, especially in rural areas and for low-income

populations. External factors like pandemics, such as COVID-19, further strain healthcare systems and intensify the demand for ICU services.

Emphasizes the pivotal role of anesthetists and surgeons in addressing ICU bed shortages and reducing elective surgery cancellations. Strategies include preoperative patient selection, optimization of postoperative care pathways, efficient use of ICU resources, and early identification and management of complications. Collaboration between anesthetists and surgeons, along with a multidisciplinary approach, is essential for effective resource management and optimal patient care.

Exploring emerging techniques in anesthesia and surgery reveals promising avenues for reducing postoperative ICU admissions. Enhanced Recovery After Surgery (ERAS) protocols [11]., minimally invasive surgery [12] non-invasive ventilation,[13], telemedicine [14], patient-centered care, artificial intelligence,[15] and personalized medicine all contribute to optimizing patient outcomes and potentially decreasing the need for postoperative ICU admission.

The historical perspective on postoperative intensive care services illustrates the evolution of ICU utilization, driven by factors like population aging and increased surgical complexity. However, the demand for ICU beds has outpaced availability, especially for non-urgent surgeries, leading to significant implications for patient outcomes. The COVID-19 pandemic further exacerbated challenges in ICU resource allocation.

Conclusion

This study sheds light on the challenges associated with postoperative intensive care services, particularly in the context of ICU bed shortages and elective surgery cancellations. Collaborative efforts between anesthetists and surgeons, coupled with the integration of emerging techniques and evolving admission approaches, present promising avenues for improving resource utilization and patient outcomes. However, addressing these challenges requires ongoing research, policy considerations, and a commitment to multidisciplinary collaboration to ensure the delivery of targeted and high-quality care for vulnerable patient populations.

Author Statements

Ethical Approval

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

Author Contributions

Houda NADIR, Mouncef CHOUBHI, Wiam EL JELLOULI, Khalil ABOU ELALAA: Conception, patient enrolment, and interpretation. All authors contributed to literature review, final draft writing, and critical revision. All the authors have participated sufficiently in this work, take public responsibility for the content, and have made substantial contributions to this research.

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