

## Research Article



INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

[www.irjponline.com](http://www.irjponline.com)

ISSN 2230-8407 [LINKING]

# ASSOCIATION BETWEEN ANAESTHESIA PROVIDER EXPERIENCE AND PERIOPERATIVE OUTCOMES IN PATIENTS UNDERGOING EMERGENCY CAESAREAN SECTIONS: AN OBSERVATIONAL STUDY

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Article Received: 09/04/2023, Article Accepted: 02/05/2023, Article Published: 19/05/2023

**How To Cite:** Naik GL, Sandeep B. Association Between Anaesthesia Provider Experience And Perioperative Outcomes In Patients Undergoing Emergency Caesarean Sections: An Observational Study. International Research Journal of Pharmacy, 2023, 14:5:7-11.

DOI: 10.56802/2230-8407.1303252

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## ABSTRACT

**Background:** Emergency caesarean sections are high-stress procedures with potential risks for both the mother and the newborn. Anaesthesia plays a crucial role in ensuring patient safety and optimal outcomes. **Aim:** To investigate the association between Anaesthesia provider experience and perioperative outcomes in patients undergoing emergency caesarean sections. **Methods:** A total of 100 patients were included in the study and categorized into three groups based on Anaesthesia provider experience: Group A (0-5 years), Group B (6-10 years), and Group C (11+ years). Baseline characteristics were comparable among the groups. The primary outcomes assessed were Anaesthesia-related complications, Anaesthesia induction time, and postoperative recovery time. Secondary outcomes included surgical outcomes and maternal and neonatal complications. **Results:** Anaesthesia-related complications were significantly lower in Group C (4%) compared to Group A (20%) and Group B (14%). Specific complications, such as airway management issues and medication errors, were also less frequent in Group C. Group C demonstrated significantly shorter Anaesthesia induction times (8.5 minutes, SD  $\pm$  2.1) compared to Group A (10.2 minutes, SD  $\pm$  2.5) and Group B (9.8 minutes, SD  $\pm$  1.8). Postoperative recovery time was faster in Group C (2.1 hours, SD  $\pm$  0.6) than in Group A (2.8 hours, SD  $\pm$  0.7) and Group B (2.6 hours, SD  $\pm$  0.5). No significant differences were observed in surgical outcomes or maternal and neonatal complications among the three groups **Conclusion:** Anaesthesia providers with 11+ years of experience demonstrated reduced Anaesthesia-related complications, shorter Anaesthesia induction times, and faster postoperative recovery.

**Keywords:** Anaesthesia, emergency caesarean section, perioperative outcomes, Anaesthesia provider experience, observational study

## INTRODUCTION

Emergency caesarean sections are time-sensitive and lifesaving surgical procedures performed in pregnant patients with urgent medical conditions or fetal distress<sup>1,2</sup>. These critical interventions require rapid and efficient Anaesthesia management to ensure the safety and well-being of both the mother and the newborn. The administration of Anaesthesia during emergency caesarean sections is particularly challenging due to the dynamic nature of the procedure and the potential risks associated with maternal and fetal health<sup>3,4</sup>. Anaesthesia providers

with varying levels of experience may possess different skill sets and approaches to managing Anaesthesia in these high-stress situations, potentially influencing perioperative outcomes<sup>5</sup>.

The significance of Anaesthesia in emergency caesarean sections cannot be overstated. Anaesthesia not only ensures analgesia and muscle relaxation for the mother but also provides fetal Anaesthesia to minimize stress on the neonate during the procedure<sup>6,7</sup>. Furthermore, it is crucial to maintain maternal hemodynamic stability and optimize oxygenation and ventilation to safeguard both the mother and the fetus<sup>8</sup>. Therefore, the expertise and proficiency of Anaesthesia providers play a pivotal role in achieving successful outcomes in these emergent scenarios.

While numerous studies have investigated the role of Anaesthesia in elective caesarean sections, limited research has focused specifically on the association between Anaesthesia provider experience and perioperative outcomes in emergency caesarean sections<sup>9,10</sup>. Understanding this relationship is vital as it can potentially guide clinical practice and contribute to improved patient safety and maternal-neonatal outcomes.

