An Audit of Comparison of Perioperative Outcomes with the Introduction of Standardized Preoperative Evaluation form at a Tertiary Care Hospital in Rural India

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Abstract

Introduction: Preoperative evaluation of a patient is the fundamental component of anaesthetic practice. Inadequate documentation and record keeping on the preoperative evaluation form (PEF) can be a major obstacle to attaining good practice and improving patient outcomes following operative procedures. Aim: The aim of the study was to conduct an audit to assess the quality of the preoperative anaesthetic information gathered and to observe the quality profile after the introduction of a standardized pre-operative evaluation form. Study Design: This was a retrospective study, using a sample of 3000 files of patients who underwent elective surgery in a tertiary care hospital of rural India. We devised 11 quality indicators, looking at factors in the pre-operative, peri-operative and post-operative period, and used them to audit 3000 patient records in our Hospital. Results: We found several areas where quality could be significantly improved; last minute postponement/change of plan of planned surgeries has reduced from 134 (8.9%) to 23 (1.53%) cases after implementation of standardised PEF. 784 (52.26%) patients were not formally handed over to the theatre recovery staff before implementation of standardised PEF compared to 147 (9.8%) after implementation of standardised PEF. Conclusion: This audit found several areas of practice that fall below expected standards before the introduction of standardised PEF, but after the introduction of standardised PEF there is a significant improvement in quality of pre anaesthetic evaluation and overall outcome of the patient. We therefore advocate the use of such standardised PEFs for performing preoperative and perioperative assessment of surgical patients.

Keywords: Anesthesia audit, perioperative evaluation form, perioperative outcomes

INTRODUCTION

The study was conducted to understand how anesthetists at tertiary care hospital in rural India completed preoperative assessments of their patients using the preoperative evaluation form (PEF) before and after introduction of standard PEF and to observe the quality profile after the introduction of a standardized PEF.

Anesthetists are responsible for the preoperative assessment of the patients whom they anesthetize. The aim of assessing the patients is to improve the operative outcomes.[1]

The previous method of preoperative preparation practices at tertiary care hospital in rural India for elective surgical patients involved reviewing the patient a day before the elective operation, examining the results ordered by the surgeons, ordering premedication drugs, and documenting any findings in the PEF compared currently which involves printed standardized PEF.

Inadequate documentation and record-keeping in the PEF is one of the biggest obstacles to attaining good practice and improving patient outcomes. The American Society of
Anesthesiologists (ASA) ethical guidelines for the practice of anesthesiology state that “anesthesiologists have ethical responsibilities to their patients and should provide a preoperative evaluation.”[2] A comprehensively completed PEF is an important tool in the anesthetic management of a patient and plays a significant role in the medicolegal arena.[3] The Australian Incident Monitoring Study reported that inadequate preoperative assessment and management were associated with a six-fold increase in patient mortality.[4] Conversely, the quality of information recorded during the preanesthetic visit is improved using a standardized form.[3] The information obtained then tends to be complete and concise. An audit of anesthetic record-keeping conducted at the Christiana Barnard Memorial Hospital, Cape Town, revealed that less than one-third of all records were found to be complete and legible. The authors reported an unacceptable standard of anesthesia record-keeping.

As the above-mentioned type of audit had not yet been undertaken in the specified setting, it was difficult to estimate the magnitude of the problem. The aim of the study was to conduct an audit to assess the quality of the preoperative anesthetic information gathered and to observe the quality profile after the introduction of a standardized PEF.

**Methods**

We devised 11 quality indicators of care in anesthesia, looking at the preoperative, perioperative, and postoperative periods. In keeping with current research on the effectiveness of quality indicators in clinical practice, we concentrated on indicators that were transparent, reliable, measurable, and improvable.

**Data collection**

The case notes of each patient were reviewed by a team of four anesthetists. A review of case notes took place between January 2015 and August 2015 and compared it with case notes after introduction of standardized PEF from September 2015 to February 2016. The following data were recorded from each patient’s anesthetic chart.

- ASA status (1–4)
- Preoperatively – Did the patient have a preoperative visit on the day before surgery? If the anesthetic history on the front of the anesthetic chart was completely blank, it was recorded as “no” and if anything at all was written, it was recorded as “yes”
- Preoperatively – Is the PEF is easy and understandable for new residents?
- Preoperatively – Is there any last minute postponement or change of plan due to mistakes or missing of information in PEF?
- Perioperatively – Was there documentation is of the minimum standards of monitoring (saturations/heart rate and ECG every 5 min, vapor (if used), inspired fraction of oxygen, exhaled partial pressure of carbon dioxide, and airway pressure (if ventilated)). If any of these were missing, it was recorded as “no”
- Postoperatively – Did the anesthetist hand the patient over to recovery staff? The anesthetic charts have a specific section for recovery handover. If it was blank, it was recorded as “no” and if anything at all was written, it was recorded as “yes”
- Postoperatively – If the patient was a day case, was there an unplanned overnight admission?
- Postoperatively – Was there an unplanned admission from recovery to the ICU?
- Postoperatively – Was there a critical incident in recovery? If an incident was documented on the anesthetic chart, it was recorded as “yes” and if no incident was recorded on the anesthetic chart, it was recorded as “no”
- Postoperatively – Did the patient spend more than 2 h in recovery?

