Original Article

Accuracy of Data Obtained from Post-Anesthesia Visits

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Objective: To assess the accuracy of data obtained from post-anesthesia visits conducted by nurse anesthetists, to quantify patient satisfaction with those visits, and to determine the time and the walking distances incurred while undertaking the visits.

Materials and Methods: A retrospective and cross-sectional descriptive study was conducted. Data relating to 101 patients who had experienced complications that had been reported to the hospital's Risk Management Unit were retrieved. Subsequently, data on the patients were extracted from their post-anesthetic records and compared with several other databases. The level of documentation accuracy, types of data entry inaccuracies, and patient satisfaction levels were evaluated. In addition, the time, distance, and number of steps involved while each nurse executed their daily post-anesthesia visits were recorded.

Results: The post-anesthesia visit data were found to have an inaccuracy rate of 81.2%. There was no significant difference in the demographic data for the accurate and inaccurate patient-groups. On a 5-point rating scale, patient satisfaction with the nurse anesthetists' visits was 4.49±0.65. The nurse anesthetists spent an average of 4.03±1.16 hours walking, representing a distance of 2.34 kilometers, to conduct a mean of 31 patient visits daily.

Conclusion: Accuracy, relevance, completeness, timeliness, and confidentiality as the basis of quality medical records are required to improve the standard of anesthetic care. Systematic problem solving for the post-anesthesia visit process should be conducted.

Keywords: Accuracy, post-anesthesia visit, data, satisfaction

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A post-anesthesia visit is the process of following up patients after anesthesia. In 1934, it was recommended that anesthesiologists should visit their patients within two days of anesthesia to evaluate their condition and obtain feedback[1]. A period of 12 to 24 hours after anesthesia has been identified as the optimum time for a post-anesthesia visit[2]. Nurse anesthetists who visit patients are able to report any problems they identify to responsible anesthesiologists and ward nurses, who can initiate immediate treatment or provide appropriate instructions[3]. The detection of anesthesia-related complications and the determination of patients' satisfaction levels during the daily post-anesthesia visits is related to the types of anesthesia used[4]. Information from the patients can be obtained by questioning them for any anesthesia-related complications, and satisfaction levels measured by generating a patient-satisfaction score.

The post-anesthesia visit process at the Department of Anesthesiology, Siriraj Hospital, commences with a post-anesthesia nurse collecting the anesthetic and post-anesthesia records from each operating suite in the hospital, planning a route for visits, walking from point to point within the hospital premises, interviewing the visited patients, completing documentation, reporting eventful cases, and returning forms to the anesthesiology department for data collection. However, clear standards of practice for the conduct of the post-anesthesia visits had not been established. All of the problems were seen to be contributing to inaccuracies in quantitative and qualitative information, which was wasteful of

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resources.

The anesthetic record form was designed for anesthesiologists to record patient data during the pre-, intra- and post-anesthesia periods. The data documented in the form provides details of the anesthetic drugs given, and helps to establish how well patients were being looked after at any perioperative time point[5]. This information is also admissible in court as evidence, is a valuable source of data for researchers, and can be used to improve the quality of patient care. However, an annual report of the Department of Anesthesiology, Faculty of Medicine, Siriraj Hospital (2012) demonstrated that 62% of anesthetic records were inaccurate.

Medical record auditing is a quality control process providing evidence of the quality of patient care[6]. Accurate documentation offers several clinical advantages. Having access to such data is a fundamental need of a hospital's management, and having accurate information can significantly improve the management of the organization. High quality information can also be used at the operational, decision-making and planning levels[7]. Information that can be used should be objective and be easily and safely accessed[8].

To develop standard practices for the conduct of the post-anesthesia visits at Siriraj Hospital, the authors decided to analyze the current post-anesthesia visit process employed by the Department of Anesthesiology. The primary objective of this study was to assess the level of accuracy of the data obtained during post-anesthesia visits within the hospital through a retrospective chart review. The secondary objectives were to quantify patient satisfaction with post-anesthesia visits, and to calculate the average time and walking distance for each post-anesthesia nurse in daily practice as a prospective data gathering.

