Journal of Surgery
Mohtashami A, et al. J Surg 9: 11149
www.doi.org/10.29011/2575-9760.11149
www.gavinpublishers.com
Research Article

Acute Surgical Unit Emerging from COVID Pandemic: Rural Australian Hospital's Response to Resource Reallocation

Ali Mohtashami[1,2*], Sally Butchers[1], Sue Velovski[1]

[1]Lismore Base Hospital, NSW, Australia

[2]Royal North Shore Hospital, Sydney, NSW, Australia

[*]**Corresponding author:** Ali Mohtashami, Department of Colorectal Department, Royal North Shore Hospital, St Leonards, NSW 2065, Australia

Citation: Mohtashami A, Butchers S, Velovski S (2024) Acute Surgical Unit Emerging from COVID Pandemic: Rural Australian Hospital's Response to Resource Reallocation. J Surg 9: 11149 DOI: 10.29011/2575-9760.11149

Received Date: 23 September2024; **Accepted Date:** 02 October2024; **Published Date:** 04 October 024

Abstract

Aim: We compared the management of surgical patients before and after introducing an Acute Surgical Unit (ASU) model within our General Surgical unit during the COVID-19 pandemic. We hypothesized that utilizing an ASU model of care would correlate with improved patient outcomes and more efficient resource allocation during the pandemic.

Methods: This is a retrospective study of medical records for surgical patients presenting to Lismore Base Hospital, NSW, Australia, during the imposed COVID restrictions in 2020, three months before and three months after the introduction of the ASU within our surgical department. Time to diagnosis, surgical intervention timing, admission duration, and complication rates were analyzed.

Results: 624 patients were included in the study (345 pre-ASU, 279 post-ASU). After the introduction of the ASU, a higher proportion of patients had their operations commenced before 13:00 hrs (25.5% pre-ASU vs. 59.4% post-ASU; $P < 0.001$). After-hours operating significantly reduced (15% pre-ASU vs. 3% post-ASU). The median time to definitive procedure was reduced (25.5 hrs vs. 19 hrs; $P < 0.001$), and the average length of stay was shorter (3.0 days vs. 2.0 days).

Conclusion: The introduction of the ASU at Lismore Base Hospital significantly improved care and patient outcomes despite the COVID-19 restrictions. It facilitated early senior decision-making, with procedures having increased complexity and duration due to viral precautions being better managed during daytime hours. The ASU model led to more rapid diagnoses and earlier surgeries. Although more patients underwent definitive surgery upon admission, the hospital stay was nearly a day shorter. These improved efficiencies stem from the consultant-led model and a dedicated team available daily to assess and treat patients. Another enhancement in patient care was the rise in patients undergoing surgery during daylight hours. Recent studies have highlighted that operating outside daylight hours is linked to reduced speed, accuracy, and skill, contributing to potentially life-threatening errors [1-3].

Introduction

The COVID-19 pandemic has presented unprecedented challenges to healthcare systems worldwide, impacting all facets of medical care, including surgical services. As hospitals grappled with the surge in COVID-19 cases, resource allocation became a critical issue. The pandemic necessitated significant reallocation of resources to manage the influx of COVID-19 patients, leading to reduced availability of operating theatres, surgical staff, and essential medical supplies. These constraints posed substantial challenges for maintaining routine and elective surgical care, potentially affecting patient outcomes and operational efficiency. In this context, the Acute Surgical Unit (ASU) emerged as a pivotal model of care. The ASU is designed to provide focused, efficient management of acute surgical patients through a dedicated, consultant-led team. This model aims to streamline patient flow, optimize surgical scheduling, and enhance patient outcomes [4-6]. It is particularly relevant during crises like the COVID-19 pandemic, where the need for efficient resource use and timely decision-making is heightened. Before the pandemic, ASUs were well-established in Australia as effective units for managing acute surgical cases [7]. They were known for improving patient care by providing dedicated resources and streamlined processes. However, the impact of the ASU model during the COVID-19 pandemic, a period marked by exceptional resource constraints and operational pressures, remains underexplored. The introduction of the ASU model at Lismore Base Hospital during the height of the pandemic aimed to address these challenges by optimizing resource use and improving patient outcomes. The ASU was intended to mitigate the effects of the pandemic-induced restrictions on surgical care, ensuring that patients received timely and efficient treatment despite the broader healthcare system's constraints. This study seeks to evaluate the effectiveness of the ASU model in managing surgical patients during the pandemic. By comparing the pre- and post-ASU periods, we aim to assess the impact of the ASU on surgical outcomes, resource utilization, and overall efficiency. Understanding these effects is crucial for refining surgical care models in response to future crises and ensuring that healthcare systems can adapt effectively to routine and emergency demands.

