

## ORIGINAL RESEARCH

# A Clinical Audit of Quality Indicators in Anesthesia Practice

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## ABSTRACT

**Background:** To measure and monitor the quality of care in anesthesia, which is lacking in India. The objective of this audit was to formulate a set of quality indicators and use them to audit our daily anesthetic practice.

**Materials and methods:** We applied eight quality indicators to audit 4,147 medical records of our hospital. We measured the quality of anesthesia care in the preoperative, intraoperative, and postoperative period by collecting and analyzing the various data.

**Results:** We found out the weaker areas where quality of anesthesia care could be improved. In 160 (3.85%) patients, preanesthetic check-up was lacking; in 569 (13.72%) patients, anesthesia plan was modified on the day of surgery. A total of 378 (9.11%) patients were ventilated following anesthesia. A total of 123 (2.96%) patients were in recovery room for more than the normal expected time and 187 (4.50%) patients were shifted to the ICU for further intensive care. There was no mortality in our audit findings.

**Conclusion:** In this audit, we found several areas where improvements could be done. In future, the quality of anesthesia services will be monitored by quality assurance programs using quality indicators, which will improve the perioperative outcome. A dramatic change is expected in anesthesia practice for the betterment of patient care. At present we should try to adopt these practices and improve anesthesia delivery services.

**Keywords:** Anesthesia, Monitoring, Quality indicators.

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## INTRODUCTION

Anesthesia is an induced, temporary, reversible, state with one or more of the following characteristics: Analgesia, muscular paralysis, reflex suppression, and amnesia with the reversible loss of consciousness.

Millions of people are anesthetized every year.<sup>1</sup> Mortality and morbidity from anesthesia in the last few years have decreased to such an extent that mortality can no longer be seen as a good quality indicator. The cause of the Patient Safety First Campaign was to make patient safety a top priority and to create a mindset of “no avoidable death and no avoidable harm”.<sup>1</sup> It also focused on the measurement and reporting of quality indicators representing safety, effectiveness, and patient experience. Diligent monitoring of the quality of anesthesia service is required to maintain and improve standards of patient safety.

Monitoring helps us to:

- Know the factors influencing variations in care
- Try to improve standards of patient care
- Understand the benefits of those changes in existing services

In monitoring these services, collecting data of important quality indicators is vital. Recently a lot of attention has been focused in the literature on how all clinical specialties measure and report on the quality of care delivered to patients.

So this study was designed to set anesthetic quality indicators and use them to audit in the practice.

## MATERIALS AND METHODS

It was a retrospective study where we devised 8 quality indicators of care in anesthesia, looking at the following:

1. Preoperatively, whether the patient has visited a preanesthetic clinic
2. Minimum mandatory monitoring done during anesthesia
3. Percentage of modification of anesthesia plan
4. Percentage of unplanned ventilation following anesthesia
5. Percentage of adverse anesthesia events
6. Whether the patient postoperatively spent more than 1 hour in recovery
7. Percentage of unplanned ICU admission after anesthesia
8. Anesthesia-related mortality rate.

The audit was conducted at RajaRajeswari Medical College and Hospital. It is a 1,000-bedded, urban, tertiary

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The study unit included 17 operating theaters with anesthetic consultants and technicians. A database of 4,147 patients who had been operated electively between September 1, 2015, and March 30, 2016, was recorded.

### Data Collection

The case notes or surgery was reviewed by a team of two anesthetists, and a review of case notes was conducted in the month of April 2016.