Materials and Methods

After approval by the Siriraj Institutional Review Board (Si. 416/2017), a retrospective and cross-sectional descriptive study of post-anesthesia visit data was undertaken at Siriraj Hospital. A total of 161 reports of adverse events had been reported to the hospital's Risk Management Unit during the preceding 2 years. Data relating to 101 patients with anesthetic complications that had been reported to the hospital's Risk Management Unit were randomly retrieved. The perioperative data from the post-anesthetic records were compared with information from other sources, such as the patients' risk management reports and medical records. The auditors were 2 experienced anesthesiologists and 2 experienced nurse anesthetists. They examined the post-anesthesia data together to achieve a consensus.

The inaccuracies encompassed errors in pain documentation (inconsistencies in the documented pain management techniques and in the scores on the numeric rating scale for pain) as well as errors in anesthesia-related complication details (complication unreported, the severity of complication unreported, incorrect in the timing records of adverse events, and incomplete complication reported) (Figure1). Demographic data were also collected; they included age, sex, details of any complications, and the surgical risk (using surgery-specific factors to predict the cardiac risk: low-risk, such as with superficial surgery; intermediate-risk, as with intra-thoracic and intra-peritoneal surgery; and high-risk, such as with aortic and major vascular surgery)[9].

To evaluate the workload during post-anesthesia visit periods, each nurse's total visit time, walking distance, and number of steps were recorded by a stopwatch and a calibrated pedometer. Items for evaluation included patients' satisfaction with aspects of the post-anesthesia visit process, the timing aspects of the visit, and the nurse anesthetists' behavior and interactions, as well as the patients' overall level of satisfaction with the visit. Non-nurse research assistants investigated the patients' satisfaction levels, using a five-point rating scale (1 = least satisfactory, 2 = less satisfactory, 3 = moderately satisfactory, 4 = satisfactory, and 5 = most satisfactory).

The inclusion criteria for the retrospective study were the 101 cases of adult and child patients who had had adverse events and had been reported to the hospital's Risk Management Unit in the preceding 2 years; outpatients were excluded as they were not visited after anesthesia. The cross-sectional descriptive study criteria included nurse anesthetists from the Department of Anesthesiology who had at least 3 years' post-anesthesia-visit experience. The 101 post-anesthesia visit cycles were monitored to assess the workload of nurse anesthetists. 100 patients who had received a post-anesthesia visit were enrolled to evaluate their satisfaction with the visits.

Statistical analysis

From an analysis of the accuracy of medical records reported in a schizophrenia-related study, the sample-size estimate for an infinite population proportion was calculated. Clinical interviews in that