Aim

The primary aim of this study was to evaluate the impact of implementing an Acute Surgical Unit (ASU) on the management of surgical patients during the COVID-19 pandemic. Specifically, we sought to:

1. **Assess Improvements in Patient Outcomes:** We compared surgical patient outcomes before and after the introduction of the ASU to determine whether the ASU model led to measurable improvements in patient care. Key outcome metrics included the time to diagnosis, timing of surgical intervention, and complication rates.

2. **Evaluate Resource Allocation Efficiency:** Given the resource constraints imposed by the COVID-19 pandemic, we aimed to investigate whether the ASU model facilitated more efficient use of available resources. This included examining changes in the timing of surgical procedures, particularly the reduction of after-hours surgeries, and assessing overall improvements in operational efficiency.

3. **Measure Time-Related Metrics:** The study aimed to quantify changes in critical time-related metrics, such as the median time to the definitive surgical procedure and the average length of hospital stay. These metrics are essential indicators of surgical management's efficiency and the impact on patient recovery times.

4. **Determine Impact on Surgical Scheduling:** Another objective was to evaluate whether the ASU model enabled more timely surgical interventions by increasing the proportion of surgeries performed during daylight hours. Operating during regular hours is associated with better outcomes, as it minimizes the effects of fatigue and resource scarcity on surgical performance.

5. **Understand the Role of Senior Decision-Making:** We aimed to explore how the ASU model, emphasizing senior consultant-led care, influenced decision-making processes and patient management. The hypothesis was that a dedicated, experienced team available throughout the day would enhance decision-making and improve patient outcomes.

By achieving these aims, the study sought to provide evidence of the effectiveness of the ASU model in enhancing surgical care during a period of significant operational challenges. The findings are intended to inform future practices and strategies for managing surgical services in routine and crises, ultimately contributing to more resilient and adaptable healthcare.

Methods

Study Design

This study employed a retrospective cohort design to evaluate the impact of the Acute Surgical Unit (ASU) on surgical patient management at Lismore Base Hospital during the COVID-19 pandemic. We analyzed patient records from two distinct periods: three months before the implementation of the ASU and three months following its introduction. This design allowed us to compare outcomes before and after the ASU model was adopted, providing insight into its effectiveness in a real-world setting.

Study Setting and Population

The study was conducted at Lismore Base Hospital, a rural

healthcare facility in Australia. The study population comprised surgical patients admitted to the hospital during the defined periods. We included all surgical patients who underwent definitive procedures during these times. Patients with incomplete records or those not treated by the ASU were excluded from the analysis.

Data Collection

We extracted data from electronic medical records for the identified patient cohort. Key variables collected included:

- **Time to Diagnosis:** The duration from patient presentation to establishing a definitive diagnosis.
- **Timing of Surgical Intervention:** The time at which surgery was initiated, categorized into pre-13:00 hours and after-hours.
- **Duration of Admission:** The length of hospital stay from admission to discharge.
- **Complication Rates:** The incidence of post-surgical complications, including infections, wound dehiscence, and other relevant adverse events.
- **Data Analysis:** Descriptive statistics were used to summarize patient demographics and clinical characteristics. We compared the following outcomes between the pre-ASU and post-ASU periods:
- **Proportion of Operations Commenced Before 13:00 Hours:** This metric assesses the impact of the ASU on the timing of surgical interventions.
- **Reduction in After-Hours Operations:** We analyzed the decrease in the proportion of surgeries performed outside regular hours.
- **Median Time to Definitive Procedure:** We calculated the median time from patient presentation to the start of the definitive surgical procedure.
- **Average Length of Stay:** We compared the average duration of hospital stay between the two periods.
- **Complication Rates:** We assessed any differences in post-surgical complications.

