

Hospital-Based Evaluation of Anaesthesia Practices in Bangladesh: A Retrospective Study

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Abstract:

Introduction: Anaesthesia management plays a critical role in ensuring patient safety and comfort during and after surgical procedures. The choice of anaesthesia type – whether regional or general – can significantly influence the incidence of complications and overall patient recovery. This study aimed to evaluate anaesthesia practices, monitor complications, and assess patient satisfaction among individuals undergoing various types of surgery. **Methods:** The study was conducted at General Hospital, Pabna, Bangladesh from 1st October 2023 to 30th September 2024. Data were collected from medical records of patients who underwent surgery at a hospital. The study population consisted of 42 individuals, with a higher proportion of females and the largest age group being 18-40 years. Data analysis was performed using SPSS version 26. **Result:** The results of this study indicate that 57.1% of patients received regional anaesthesia, while 42.9% were administered general anaesthesia. Monitoring techniques, including pulse oximetry, ECG, and blood pressure, were widely used, with complications occurring in 33.3% of the population. Post-anaesthesia complications were most commonly nausea (42.9%) and hypotension (4.8%). Satisfaction with anaesthesia was high, with 95.2% of patients reporting satisfaction. A significant negative correlation (-0.361 , $p=0.0188$) was found between general anaesthesia and the absence of complications. **Conclusion:** The findings from this study indicate that regional anaesthesia is associated with fewer post-anaesthesia complications compared to general anaesthesia, as evidenced by the negative correlation between the two. The statistically significant p -value of 0.0188 ($p < 0.05$) underscores the meaningful association between the type of anaesthesia and the occurrence of post-anaesthesia complications.

Introduction:

Anaesthesia is a cornerstone of modern surgical practice, ensuring patient comfort, reducing intraoperative stress responses, and improving surgical outcomes. Globally, anaesthesia services have undergone significant advancements in safety protocols, monitoring technologies, and workforce expansion. However, disparities in anaesthesia practices persist, particularly between high-income countries (HICs) and low- and middle-income

countries (LMICs), where resource constraints limit access to safe anaesthesia care¹. The World Health Organization (WHO) and the World Federation of Societies of Anesthesiologists (WFSA)

have established global guidelines for safe anaesthesia, emphasizing the importance of trained personnel, adequate monitoring, and essential drug availability to improve patient outcomes². Despite these advancements, perioperative mortality remains disproportionately high in LMICs due to inadequate

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anaesthesia services, equipment shortages, and a lack of standardized safety protocols³. Bangladesh, as a developing country, faces significant challenges in ensuring safe and effective anaesthesia practices, necessitating a systematic evaluation of hospital-based anaesthesia services.

The anaesthesia workforce shortage in LMICs is a critical barrier to safe surgical care. A global assessment of anaesthesia capacity has revealed that the provider-to-patient ratio in LMICs is alarmingly low, with some countries having as few as 0.1 anaesthesia providers per 100,000 people, compared to more than 20 per 100,000 in HICs¹. In Bangladesh, there are approximately 0.58 anesthesiologists per 100,000 people, a modest increase from 0.52 in 2012, but still far below the WHO's recommended minimum⁴. Public hospitals, particularly in rural areas, rely on non-physician anesthetists, leading to concerns about variability in anaesthesia administration quality and patient safety. Additionally, disparities exist between urban tertiary care hospitals and district-level healthcare facilities, where a shortage of anaesthesia equipment and trained personnel exacerbates surgical risks⁵. Infrastructure limitations, such as intermittent electricity, unreliable oxygen supplies, and inadequate patient monitoring, further hinder the ability to deliver safe anaesthesia care in district hospitals⁴. Anaesthesia safety protocols in Bangladesh remain poorly documented and inconsistently implemented. A situational analysis of patient safety measures in primary and secondary healthcare facilities in Bangladesh revealed that there are no formalized anaesthesia safety protocols at many district hospitals⁶. Healthcare managers acknowledge the importance of patient safety but lack structured guidelines and adequate human resources to implement proper anaesthesia safety standards. Deficiencies in monitoring devices such as pulse oximeters, electrocardiography (ECG) monitors, and blood pressure monitoring equipment pose a significant risk to patient safety, particularly in emergency settings⁴. In maternal healthcare, for example, general anaesthesia remains the default choice for emergency cesarean sections, despite international evidence supporting the safety and cost-effectiveness of spinal anaesthesia for obstetric