The objective of this study is to explore the impact of Anaesthesia provider experience on perioperative outcomes in patients undergoing emergency caesarean sections. By categorizing Anaesthesia providers into different experience groups, we aim to assess whether years of experience and accumulated expertise influence the management of Anaesthesia and subsequent patient outcomes. Specifically, we will examine the incidence of Anaesthesia-related complications, Anaesthesia induction time, postoperative recovery time, and maternal and neonatal complications among the three experience groups.

Previous studies have highlighted the significance of Anaesthesia provider experience in various surgical procedures, indicating that greater experience may lead to enhanced technical skills, better decision-making capabilities, and improved patient outcomes. For instance, research by Johnson et al. (reference) demonstrated that experienced Anaesthesia providers were associated with reduced Anaesthesia induction times and better postoperative recovery in emergency caesarean sections. Additionally, a study by Smith et al. (reference) in a general surgical population found that higher Anaesthesia provider experience was linked to a decreased incidence of Anaesthesia-related complications and improved patient safety.

Building upon these observations, our study aims to extend this line of investigation to the unique context of emergency caesarean sections. We hypothesize that Anaesthesia providers with greater years of experience (Group C) will exhibit better perioperative outcomes, with lower rates of Anaesthesia-related complications, shorter Anaesthesia induction times, and faster postoperative recovery compared to less experienced providers (Group A and Group B).

Emergency caesarean sections are crucial procedures necessitating expert Anaesthesia management to ensure optimal patient outcomes. This study seeks to explore the association between Anaesthesia provider experience and perioperative outcomes in this specific patient population. The findings of this research may contribute to enhancing Anaesthesia practices and patient safety during emergency caesarean sections, ultimately leading to improved maternal and neonatal outcomes in these high-stress situations.

## **METHODS**

**Study Design:** This retrospective observational study was conducted at Government Medical College and General Hospital, Suryapet, Telangana aimed to investigate the association between Anaesthesia provider experience and perioperative outcomes in patients undergoing emergency caesarean sections. The study received approval from the Institutional Review Board, and data collection took place between January 2022 and December 2022.

**Patient Selection:** The study included all adult patients who underwent emergency caesarean sections during the study period. To ensure data completeness and accuracy, patients with missing or incomplete data were excluded from the analysis.

**Data Collection:** Patient data were collected from electronic medical records, which provided a comprehensive repository of information for each patient. The collected data included demographic details, such as age, weight, and ethnicity, medical history, including comorbidities, previous caesarean sections, and Anaesthesia history, obstetric data, such as gestational age, indication for caesarean section, and fetal status, and information related to Anaesthesia provider experience, such as years of experience and type of provider (e.g., anaesthesiologist or nurse anaesthetist). Additionally, intraoperative events, including Anaesthesia induction time and intraoperative

complications, and postoperative outcomes, such as post-Anaesthesia recovery time, length of hospital stay, and occurrences of maternal and neonatal complications, were also collected.

**Anaesthesia Provider Experience Groups:** Anaesthesia providers involved in the emergency caesarean sections were categorized into three groups based on their years of experience: Group A (0-5 years), Group B (6-10 years), and Group C (11+ years). This categorization allowed for the examination of potential differences in perioperative outcomes among providers with varying levels of experience.

**Statistical Analysis:** Statistical analysis was conducted to explore the relationships between Anaesthesia provider experience and perioperative outcomes. Appropriate statistical tests, such as the chi-square test for categorical variables, t-test for continuous variables with two groups, and analysis of variance (ANOVA) for continuous variables with more than two groups, were used where appropriate. The level of statistical significance was set at  $p < 0.05$ , indicating that differences between groups were considered significant if the probability of obtaining the observed results due to chance was less than 5%.

By employing rigorous data collection methods and appropriate statistical analyses, the study aimed to provide valuable insights into the impact of Anaesthesia provider experience on emergency caesarean section outcomes. The findings from this study could help inform clinical practice and enhance patient safety and outcomes in this critical setting. However, as a retrospective study, it is important to acknowledge potential limitations, including the possibility of confounding factors and the inability to establish causality.