The following data were recorded from each patient's anesthetic chart:

- Gender
- Age
- ASA status
- The quality of anesthesia documentation
- Preoperatively, whether the patient had visited for preanesthetic check-up; if the preanesthetic sheet was blank, it was recorded as "No"; if written, it was recorded as "Yes"
- Minimum mandatory monitoring done during anesthesia; if "Yes," mandatory ASA recommended monitoring was done; "No" if monitoring was absent.
- Percentage of modification of anesthesia plan (Did the patient receive the anesthetic technique as planned during the preanesthetic period? If the pre-anesthetic chart and the anesthetic chart matched, then "No" was recorded; else "Yes" was recorded.)
- Percentage of unplanned ventilation following anesthesia: In this, if the patients had to be intubated during the anesthesia and re-intubated after post-extubation were noted. If "Yes" means ventilated or else, it was recorded as "No".
- Percentage of adverse anesthesia events,<sup>1</sup> which included the following:
  - Cough/hiccough/chomping on induction
  - Low blood pressure (hypotension)
  - Inappropriate patient movement during surgery
  - Low oxygen saturation (SpO<sub>2</sub>) on pulse oximeter
  - Residual neuromuscular block in recovery
  - Slow-to-regain consciousness in recovery
  - Anesthetic turned off too early at the end of the operation

All the above adverse events were noted down. If they occurred during anesthesia, they were noted as "Yes"; if not, they were noted as "No."

- Postoperatively, whether the patient spent more than 1 hour in recovery ("Yes" if the patient was in recovery for more than 1 hour, and "No" if the patient was shifted to the postoperative ward within 1 hour.)
- Percentage of unplanned ICU admission after anesthesia (If the patient was shifted to the ICU from the

operation theater, it was recorded as "Yes," and if shifted to the postop ward, it was recorded as "No.")

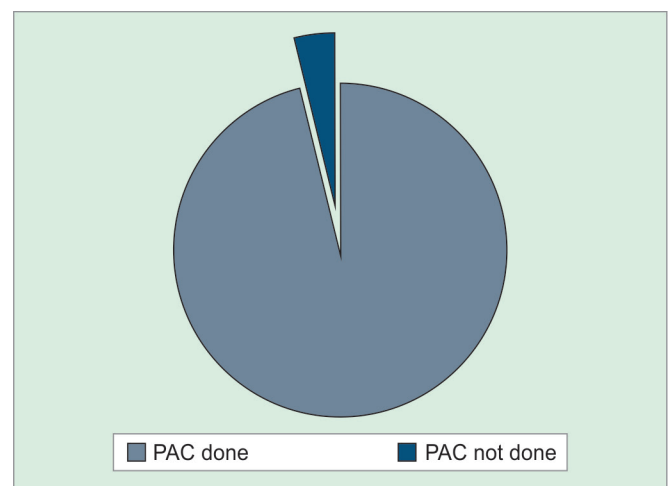
- Anesthesia-related mortality rate (If mortality was noted, it was written as "Yes"; if no mortality, then it was mentioned as "No.")

### Statistical Analysis

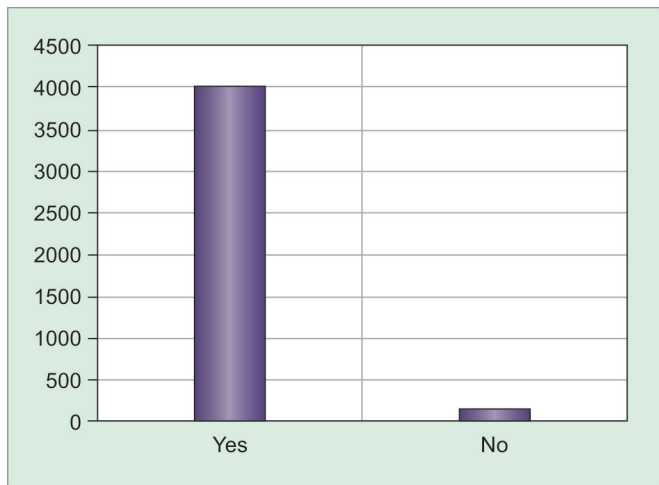
This study involves a review of patient data; hence, the statistical analysis is descriptive. Categorical data are expressed as numbers and percentages. Continuous data are analyzed by the mean or median with standard deviation, the range depending on the distribution of the individual variables. For statistical tests and analysis, we used Microsoft Excel.