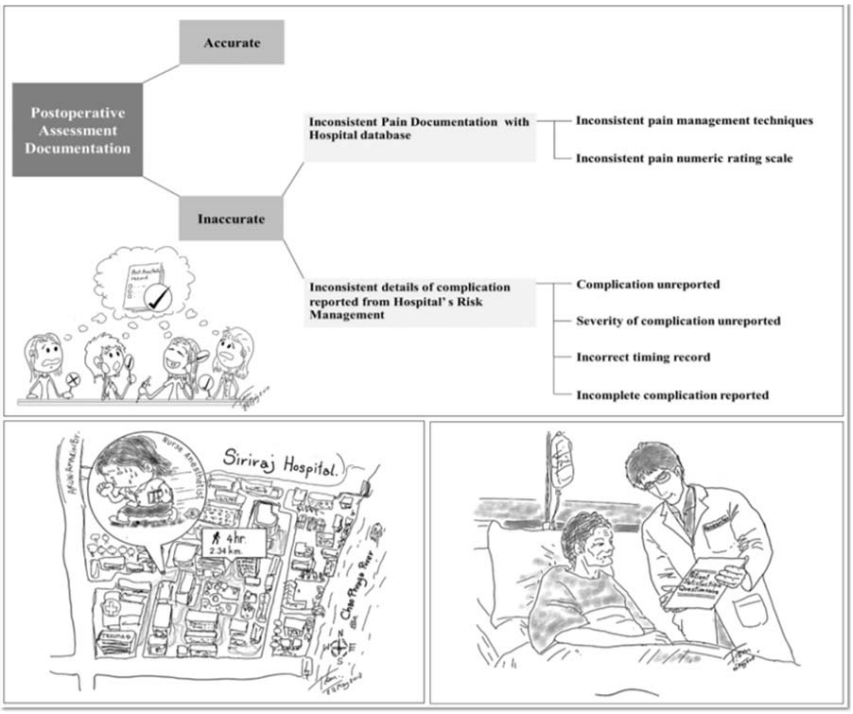

Figure 1. Scheme of data collection process.

study determined that 62% of the total study cohort had psychotic symptoms, yet only 45% of that group had those symptoms entered in their records[10]. Using a 95% confidence interval [CI] with an accuracy expectation of 45% and an allowable error of 10%, the sample size for our study was calculated to be 100 cases. The statistical analysis was performed using the software program, SPSS Statistics for Windows, version 18.0 (SPSS Inc., Chicago, Ill., USA). Demographic data were reported as percentages, means and standard deviations. We used the independent Student's t-test, the chi-squared test, or Fisher's exact test for the statistical analyses, with a 95% confidence interval [CI].

Results

In the present study, 101 anesthetic records and post-anesthesia visit records were reviewed. An inaccuracy level of 81.2% was found for the post-anesthesia visit data. There were no significant differences in age, sex, surgical risk, American Society of Anesthesiologists [ASA] classifications, or perioperative complications for the records associated with patients in the accurate and inaccurate record-groups. The adverse incidents which had not been noted in Siriraj Hospital's post-anesthesia visit records included airway and respiratory events, 26.3%; death, 21.1%; cardiac arrest, 15.8%; drug errors, 21.1%; organ injuries, 5.3%; neurological complications, 5.3%; and other events, such as massive blood loss, sepsis, and abnormal electrocardiography, 5.3% (Table 1).

The causes of inaccuracy were complication unreported, 52.4%; the severity of the complication unreported, 29.3%; inconsistencies in the documented pain management techniques, 25.6%; inconsistencies in the scores on the numeric rating scale for pain, 14.6%; incorrect timing record of adverse events, 12.2%; incomplete complication reported, 12.2% (Figure 2). To evaluate the workload during post-anesthesia visit periods, 36 nurse anesthetists were enrolled. Their daily walking distances were monitored, and the number of patients they visited and the time spent on those visits each day were recorded. On average, the nurse anesthetists walked for 4.03$\pm$1.16 hours over a distance of 2.34 kilometers to visit 20 to 50 patients daily (Table 2). Patient satisfaction with the post-anesthesia visits was evaluated using a 5-point Likert scale. The satisfaction levels were predominantly 4 (satisfactory) or 5 (most satisfactory), with an overall post-anesthesia visit score of 4.49$\pm$0.65. The least satisfactory score related to one aspect of staff

Table 1. Demographic data of patients with anesthetic complications

Data	(n = 101)		*p*-value
	Accurate (n = 19)	Inaccurate (n = 82)	
Age (year)	42.74±29.51	51.15±23.93	0.190
Sex: Male	9 (47.4)	34 (41.5)	0.797
Surgery			0.530
Low risk	4 (21.1)	28 (34.1)	
Intermediate risk	6 (31.6)	20 (24.4)	
High risk	9 (47.4)	34 (41.5)	
Type of Surgery			0.763
Emergency	14 (73.7)	64 (78.0)	
Elective	5 (26.3)	18 (22.0)	
ASA classifications			0.172
Class I	4 (21.1)	5 (6.1)	
Class II	6 (31.6)	31 (37.8)	
Class III	4 (21.1)	28 (34.1)	
Class IV	3 (15.8)	15 (18.3)	
Class V	2 (10.5)	3 (3.7)	
Complication in operating theatre	16 (84.2)	54 (65.9)	0.266
Complication in post-operative period	8 (42.1)	40 (48.8)	0.215
Events			
Airway and respiratory complications	5 (26.3)	8 (19.0)	
Death	4 (21.1)	2 (4.8)	
Cardiac arrest	3 (15.8)	10 (23.8)	
Drug error	4 (21.1)	7 (16.7)	
Organ injury	1 (5.3)	4 (9.5)	
Neurological complication	1 (5.3)	8 (19.0)	
Others	1 (5.3)	3 (7.1)	