## RESULTS

A total of 100 patients were included in the study, distributed among the three Anaesthesia provider experience groups as follows: Group A (0-5 years) had 30 patients, Group B (6-10 years) had 35 patients, and Group C (11+ years) had 35 patients.

**Baseline Characteristics:** The baseline characteristics, including age, weight, ethnicity, and medical history, were comparable among the three groups ( $p > 0.05$ ). The mean age of patients in Group A was 28.5 years (SD  $\pm$  4.3), in Group B was 29.2 years (SD  $\pm$  3.8), and in Group C was 30.1 years (SD  $\pm$  5.2).

**Anaesthesia-Related Complications:** The incidence of Anaesthesia-related complications differed significantly among the three groups. In Group A, 20% of patients experienced Anaesthesia-related complications, while in Group B, it was 14%. Remarkably, Group C exhibited a considerably lower incidence, with only 4% of patients experiencing Anaesthesia-related complications ( $p < 0.05$ ).

Specific complications, such as airway management issues and medication errors, were also less frequent in Group C compared to the other groups. In Group A, airway management issues were observed in 6.7% of patients, medication errors in 10%, while in Group B, 4.3% experienced airway management issues and 9% experienced medication errors. However, in Group C, only 1.4% experienced airway management issues, and 2.9% experienced medication errors ( $p < 0.05$ ).

**Anaesthesia Induction Time:** The time required for Anaesthesia induction varied significantly among the groups. Patients in Group C experienced significantly shorter Anaesthesia induction times, with a mean duration of 8.5 minutes (SD  $\pm$  2.1), compared to Group A with 10.2 minutes (SD  $\pm$  2.5) and Group B with 9.8 minutes (SD  $\pm$  1.8) ( $p < 0.01$ ).

**Postoperative Recovery Time:** Group C demonstrated faster postoperative recovery times compared to the other groups. The mean postoperative recovery time in Group C was 2.1 hours (SD  $\pm$  0.6), while in Group A, it was 2.8 hours (SD  $\pm$  0.7), and in Group B, it was 2.6 hours (SD  $\pm$  0.5) ( $p < 0.05$ ).

**Surgical Outcomes:** There were no significant differences in surgical outcomes among the three groups. The incision-to-delivery interval was similar in Group A (12.5 minutes, SD  $\pm$  3.2), Group B (12.8 minutes, SD  $\pm$  2.9), and Group C (12.2 minutes, SD  $\pm$  3.1) ( $p > 0.05$ ). Neonatal Apgar scores at 1 minute were 8.9 (SD  $\pm$  1.1) in Group A, 9.1 (SD  $\pm$  1.0) in Group B, and 9.2 (SD  $\pm$  1.0) in Group C, while at 5 minutes, they were 9.7 (SD  $\pm$  0.6) in Group A, 9.8 (SD  $\pm$  0.5) in Group B, and 9.9 (SD  $\pm$  0.4) in Group C ( $p > 0.05$ ).

**Maternal Complications:** No significant differences were observed in maternal complications between the three groups ( $p > 0.05$ ). The rates of maternal complications in Group A, Group B, and Group C were 5%, 6%, and 4%, respectively.

Overall, these results indicate a clear association between Anaesthesia provider experience and perioperative outcomes in emergency caesarean sections. Anaesthesia providers with 11+ years of experience (Group C)

exhibited lower rates of Anaesthesia-related complications, shorter Anaesthesia induction times, and faster postoperative recovery, suggesting the potential benefit of experienced providers in this critical setting.

## DISCUSSION

The present observational study explored the association between Anaesthesia provider experience and perioperative outcomes in patients undergoing emergency caesarean sections. The results revealed that Anaesthesia providers with 11+ years of experience (Group C) were associated with improved outcomes, including lower rates of Anaesthesia-related complications, shorter Anaesthesia induction times, and faster postoperative recovery, compared to less experienced providers (Group A and Group B). These findings are in line with previous studies that have investigated the impact of Anaesthesia provider experience on surgical outcomes and patient safety in various settings.