cases⁷. These findings indicate a crucial gap in clinical anaesthesia practices and highlight the need for data-driven interventions to improve safety standards. The importance of retrospective hospital-based evaluations in identifying gaps in anaesthesia services has been demonstrated in multiple studies. A 7-years retrospective analysis of anaesthesia awareness in cancer patients demonstrated the effectiveness of using hospital records to evaluate long-term trends in patient safety and highlight inconsistencies in anaesthesia administration⁸. Another 9-year retrospective study on preventable anaesthesia -related adverse events revealed that 42.8% of anaesthesia complications were preventable, reinforcing the value of retrospective audits in improving patient outcomes⁹. Retrospective data analysis is particularly relevant in resource-constrained settings, as it allows for cost-effective assessment of real-world clinical practices without the logistical and financial burdens associated with prospective studies¹⁰. Given the limited systematic data collection on anaesthesia protocols in Bangladesh, a retrospective study focusing on hospital-based anaesthesia practices can provide critical insights into perioperative patient safety, workforce challenges, and areas for policy intervention. The findings of this study have important policy implications for Bangladesh's healthcare system. Currently, no national database exists to track anaesthesia -related complications, safety protocol adherence, or workforce distribution. Countries that have implemented national anaesthesia registries have shown significant improvements in patient safety outcomes, as retrospective analyses help shape guidelines and resource allocation¹¹. In Bangladesh, policy interventions should focus on workforce expansion, standardized training programs, and ensuring adequate anaesthesia equipment in district hospitals⁴. Furthermore, as seen in the pediatric sepsis protocol study in Dhaka hospitals, the success of healthcare policy changes depends not only on protocol development but also on adherence monitoring and implementation strategies¹². A systematic hospital-based evaluation of anaesthesia services will provide data to guide policymakers, hospital administrators, and professional bodies in strengthening anaesthesia

services across the country. This study aims to evaluate hospital-based anaesthesia practices in Bangladesh through a retrospective analysis of patient records, anaesthesia administration protocols, and perioperative outcomes. By identifying gaps in anaesthesia services, patient safety protocols, and workforce distribution, this research seeks to contribute to evidence-based policy recommendations to enhance anaesthesia care nationwide. Retrospective data will allow for trend analysis over a significant period, enabling comparisons between different hospital types and regions. Ultimately, the study will serve as a foundational resource for healthcare planners, policymakers, and professional organizations to improve anaesthesia safety and access across Bangladesh.

Materials and methods:

The study was conducted at General Hospital, Pabna, Bangladesh from 1st October 2023 to 30th September 2024. Data were collected from medical records of patients who underwent surgery at a hospital. The study population consisted of 42 individuals, with a higher proportion of females and the largest age group being 18-40 years. Surgeries were categorized into general surgery, orthopedic surgery, ENT surgery, and obstetrics/gynecology, with a relatively even distribution. The type of anaesthesia used in each case was recorded, with regional anaesthesia (spinal or epidural) applied to most patients and general anaesthesia to the remaining cases. Monitoring practices, including pulse oximetry, ECG, and blood pressure, were documented, although capnography was not used in any of the cases. The occurrence of anaesthesia-related complications was noted. Post-anaesthesia complications such as nausea, hypotension, and vomiting were recorded, and satisfaction with the anaesthesia care was overwhelmingly positive. Data analysis was performed to explore the relationship between the type of anaesthesia and post-anaesthesia complications, utilizing Pearson's correlation coefficient to assess statistical significance. Data analysis was performed using SPSS version 26.

Results:

The study population primarily consists of individuals aged 18-40 years (61.9%), with a higher proportion of females (61.9%). The distribution of surgeries is relatively even, with general surgery

accounting for 33.3%, followed by orthopedic, ENT, and obstetrics/gynecology surgeries, each comprising 19.0% to 23.8%. The sample includes a small proportion of participants under 18 (19.0%) and over 60 (2.4%). The absence of participants in the "Other" gender and surgery categories indicates a focused demographic in this study. [Table I]

Table I
Distribution of study population based on demographic information (n=42)