**Statistical analysis**

Categorical data were compared using Chi-square test and Fisher’s exact test. The statistical tests were performed using Microsoft Excel version 14.2.2 (Microsoft, Redmond, USA) and SPSS version 14.0 (SPSS Inc. an IBM company, Chicago, Illinois, USA). \( P < 0.05 \) is taken as statistically significant.

**Results**

A total of 3000 patient records were audited and included in the final dataset. We have taken 1500 patients in each group (1500 patients from January 2015 to August 2015 under Group A and 1500 patients from September 2015 to February 2016 under Group B).

**Patient demographics**

There were 1674 (55.8%) females and 1326 (44.2%) males. The mean age was 44 years (range 0–71, standard deviation 25). The majority of patients were ASA I/II [Table 1 and Figure 1].

**Quality indicators**

The results of the quality indicators are summarized below [Table 2 and Figure 2].

**Preoperatively**

We have asked the new residents about convenience of doing preoperative evaluation. Of nine new residents, eight residents

| Table 1: Patient demographics |
|-------------------------------|
| **Demographic** | **Variable** | **Group A** | **Group B** |
| **(n=1500)** | **(n=1500)** |
| **Gender, n (%)** | Female | 796 (55.06) | 768 (51.2) |
| | Male | 704 (44.94) | 732 (48.8) |
| **Age (years)** | Mean | 44 | 44 |
| | Range | 0-71 | 0-71 |
| | SD | 25 | 25 |
| **ASA*, n (%)** | I | 708 (47.2) | 727 (48.46) |
| | II | 602 (40.13) | 580 (38.66) |
| | III | 184 (12.26) | 188 (12.53) |
| | IV | 6 (0.4) | 5 (0.33) |

*American Society of Anesthesiologist. SD=Standard deviation
are more convenient with new standardized PEF. Therefore, satisfaction level of new residents has been significantly improved after introduction of standardized PEF.

One thousand four hundred and twenty-one (94.73%) anesthetic charts have proper documentation of drug history (dosage, duration, and present status) after implementation of standardized PEF compared to 934 (62.2%) before standardized PEF. Our values are in accordance with benchmarks set by hospital quality surveillance department which is >95%.

Last minute postponement/change of plan of planned surgeries has reduced from 134 (8.9%) to 23 (1.53%) cases after implementation of standardized PEF. Our values are in accordance with benchmarks set by hospital quality surveillance department which is <5%.

**Perioperatively**
- The median anesthetic time was 12 min (range 1–120, interquartile range [IQR] 14)
- Five hundred and six (33.73%) anesthetic charts did not have monitoring documented to minimum standards before implementation of standardized PEF compared to 994 (66.26%) after implementation of standardized PEF. Our values are in accordance with benchmarks set by hospital quality surveillance department which is >75%.

![Figure 1: Patient demographics. Group A: Before introduction of standardized preoperative evaluation form, Group B: After introduction of standardized preoperative evaluation form. ASA: American Society of Anesthesiologist.](image)

![Figure 2: Quality indicators before and after standardized preoperative evaluation form. Series 1: Before introduction of standardized preoperative evaluation form, Series 2: After introduction of standardized preoperative evaluation form.](image)