Statistical analyses were performed using appropriate tests to determine the significance of observed differences. Continuous variables were compared using the Mann-Whitney U test, while categorical variables were analyzed with Chi-square tests. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted per ethical standards, and approval was obtained from the hospital's research ethics committee. All data were anonymized before analysis to maintain patient confidentiality.

Limitations

We acknowledge potential limitations in our study, including the retrospective design, which may be subject to biases inherent in historical data. Additionally, as this was a single-center study, the findings may not be generalizable to other settings.

Results

Study Population

A total of 624 surgical patients were included in the study. Of these, 345 patients were treated in the three months before the introduction of the Acute Surgical Unit (ASU), and 279 patients were treated in the three months following its implementation.

Timing of Surgical Procedures

- **Proportion of Operations Commenced Before 13:00 Hours**

Post-ASU implementation, significantly more surgeries were commenced before 13:00 hours. Specifically, 59.4% of operations started before 13:00 hours after the ASU was introduced, compared to 25.5% in the pre-ASU period ($P < 0.001$). This shift indicates improved scheduling efficiency and suggests that the ASU model facilitated more timely surgical interventions during regular hours.

- **Reduction in After-Hours Operations**

The proportion of surgeries performed after-hours decreased significantly after the introduction of the ASU. Before the ASU, 15% of surgeries were conducted outside regular hours. This figure dropped to 3% following the ASU implementation ($P < 0.001$). The reduction in after-hours procedures is a notable outcome, reflecting the ASU's success in optimizing operating room availability and reducing the reliance on out-of-hours surgical care.

Time to Diagnosis and Surgical Intervention

- **Median Time to Definitive Procedure**

The median time from patient presentation to the initiation of the definitive surgical procedure decreased significantly after the ASU was introduced. In the pre-ASU period, the median time was 25.5 hours, which was reduced to 19 hours post-ASU ($P < 0.001$). This reduction demonstrates the ASU's effectiveness in accelerating the diagnostic and surgical processes, likely due to more efficient management and streamlined decision-making.

Length of Hospital Stay

- **Average Length of Stay**

There was a significant reduction in the average length of hospital

stay after the ASU was implemented. The average length of stay decreased from 3.0 days in the pre-ASU period to 2.0 days post-ASU ($P < 0.001$). This finding suggests that the ASU model improved the timeliness of surgical interventions and contributed to more efficient patient recovery and discharge processes.

Complication Rates

- **Complications and Outcomes**

The analysis of post-surgical complications revealed no significant difference in complication rates between the two periods. This suggests that while the ASU model improved operational efficiency and reduced delays, it did not adversely affect patient safety or outcomes.

Discussion of Results

- The introduction of the ASU at Lismore Base Hospital resulted in several notable improvements in surgical care. The increased proportion of surgeries started during daylight hours, and the reduction in after-hours operations align with recent literature emphasizing the benefits of daytime surgical procedures on performance and outcomes. The decrease in median time to definitive procedure and the shorter length of hospital stay highlight the ASU's role in enhancing operational efficiency and patient throughput.

- Despite the increased complexity and duration of procedures during the pandemic due to viral precautions, the ASU's dedicated, consultant-led model facilitated better management of these challenges. The ASU's focus on early senior decision-making and its availability throughout the day were key factors contributing to these improvements.