The data are presented as mean□standard deviation or n (%)
ASA = American Society of Anesthesiologists; Others = Other complications that occurred such as massive blood loss, sepsis, and abnormal electrocardiography

behavior and patient interaction, namely, 4.18±0.85 for the showing of the staff member's identification card (Table 3).

Discussion

An inaccuracy level of 81.2% was found for the post-anesthesia visit data. There were no significant differences in the age, sex, surgical risks, American Society of Anesthesiologists [ASA] classifications, or perioperative complications for the records associated with patients in the accurate and inaccurate record-groups. On average, the nurse anesthetists walked for 4 hours over a distance of 2.34 kilometers to visit 31 patients daily. The evaluation of the patients' satisfaction with the post-anesthesia visits showed an overall post-anesthesia visit score of 4.49±0.65.

Post-anesthesia visits form an important part of perioperative care. They permit anesthesia-related complications to be detected while increasing patient satisfaction[11]. Information and comments from the visited patients promote improvements in anesthesia care; furthermore, they benefit research and the development of practice guidelines. During the post-anesthesia period, any complications related to the anesthesia which had occurred can be managed and explained to the patients and their family. The recording of the identified complications can also aid in the provision of a safe anesthesia in the future.

Inaccurate documentation in medical records is wasteful in terms of the additional workloads that it generates and the making of inappropriate decisions based on unreliable data. Inaccurate or incomplete information makes a system less useful, negatively impacting on the implementation of perioperative care

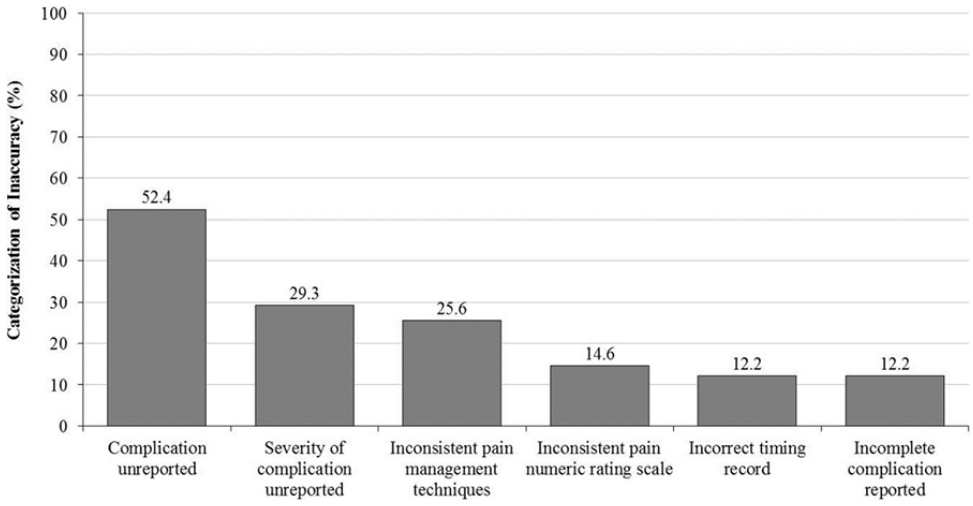

Figure 2. Categorization of inaccuracies in post-anesthesia documentation and hospital database.