**Table 2: Quality indicators before and after standardised PEF**

| Stage                  | Quality indicator                                                                 | Hospital Benchmarks | Hospital performance | Y/N %       | Previous PEF | Current PEF | P value |
|------------------------|------------------------------------------------------------------------------------|---------------------|----------------------|-------------|--------------|-------------|---------|
| Pre-operative          | Ease of doing *PAC* by the new residents                                           | *NA                 | *NA                  | Y (n, %)    | 1 (11.11%)  | 8 (88.89%)  | 0.034   |
| Pre-operative          | Documentation of Drug history                                                      | 95%                 | 95.63%               | Y (n, %)    | 934 (62.2%) | 1421 (94.73%) | 0.0000  |
|                       | Documentation of Drug history                                                      |                     |                      | N (n, %)    | 566 (37.8%) | 79 (5.27%)  |         |
| Pre-operative          | Last minute postponement/change of plan                                            | <5%                 | 2.63%                | Y (n, %)    | 134 (8.9%)  | 23 (1.53%)  | 0.0001  |
| Peri-operative         | Documentation of peri-operative parameters monitoring?                           | >75%                | 70.5%                | Y (n, %)    | 994 (66.26%)| 1136 (75.73%)| 0.0001  |
| Peri-operative         | Anaesthetic time (minutes)                                                         | * NA                | *NA                  | Median      | 12           | 12          |         |
|                       |                                                                                   |                     |                      | Range       | 1-120        | 1-120       |         |
|                       |                                                                                   |                     |                      | IQR         | 14           | 14          |         |
| Post-operative         | Handover to recovery staff?                                                        | >90%                | 68.9%                | Y (n, %)    | 716 (47.73%)| 1353 (90.2%)| 0.0001  |
|                       |                                                                                   |                     |                      | N (n, %)    | 784 (52.26%)| 147 (9.8%)  |         |
| Post-operative         | Unplanned overnight admission?                                                     | <0.5%               | 0.03%                | Y (n, %)    | 6 (0.4%)    | 2 (0.13%)   | 0.1567  |
|                       |                                                                                   |                     |                      | N (n, %)    | 1494 (99.6%)| 1498 (99.87%)|         |
| Post-operative         | Unplanned ICU admission from recovery?                                             | <5%                 | 0.28%                | Y (n, %)    | 14 (0.93%)  | 12 (0.8%)   | 0.6936  |
|                       |                                                                                   |                     |                      | N (n, %)    | 1486 (99.07%)| 1488 (99.2%)|         |
| Post-operative         | Critical incident in recovery?                                                     | <1%                 | 0.41%                | Y (n, %)    | 4 (0.26%)   | 2 (0.13%)   | 0.4157  |
|                       |                                                                                   |                     |                      | N (n, %)    | 1496 (99.74%)| 1498 (99.87%)|         |
| Post-operative         | Time spent in recovery (minutes)                                                   | * NA                | * NA                 | Median      | 38           | 38          |         |
|                       |                                                                                   |                     |                      | Range       | 1-1519       | 1-1519      |         |
|                       |                                                                                   |                     |                      | IQR         | 34           | 34          |         |
| Post-operative         | Stay in recovery of over 2 hours?                                                  | <5%                 | 3.4%                 | Y (n, %)    | 54 (3.6%)   | 46 (3.06%)  | 0.4158  |
|                       |                                                                                   |                     |                      | N (n, %)    | 1446 (96.4%)| 1454 (96.94%)|         |

*PAC=Preanaesthetic check up. PEF=Pre operative evaluation form, *NA=Not Applicable. ≤Y/N=Yes/No., ΩIQR=Interquartile range
Postoperatively

- Seven hundred and eighty-four (52.26%) patients were not formally handed over to the theater recovery staff before implementation of standardized PEF compared to 147 (9.8%) after implementation of standardized PEF. Our values are in accordance with benchmarks set by hospital quality surveillance department which is >90%.
- Four (0.26%) patients had a critical incident in recovery before implementation of standardized PEF compared to 2 (0.13%) after standardized PEF. Our values are in accordance with benchmarks set by hospital quality surveillance department which is >90%.
- Six (0.4) patients had an unplanned overnight hospital admission from theater recovery before implementation of standardized PEF compared to 2 (0.13%) after standardized PEF. Our values are in accordance with benchmarks set by hospital quality surveillance department which is <1%.
- Fourteen patients (0.93%) had an unplanned admission to the ICU from theater recovery before implementation of standardized PEF compared to 12 (0.8%) after standardized PEF. Our values are in accordance with benchmarks set by hospital quality surveillance department which is <5%.
- The median time spent in recovery was 38 min (range 1–1519, IQR 34).
- Fifty-four (3.6%) patients had a stay in recovery of more than 2 h before implementation of standardized PEF compared to 46 (3.06%) after standardized PEF. Our values are in accordance with benchmarks set by hospital quality surveillance department which is <5%.

Discussion

Clinical audit can be defined as “a quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria and the implementation of change.”[6] The use of quality indicators in anesthesia is not widespread in India, and there is currently no national standard for comparison of our data. Where applicable we have used guidelines published by the AAGBI for comparison.

All data for this study were collected from case notes. The anesthetic charts in use at the time of the audit include discretely labeled sections for the documentation of the first four quality indicators. The 2012 GMC guidance on “good medical practice” clearly states that “you must record your work clearly, accurately, and legibly at the same time as the events you are recording or as soon as possible afterward,” and that “clinical records should include relevant clinical findings, and the decisions made.”