Conclusion

Implementing the Acute Surgical Unit (ASU) at Lismore Base Hospital during the COVID-19 pandemic resulted in significant enhancements in surgical care and operational efficiency. This study provides evidence supporting the effectiveness of the ASU model in addressing the challenges posed by the pandemic and optimizing surgical management. Key conclusions drawn from the study include:

1. **Improved Timing of Surgical Procedures:** The ASU model led to a notable increase in the proportion of surgeries commenced before 13:00 hours, rising from 25.5% pre-ASU to 59.4% post-ASU ($P < 0.001$). This improvement indicates that the ASU effectively streamlined surgical scheduling, allowing for more procedures to be performed during regular hours. The reduction in after-hours surgeries from 15% to 3% further underscores ASU's success in maximizing the use of available resources and minimizing the logistical and performance challenges associated with nighttime operations.

2. **Reduced Time to Definitive Procedure:** The median time to definitive surgical procedures decreased significantly from 25.5 hours to 19 hours ($P < 0.001$) following the introduction of the ASU. This reduction demonstrates that the ASU model facilitated quicker diagnostic and surgical interventions. By enhancing operational processes and decision-making, the ASU contributed to more timely patient care, crucial in managing acute surgical cases effectively.

3. **Shorter Hospital Stays:** The average length of hospital stay decreased substantially from 3.0 days to 2.0 days ($P < 0.001$) post-ASU. This decrease reflects improved efficiency in patient management and recovery processes. The ASU's model of care likely played a role in expediting patient discharge by ensuring timely and effective surgical interventions and reducing delays in care.

4. **Maintenance of Patient Safety:** Importantly, the introduction of the ASU did not increase post-surgical complications. The stable complication rates suggest that the improved efficiency and timing of care provided by the ASU did not compromise patient safety or lead to adverse outcomes. This is a critical finding, as it underscores that the benefits of the ASU model were achieved without negatively impacting the quality of patient care.

5. **Enhanced Resource Utilization:** The ASU model's emphasis on senior consultant-led care and dedicated in-hours management contributed to more effective use of hospital resources. By centralizing acute surgical care and optimizing scheduling, the ASU addressed the resource constraints imposed by the pandemic and improved overall operational efficiency.

6. **Broader Implications:** The positive outcomes observed in this study suggest that the ASU model could serve as a valuable framework for managing surgical care in future crises and routine settings. The ASU's ability to adapt to the challenges of the COVID-19 pandemic and improve patient outcomes highlights its potential for broader application in diverse healthcare environments.

In conclusion, the ASU model at Lismore Base Hospital demonstrated significant benefits regarding surgical timing, efficiency, and patient outcomes during the COVID-19 pandemic. These findings support the ASU model's continued use and potential expansion to enhance surgical care, optimize resource use, and ensure high-quality patient management in both emergency and non-emergency contexts.

Disclosure: The authors have not received any grant support and declare no conflicts of interest. All authors agree with the manuscript's content, which has not been published previously and is not under consideration elsewhere.

Citation: Mohtashami A, Butchers S, Velovski S (2024) Acute Surgical Unit Emerging from COVID Pandemic: Rural Australian Hospital's Response to Resource Reallocation. J Surg 9: 11149 DOI: 10.29011/2575-9760.11149

References

1. Grantcharov TP, Bardram L, Funch-Jensen P, Rosenberg J (2001) Laparoscopic performance after one night on call in surgical department: prospective study. BMJ 323: 1222-1223.
2. Taffinder N, McManus I, Gul Y (1998) Effect of sleep deprivation on surgeons' dexterity on laparoscopy simulator. Lancet 352: 1191.
3. Ricci WM, Gallagher B, Brandt A (2009) Is after-hours orthopaedic surgery associated with adverse outcomes? J Bone Joint Surg Am 91: 2067-2072.
4. Uranues S, Lamont E (2008) Acute care surgery: the European model. World J. Surg 32: 1605-1612.
5. Hoyt DB, Kim HD, Barrios C (2008) Acute care surgery: a new training and practice model in the United States. World J. Surg 32: 1630-1635.
6. Diaz JJ, Miller RS, Addison KM, Morris JA (2007) Acute care surgery: a functioning program and fellowship training. Surgery 141: 310-316.
7. Emergency surgery guidelines (2009) NSW Surgical Services Taskforce, NSW Health.