Table 2. Characteristics of post-anesthesia nurses and their workloads

Items	
Age of nurse anesthetist who participate in post-anesthesia visits (year)	35.63±8.62
Sex: female (%)	34 (96.04)
Number of patients visited (cases)	30.88±10.69
Hours spent per post-anesthesia visit period (hr)	4.03±1.16
Distance walked per post-anesthesia visit period (km)	2.34±0.68

The data are presented as mean ± standard deviation or n (%)

guidelines and the associated workloads, and undermining the benefits that are obtainable from post-anesthesia visits. Nevertheless, in the majority of institutions, there are no established protocols for the conduct of post-anesthesia visits[2].

A high rate of inaccuracy was found in medical records in this study, with an inaccuracy rate of 81.2% in the postoperative round reports. As evident in Figure 2, the most common cause of inaccuracy was complication unreported in accordance with the hospital's risk management protocol (52.4%). Incomplete complication reported on those were also high (12.2%), while there was great variability in the amount and quality of information recorded by different nurse anesthetists.

As for the post-anesthesia record form, ambiguities and a lack of clarity in the form resulted in the entry of inaccurate and/or incomplete data during the perioperative period, which is when the post-anesthesia visit nurses require that information to investigate patients in the wards. Complexities and difficulties finding the details of events in medical records also contributed to incompleteness. One study found that having standardized medical records that consisted of objective items improved the accuracy of information entered in the medical records[12]. Elhalawani et al found that having a lack of recorded information relating to the intraoperative period was one of the major causes of inaccurate and incomplete data subsequently being entered in post-anesthesia records[13].

Moving on to the process utilized for the post-anesthesia visits, the visit objectives and the methods to be used to conduct the visits were not clearly stated in a protocol or communicated to staff. As a result, information was recorded in different ways. Auditing and nurse-anesthetist feedback for new staff should greatly help to improve the quality of post-anesthesia visits. As mentioned earlier, the review and auditing of medical records have also been recommended as the

Table 3. Patient satisfaction with post-anesthesia visits

Information	Satisfaction score (n = 100)
Post-anesthesia visit process	
Introduction of themselves before visit	4.30±0.74
Interviewing and questioning regarding complications	4.44±0.63
Instructions about complications	4.20±0.63
Overall score from visit process	4.31±0.67
Timing	
Post-anesthesia visit timing	4.35±0.66
Duration of post-anesthesia visit	4.32±0.70
Overall score from visit time	4.34±0.68
Staff behavior and interactions	
Showing of identification card	4.18±0.85
Knowledge sharing and answering about complications	4.57±0.61
Enthusiasm and willingness to serve	4.59±0.62
Manner and relationship	4.68±0.55
Overall score from visiting staff	4.61±0.59
Overall post-anesthesia visit	4.49±0.65

The data are presented as mean□standard deviation or n (%)
Rating levels: 1 = least satisfactory, 2 = less satisfactory, 3 = moderately satisfactory, 4 = satisfactory, 5 = most satisfactory

"gold standard", and have provided the best data for administrative validation[14,15].

Postoperative visits are fundamental. This process can enhance the degree of patient satisfaction even when the patients are not visited by the anesthesiologist who administered the anesthesia. A high level of satisfaction with the post-anesthesia visits was found by this study (4.49±0.65; Table 3). However, the nurse anesthetists who visited the patients had a high workload during their post-anesthesia visits. Each of the 3 nurse anesthetists took on average 4 hours to visit around 31 patients on foot per day, and additional time was spent on various processes, such as retrieving anesthetic records and post-anesthesia record forms, assessing pain scores, informing anesthesiologists about complications, and managing those complications.

There were several limitations to the present study. First, as it was a retrospective study, incompleteness in the documents may have occurred. In addition, data were retrieved from patients who had experienced complications that had been reported to the hospital's Risk Management Unit. This led to selection bias in the data collection process. Complexities and difficulties finding details of events in the medical records of patients with complication created inaccuracies in the documentation. This can result in an overestimate of the inaccuracy rate compared to the general post-anesthesia visit report. A prospective study is warranted to assess the accuracy of the overall post-anesthesia visit reports. Nevertheless, the data from those patients with complications can be used for systematic problem solving and can be used to identify failings in the post-anesthesia visit process. The association between the inaccuracy of the data obtained during post-anesthesia visits and visiting nurses' workloads should also be investigated.