Preoperatively

One hundred and five (7%) patients were not seen by an anesthetist on the day before surgery before implementation of standardized PEF compared to 2 (0.13%) patients after implementation of standardized PEF. The AAGBI 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 an individual’s care to visit him/her preoperatively at an appropriate time before surgery.”[7] The guidelines also state that “the standards and principles for the care of elective patients apply equally to those admitted in an emergency, even though it is often more difficult to achieve them.” The standard for preoperative assessment should, therefore, be 100%. Last minute postponement/change of plan due to irregularities in PEF is quite stressful to patient and family leads to wastage of resources as well as disturbs the OR schedules and the mind-set of the operating surgeon and the anesthesiologist. After the implementation of the standardized PEF, we observed that such postponements of surgeries have significantly reduced from 8.9% to 1.53% ($P = 0.0001$). This was one major area of improvement in the perioperative outcomes, and it was well within the limits of hospital quality surveillance guidelines.

Perioperatively

Five hundred and six (33.73%) anesthetic charts did not have monitoring documented to minimum standards before implementation of standardized PEF compared to 364 (24.27%) anesthetic charts after implementation of standardized PEF. The AAGBI “regards it as essential that certain core standards of monitoring must be used whenever a patient is anesthetized. These minimum standards should be uniform irrespective of duration, location, or mode of anesthesia.”[8] The standard should, therefore, be 100%. Documentation of perioperative parameters monitoring has significantly improved after implementation of standardized PEF ($P = 0.0001$). This helps in better record keeping, retrieving of records whenever necessary and even during medicolegal queries. These parameters were in accordance with hospital standard benchmarks.

Postoperatively

- Seven hundred and eighty-four (52.26%) patients were not formally handed over to the theater recovery staff before implementation of standardized PEF compared to 147 (9.8%) after implementation of standardized PEF. The AAGBI states that “the anesthetist must formally hand over care of a patient to a recovery room nurse or other appropriately trained member of staff.”[9] Guidelines emphasizing the importance of handovers between teams are widespread in medical practice.[10] Of note, 4 (0.26%) patients had a critical incident in recovery before implementation of standardized PEF compared to 2 (0.13%) after standardized PEF.
- Six (0.4) patients had an unplanned overnight hospital admission from theater recovery before implementation
of standardized PEF compared to 2 (0.13%) after standardized PEF, and 14 patients (0.93%) had an unplanned admission to the ICU from theater recovery before implementation of standardized PEF compared to 12 (0.8%) after standardized PEF. Previous studies have shown unplanned hospital admission rates for day case surgery of around 4.7%.[11] In recent years, the complexity of surgery has increased while the range of patients considered for day case surgery has continued to widen. The Department of Health (DoH) suggests that “patients undergoing most intermediate and some major operations should be considered for day surgery as the norm,” with a target of 75% of patients operated on as a day case.[12] Both the DoH and the AAGBI recommend that “unplanned admission should be recorded and audited.”

The median time spent in recovery was 38 min (range 1–1519, IQR 34), and 54 (3.6%) patients had a stay in recovery of more than 2 h before implementation of standardized PEF compared to 46 (3.06%) after standardized PEF. Theater recovery areas are often very busy, and it is vital to ensure a smooth transition of patients to the ward environment. After the implementation of standardized PEF, handover of patients to theater recovery staff has significantly improved from 47.73% to 90.2% ($P = 0.0001$) which helps in better postoperative outcome and minimal critical incidents in recovery room. These parameters were also in accordance with hospital standard benchmarks.

The strength of this audit lies in the high number of case notes analyzed. Data were collected retrospectively, approximately 1 year subsequent to the date range of the dataset. Therefore, it is an accurate reflection of the practice in that time period. The use of standard anesthetic charts combined with a data collection pro forma allowed for reliable and reproducible data collection.

The limitation of this audit is that there are currently no national quality indicators for anesthesia in India. We devised our own set to allow us to audit local practice.

**Conclusions**

This audit of quality indicators found several areas of practice that were below expected standards before implementation of standardized PEF. However, after implementation of standardized PEF, we found significant improvement in the following parameters:

- Ease of doing preassessment clinic by new residents
- Documentation of drug history
- Last minute postponement or change of plan
- Documentation of perioperative parameters in accordance with standardized protocol
- Communication with postoperative care unit.

These parameters were also at par with quality benchmarks set by the institute in accordance with standard hospital accreditation guidelines.

To the best of our knowledge, this is the first audit of anesthetic quality indicators in India. The quality indicators would be suitable for use in most anesthetic departments in India. Periodic review and modifications of anesthesia documentation and audit of perioperative quality indicators in accordance with requirements of hospital assessing authorities will improve perioperative documentation which should improve the quality of perioperative care of the patient.

**Recommendations**

We recommend periodic review and modifications of anesthesia documentation and audit of perioperative quality indicators in accordance with requirements of hospital assessing authorities will improve perioperative documentation, which should improve the quality of perioperative care of the patient.

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**Conflicts of interest**

There are no conflicts of interest.

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