Demographic Information	n	%
Age		
<18years	8	19.0
18-40 years	26	61.9
41-60 years	7	16.7
>60 years	1	2.4
Gender		
Male	16	38.1
Female	26	61.9
Other	0	0.0
Type of Surgery		
General Surgery	14	33.3
Orthopaedic Surgery	8	19.0
ENT Surgery	10	23.8
Obstetrics and Gynaecology	10	23.8
Other	0	0.0

In this analysis of anaesthesia practices among the 42-study population, 57.1% (n=24) of procedures used regional anaesthesia, while 42.9% (n=18) used general anaesthesia, with no use of local or combined techniques. 100% of the study population had pulse oximetry monitoring, and most had ECG (66.7%) and blood pressure (90.5%) monitoring, but capnography was not utilized. Despite the extensive monitoring, 33.3% of the study population experienced complications during anaesthesia, highlighting potential risks. The relatively low complication rate, however, suggests adequate anaesthesia management. [Table II]

Table II <i>Distribution of study population based on Anaesthesia Practices (n=42)</i>		
Anaesthesia Practices	n	%
Type of Anaesthesia		
General Anaesthesia	18	42.9
Regional Anaesthesia (Spinal, Epidural)	24	57.1
Local anaesthesia	0	0.0
Combined techniques	0	0.0
Anaesthesia Monitoring Techniques		
Used	42	100.0
Pulse Oximetry	28	66.7
ECG monitoring	38	90.5
Blood Pressure Monitoring	0	0.0
Capnography	0	0.0
Others		
Complications Recorded During Anaesthesia		
Yes	14	33.3
No	28	66.7

In this cohort of 42 study population, 60% (n=25) were transferred to the Post-Anaesthesia Care Unit (PACU), with the majority 57.1% (n=24) staying for less than 1 hour. Post-anaesthesia complications were observed in 24 study populations, with nausea being the most common 42.9% (n=18), followed by hypotension and other complications, each at 4.8% (n=2). Vomiting and respiratory distress were rare, affecting only 4.8% of the study population. Satisfaction with anaesthesia practices was overwhelmingly positive, with 95.2% (n=40) of the study population reporting satisfaction, and only 4.8% (n=2) indicating they were very satisfied. No study population reported dissatisfaction or neutrality. [Table III]

General anaesthesia (n=18) was associated with a higher incidence of nausea (55.6%), vomiting (11.1%), and other complications compared to regional anaesthesia (n=24), which had lower rates of nausea (33.3%) and no cases of vomiting. Hypotension occurred in one patient from each group, while no cases of respiratory distress were observed. A greater proportion of patients under regional anaesthesia (58.3%) experienced no complications compared to those under general anaesthesia (22.2%). Pearson correlation analysis showed a negative correlation (-0.361) between general anaesthesia and the absence of complications, with statistical significance (p=0.0188). [Table IV].

Table III <i>Distribution of study population based on Post-Anaesthesia Care (n=42)</i>		
Post-Anaesthesia Care	n	%
The study population Transferred to the Post-Anaesthesia Care Unit (PACU)	25	60.0
Duration of Stay in the PACU		
<1 hour	24	57.1
1-3 hours	10	23.8
>3 hours	2	4.8
Post-anaesthesia Complications Observed		
Nausea	18	42.9
Vomiting	2	4.8
Respiratory Distress	0	0.0
Hypotension	2	4.8
Other	2	4.8
Overall Satisfaction with Anaesthesia Practices (For Healthcare Providers)		
Very Satisfied	2	4.8
Satisfied	40	95.2
Neutral	0	0.0
Dissatisfied	0	0.0
Very dissatisfied	0	0.0

Table IV
Association between Type of Anaesthesia and Post-Anaesthesia Complications (n=42)

Type of Anaesthesia	Nausea (n=18)	Vomiting (n=2)	Respiratory Distress (n=0)	Hypotension (n=2)	Other (n=2)	No Complications (n=18)	Total (n=42)	Pearson Correlation	p-value
General Anaesthesia (n=18)	10(55.6%)	2(11.1%)	0(0.0%)	1(5.6%)	1(5.6%)	4(22.2%)	18(100%)	-0.361	0.0188
Regional Anaesthesia (n=24)	8(33.3%)	0(0.0%)	0(0.0%)	1(4.2%)	1(4.2%)	14(58.3%)	24(100%)		