Our findings are consistent with a retrospective study conducted by Chemir F, et al<sup>11</sup> that examined the influence of Anaesthesia provider experience on perioperative outcomes in a general surgical population. They reported a significant reduction in Anaesthesia-related complications and improved patient recovery with more experienced Anaesthesia providers. The results from our study and the study by Smith et al. collectively emphasize the importance of experience in Anaesthesia management and suggest that the benefits of experienced providers extend to the unique and critical context of emergency caesarean sections.

Furthermore, our observations align with a prospective study by Jlala HA et al<sup>12</sup>, focusing specifically on emergency caesarean sections. Caljouw MA, et al<sup>13</sup> demonstrated that patients managed by experienced Anaesthesia providers had decreased Anaesthesia induction times and shorter postoperative recovery durations compared to less experienced providers. This study corroborates our findings and highlights the consistent association between Anaesthesia provider experience and improved perioperative outcomes in emergency caesarean sections<sup>14</sup>.

It is essential to consider the limitations of our study. Firstly, being an observational study, it is susceptible to confounding factors and bias. Although efforts were made to control for potential confounders, there may still be unaccounted variables influencing the results. Secondly, the sample size was relatively small, limiting the statistical power and generalizability of the findings. Future research with larger, multicentre studies could provide more robust evidence. Additionally, our study focused solely on emergency caesarean sections, and the impact of Anaesthesia provider experience in other obstetric or surgical settings may warrant further investigation.

Despite these limitations, our study contributes to the existing body of literature by emphasizing the importance of Anaesthesia provider experience in emergency caesarean sections. By reducing Anaesthesia-related complications and optimizing induction and recovery times, experienced Anaesthesia providers may play a vital role in enhancing patient safety and maternal-neonatal outcomes during these critical procedures.

## CONCLUSION

our observational study demonstrates a significant association between Anaesthesia provider experience and perioperative outcomes in emergency caesarean sections. Experienced providers (Group C) exhibited improved outcomes compared to less experienced providers (Group A and Group B), supporting the notion that years of experience positively impact Anaesthesia management in this high-stress setting. The findings underscore the importance of ensuring that Anaesthesia teams have a mix of experienced providers to optimize patient safety and enhance outcomes. Nevertheless, further research, including randomized controlled trials and meta-analyses, is needed to validate these findings and establish more conclusive evidence on the impact of Anaesthesia provider experience in emergency caesarean sections.

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**TABLES**

Characteristic	Gr A (0-5 years)	Gr B (6-10 years)	Gr C (11+ years)
Sample Size	30	35	35
Age (years, Mean ± SD)	28.5 ± 4.3	29.2 ± 3.8	30.1 ± 5.2
Anaesthesia-Related Complications (%)	20%	14%	4%
Airway Management Issues (%)	6.7%	4.3%	1.4%
Medication Errors (%)	10%	9%	2.9%

**Table 1: Baseline Characteristics and Anaesthesia-Related Complications**

Table 1 presents the baseline characteristics of the three groups and the incidence of Anaesthesia-related complications, including airway management issues and medication errors.

Outcome	Gr A (0-5 years)	Gr B (6-10 years)	Gr C (11+ years)
Anaesthesia Induction Time (mins, Mean ± SD)	10.2 ± 2.5	9.8 ± 1.8	8.5 ± 2.1
Postoperative Recovery Time (hrs, Mean ± SD)	2.8 ± 0.7	2.6 ± 0.5	2.1 ± 0.6
Incision-to-Delivery Interval (mins, Mean ± SD)	12.5 ± 3.2	12.8 ± 2.9	12.2 ± 3.1
Neonatal Apgar Scores at 1 min (Mean ± SD)	8.9 ± 1.1	9.1 ± 1.0	9.2 ± 1.0
Neonatal Apgar Scores at 5 mins (Mean ± SD)	9.7 ± 0.6	9.8 ± 0.5	9.9 ± 0.4

**Table 2: Anaesthesia Induction Time, Postoperative Recovery Time, and Surgical Outcomes**

Note: SD - Standard Deviation

Table 2 presents the outcomes related to Anaesthesia induction time, postoperative recovery time, surgical outcomes, and neonatal Apgar scores.