### RESULTS

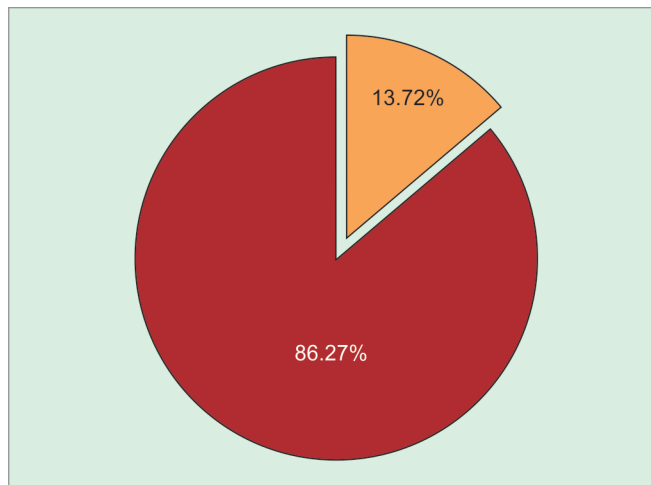
- A total of 4,147 patients record were audited and included in the final data sheet, out of which 2,528 (60.9%) were females and 1,619 (39.04%) were males.
- The mean age was 39 years (0–71, SD: 25).
  - Preoperatively, did the patient visit for preanesthetic check-up (PAC) (Graph 1):  
 "Yes" – 3,987 (96.14%); PAC was done  
 and  
 "No" – 160 (3.85%); PAC was not done
  - Minimum mandatory physiological monitoring during anesthesia (Graph 2):  
 "Yes" – 4,000 (96.45%); patients were monitored  
 and  
 "No" – 147 (3.55%); patients were not monitored
  - Percentage of modification of anesthesia plan (Graph 3):  
 "Yes" – 569 (13.72%); plan was modified  
 and  
 "No" – 3,578 (86.27%); plan was not modified



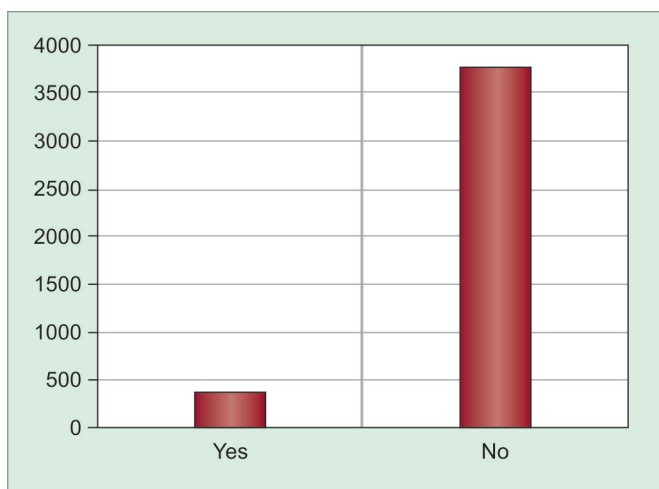
Graph 1: Preoperatively, did the patient visit for preanesthetic check-up



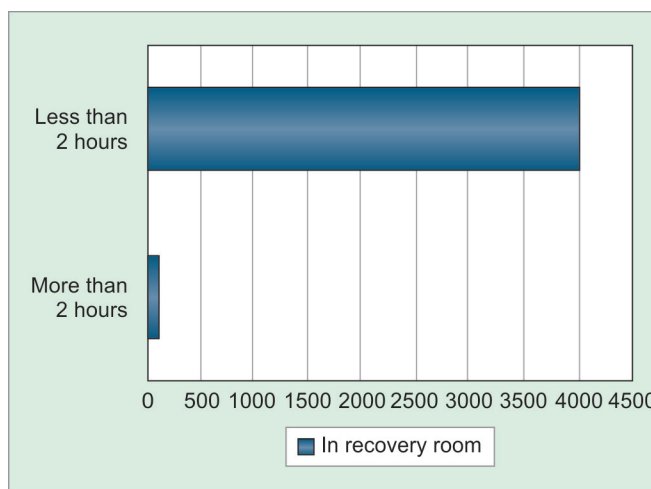
Graph 2: Minimum mandatory monitoring during anesthesia