Conclusion

The anesthetic records and post-anesthesia record forms used during the post-anesthesia visits were shown to have a high rate of inaccuracy, and a high level of resources was needed for the documentation and visitation process. Accuracy, relevance, completeness, timeliness and confidentiality as the basis of quality medical records are required to improve the levels of anesthetic care. Systematic problem solving of the post-anesthesia visit process should be conducted.

What is already known on this topic?

A post-anesthesia visit is an important process of following up patients after anesthesia. The data documented in anesthetic records help to establish how well patients are being looked after at any perioperative time point. Inaccurate documentation in medical records is wasteful in terms of the additional

workloads that it generates and the making of inappropriate decisions based on unreliable data.

What this study adds?

The present study assessed the levels of accuracy of the collected data, identified the degree of patient satisfaction with post-anesthesia visits, and determined the time and distances involved in those visits. A high rate of inaccuracy was found in the postoperative round reports. The causes of the inaccuracies were identified. The findings from this study will form a baseline for systematic problem solving of the identified failings of the post-anesthesia visit process.

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Potential conflicts of interest

The authors declare no conflict of interest.

References

1. Hesse F, Lendle L, Schoen R. General anesthesia and local anesthesia. Summary for pharmacological and clinical practice. New York: Barth; 1934.
2. Bajwa SJ, Takrouri MS. Post-operative anesthesia rounds: Need of the hour. Anesth Essays Res 2013; 7:291-3.
3. Garfield JM, Garfield FB, Kodali B, Sarin P, Liu X, Vacanti JC. A postoperative visit reveals a significant number of complications undetected in the PACU. Perioper Care Oper Room Manag 2016;2:38-46.
4. Fink T, Rensing H, Volk T, Huhn R, Mathes AM. The practice of postanesthesia visits-a questionnaire study. Rev Bras Anestesiol 2017;67:571-7.
5. Juthasantikul W, Thiangchanya P, Nasae T. The perceptions of nurse anesthetists regarding head nurse anesthetists' safety management and nurse anesthetists' safety practices for patients under anesthesia in secondary and tertiary hospitals, southern Thailand. Songkla Med J 2015;3:121-37.
6. National Health Security Office (NHSO). Medical record audit guideline. Bangkok: Union Ultra Violet; 2010.
7. Frangopol DM. Life-cycle performance, management, and optimization of structural systems under uncertainty: Accomplishments and challenges. Struct Infrastruct Eng 2011;7:389-413.
8. Marshall L, De la Harpe R. Decision making in the context of business intelligence and data quality. J Manag Inf Syst 2009;11:1-15.
9. Kristensen SD, Knuuti J, Saraste A, Anker S, Botker HE, Hert SD, et al. 2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management: The Joint Task Force on non-cardiac surgery: cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA). Eur Heart J 2014;35:2383-431.
10. Cradock J, Young AS, Sullivan G. The accuracy of medical record documentation in schizophrenia. J Behav Health Serv Res 2001;28:456-65.
11. Saal D, Heidegger T, Nuebling M, Germann R. Does a postoperative visit increase patient satisfaction with anaesthesia care? Br J Anaesth 2011;107:703-9.
12. Pan L, Fergusson D, Schweitzer I, Hebert PC. Ensuring high accuracy of data abstracted from patient charts: the use of a standardized medical record as a training tool. J Clin Epidemiol 2005;58:918-23.
13. Elhalawani I, Jenkins S, Newman N. Perioperative anesthetic documentation: Adherence to current Australian guidelines. J Anaesthesiol Clin Pharmacol 2013;29:211-5.
14. Tu K, Campbell NR, Chen ZL, Cauch-Dudek KJ, McAlister FA. Accuracy of administrative databases in identifying patients with hypertension. Open Med 2007;1:e18-26.
15. Hux JE, Ivis F, Flintoft V, Bica A. Diabetes in Ontario: determination of prevalence and incidence using a validated administrative data algorithm. Diabetes Care 2002;25:512-6.