Discussion

The study population primarily consisted of individuals aged 18-40 years (61.9%), with a notable female preponderance (61.9%). The diversity of surgeries included in the study, with general surgery accounting for 33.3% and orthopedic, cardiac, and obstetrics/gynecology surgeries accounting for 19.0% to 23.8% each, reflects the typical surgical practice in many settings. The study's findings show that 57.1% of patients received regional anaesthesia, while 42.9% received general anaesthesia. This distribution is consistent with existing literature, which suggests that regional anaesthesia is preferred for many types of surgery due to its ability to provide effective pain relief with fewer systemic effects compared to general anaesthesia^{13,14}. Regional anaesthesia, especially spinal and epidural blocks, is increasingly preferred in various surgical procedures because of its reduced complication rates, which were corroborated by the present study, where regional anaesthesia was associated with fewer complications compared to general anaesthesia¹⁵. In terms of anaesthesia monitoring, pulse oximetry was used in all cases, while ECG and blood pressure monitoring were used in 66.7% and 90.5% of patients, respectively. These high monitoring rates align with recommended best practices in anaesthesia management^{16,17}. While complications during anaesthesia were observed in 33.3% of the population, this rate is relatively low, indicating that anaesthesia management was largely successful, though improvements can be made in minimizing complications such as nausea and vomiting. The post-anaesthesia care unit (PACU) transfer rate of 60% is consistent with previous studies, as it is common practice to transfer patients to the PACU for close monitoring after anaesthesia¹⁸. The majority of patients (57.1%) stayed in the PACU for less than 1 hour, reflecting the short duration of

recovery for patients who undergo less invasive surgical procedures. The complications observed post-anaesthesia were primarily nausea (42.9%), which is a common side effect of general anaesthesia, and hypotension (4.8%), which can occur due to the vasodilatory effects of anaesthetic agents¹⁹. Interestingly, no cases of respiratory distress were reported, indicating that respiratory complications were well managed, likely due to the use of pulse oximetry and ECG monitoring during anaesthesia. The finding that no patients reported dissatisfaction with anaesthesia practices is a testament to the effectiveness of anaesthesia management in this cohort, as satisfaction is a key indicator of the success of anaesthesia care²⁰. The study also revealed a higher incidence of nausea and vomiting in patients receiving general anaesthesia compared to those receiving regional anaesthesia, a result consistent with previous studies showing that general anaesthesia, particularly when using volatile agents, tends to have higher rates of postoperative nausea and vomiting (PONV)²¹. This finding highlights the importance of considering PONV risk factors in anaesthesia planning and underscores the potential benefits of using regional anaesthesia, which has lower rates of these complications²². Hypotension was observed in one patient from each anaesthesia group, which is consistent with the expected hemodynamic changes during anaesthesia, particularly in patients who are older or have pre-existing comorbidities²³. The higher proportion of patients experiencing no complications under regional anaesthesia (58.3%) compared to general anaesthesia (22.2%) further supports the notion that regional anaesthesia is associated with fewer postoperative complications²⁴. A Pearson correlation analysis revealed a statistically significant negative correlation (-0.361) between general anaesthesia and

the absence of complications ($p=0.0188$). This finding suggests that general anaesthesia may be associated with a higher risk of complications compared to regional anaesthesia, particularly in the context of nausea and vomiting, as discussed above. Such results align with findings from other studies that have found regional anaesthesia to be safer in certain populations, particularly for procedures with low to moderate complexity^{25,26}.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion

In conclusion, the findings from this study indicate that regional anaesthesia is associated with fewer post-anaesthesia complications compared to general anaesthesia, as evidenced by the negative correlation between the two. The statistically significant p -value of 0.0188 ($p < 0.05$) underscores the meaningful association between the type of anaesthesia and the occurrence of post-anaesthesia complications. These results suggest that regional anaesthesia may offer a safer alternative, particularly in reducing complications such as nausea and vomiting, highlighting the need for careful anaesthesia selection tailored to individual patient needs.

Recommendation

Based on the findings of this study, it is recommended that regional anaesthesia be considered the preferred approach in patients undergoing elective surgeries, particularly when aiming to minimize post-anaesthesia complications such as nausea and vomiting. The significant association between regional anaesthesia and fewer complications suggests that it could be a safer option for many patients. However, anaesthesia choices should still be individualized, taking into account patient factors, the type of surgery, and potential risks, with ongoing monitoring and adjustments as necessary to optimize patient outcomes.

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