Graph 3: Percentage of modification of anesthesia plan



Graph 4: Percentage of unplanned ventilation following anesthesia



Graph 5: Postoperatively, did the patient spend more than 2 hours in recovery

- Percentage of unplanned ventilation following anesthesia (Graph 4):
  - “Yes” – 378 (9.11%); were ventilated and
  - “No” – 3,769 (90.88%); were not ventilated
- Percentage of adverse anesthetic events (Table 1):

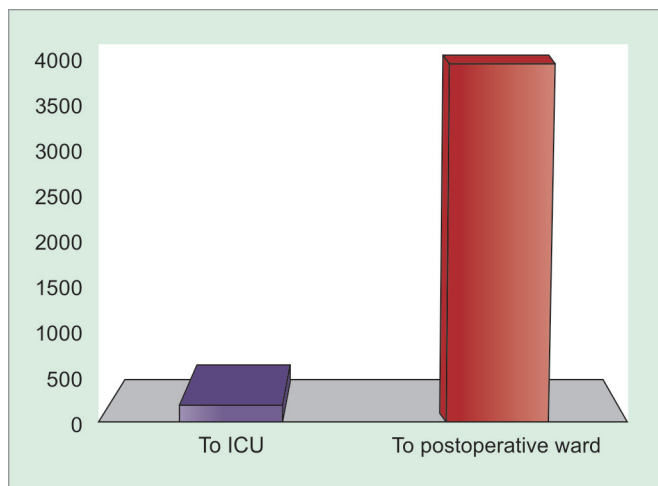
Table 1: Percentage of adverse anesthetic events

Adverse anesthetic event	No. of patients (percentage)
Cough/hiccough/chomping on induction	289 (6.96)
Low blood pressure	783 (18.27)
Inappropriate patient movement during surgery	53 (0.12)
Low SpO <sub>2</sub> on pulse oximeter	92 (0.24)
Residual neuromuscular block in recovery	302 (7.2)
Slow-to-regain consciousness in recovery	1,077 (25.9)
Anesthetic turned off too early at the end of operation	18 (0.04)

- Postoperatively, did the patient spend more than 1 hour in recovery (Graph 5):
  - “Yes” – 123 (2.96%); was in recovery for more than 2 hours and
  - “No” – 4,024 (97.03%); was shifted to the postoperative ward
- Percentage of unplanned ICU admission after anesthesia (Graph 6):
  - “Yes” – 187 (4.50%); was shifted to the ICU and
  - “No” – 3,960 (95.49%); was shifted to the postoperative ward
- Anesthesia-related mortality rate: In our audit we did not record any mortality related to anesthesia in patients who were operated during this time period.

**DISCUSSION**

Clinical audit can be defined as “a quality improvement process that seeks to improve patient care and outcomes



**Graph 6:** Percentage of unplanned ICU admission after anesthesia

through systematic review of care against explicit criteria and the implementation of change.”

During anesthesia, we encounter many potential hazards jeopardizing the patient safety. Haller et al<sup>4</sup> from Switzerland state that “clinical indicators are increasingly developed and promoted by professional organizations, governmental agencies, and quality initiatives as measures of quality and performance.” To clarify the number, characteristics, and validity of indicators available for anesthesia care, the authors performed a systematic review. They identified 108 anesthetic clinical indicators, of which 53 related also to surgical or postoperative ward care. Most were process (42%) or outcome (57%) measures assessing the safety and effectiveness of patient care. To identify possible quality issues, most clinical indicators were used as part of inter-hospital comparison or professional peer-review processes. For 60% of the clinical indicators identified, validity relied on expert opinion. The level of scientific evidence on which prescriptive indicators were based showed as high for 38% (Evidence 1a-1b) and low for 62% (Evidence 4-5) of indicators. We feel that additional efforts should be made to develop and validate anesthesia-specific quality indicators.

The use of quality indicators in anesthesia is not widespread in India; there is currently no national standard for comparison of our data. All data for this study were collected from anesthetic charts. We did the audit on a total of 4,147 patients, of whom 60.9% (2,528) were females; about 39 years was the mean age and about 41.4% were ASA group I patients.

In our audit, 96.14% (3,987) patients visited preanesthetic clinic. The British and Irish Society of Anaesthesiologist’s guidelines on preoperative assessment and patient preparation state that “operating sessions and the individual anesthetist’s job plan must be arranged to allow time for the anesthetist responsible for individual’s

care to visit him/her pre-operatively at an appropriate time before surgery.”<sup>2</sup>

In our study, 96.45% of patients were monitored with ECG, SpO<sub>2</sub>, NIBP, and EtCO<sub>2</sub> monitors. Only 3.55% patients didn’t have all the mandatory monitors (EtCO<sub>2</sub>).

It is essential to define the various parameters of care so that it becomes easy to monitor the quality of anesthesia services at a specified time interval. Such indicators can be incorporated into the various standard operating procedures of the department. These indicators are to be periodically rechecked and reviewed.

There was modification of anesthesia plan in only 13.72% (569/4,147) patients. The reasons were no availability of financial support to bring drugs, non-optimization of patient’s co-morbidities, and patient’s preference for a different type of anesthetic technique. There was also unplanned ventilation following anesthesia in only 9.11% (378/4,147) patients. This was due to unexpected surgical pathology, prolonged surgery, and anesthesia with residual neuromuscular paralysis. We also recorded adverse anesthetic events like slow-to-regain consciousness during recovery in 25.9% (1,077) patients and low blood pressure in 18.27% (783) patients.

Anesthetic documentation includes proper history taking, reviewing drug history, history of systemic illness including allergies, adverse drug reactions, substance abuse history, previous anesthesia and surgical experience, current medications, physical examination, planning the anesthetic procedure, requirement of ICU admission, etc. All these parameters can be measured. According to Walczak RM, the adequacy of anesthesia care documentation can also be measured during the surgery and in postoperative recovery room.<sup>2</sup>

A total of 2.96% (123) of patients in this study spent more than 1 hour after the surgery in the recovery room. Operation theater recovery rooms are at times very busy, and it is important to ensure a smooth transfer of patients to the postoperative ward.<sup>3</sup> In our audit, 4.50% (187) patients were shifted to the ICU from operation rooms, reason being slow-to-regain consciousness during recovery in 25.9% (1,077) patients, hypotension in 18.27% (783) patients, and unplanned ventilation in 9.11% (378) patients. We did not record any mortality due to anesthesia in the period of audit we conducted.

As per Haller G study,<sup>4</sup> “quality of anesthesia is closely related to the incidences of pain, post operative nausea and vomiting, overall experience and satisfaction during the recovery period after the surgical procedure.” Such measurements require evidence-based support.<sup>4</sup>

Globally, numerous attempts have been made to assess postoperative patient satisfaction; multiple questionnaires have been developed and validated during

the course of these scientific studies by the respective researchers.<sup>5-12</sup>

Quality of recovery can be assessed by a 9-point scale formulated by Myles et al, which includes items derived from a larger 40-item measurements, such as general well-being, support from others, understanding of instructions, respiratory function, bowel function, nausea, vomiting, pain, and others.<sup>11,12</sup>

In our study, data were collected retrospectively in large number of patients, which we think is the strength of this study. The limitation of this audit is that there are currently no accepted and validated national quality indicators for anesthesia in India to compare our results.

## CONCLUSION

The importance of quality assurance and quality control is rapidly gaining popularity in anesthetic practice. This audit of quality indicators found several areas of weaknesses as mentioned above. It is desirable to have further research in this area, so as to adopt such principles into the day-to-day anesthetic practice. It is also desirable to know the in-depth significance of major and minor critical events. We can address these by incorporating the suitable remedial measures. All anesthetic departments should audit the quality of their service, and the results should be shared and published.

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