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Critical Incidents in Post Anesthesia Care Unit (PACU) at a Tertiary Care Hospital: A Prospective Internal Audit

Muhammad Asghar Ali*, Khalid Siddiqui, Kashif Munshi and Shemila Abbasi

Department of Anesthesia, Aga Khan University, Karachi, Pakistan

Abstract

Introduction: Emergence from anesthesia is the critical period. This early emergence period is rife with potential complications. In order to enable early detection and prompt treatment of these potential complications by the practitioner, there needs to be an effective system of detection and reporting of all adverse events occurring during the period of emergence. The purpose of this audit was to determine an accurate and comprehensive prospective analysis of all untoward critical incidents and their sequelae in a post anesthesia care unit of a tertiary care hospital over a period of 2 years.

Material and Method: After approval from departmental research and ethical review committees, this prospective audit was conducted. An institutionally approved critical incident reporting form is already available in the department for reporting critical incidents. Anaesthesiologists were asked to report 24-hour-postoperative critical incidents as per their understanding in the post-anesthesia care unit.

Results: During the two year study period, 84 critical incidents were reported with complete recovery. Incidence was maximum in patients with respiratory (20.7%) and cardiovascular (12.3%) involvements. Critical incidents most commonly occurred during the first hour of recovery room stay. Majority of these incidents (56.5%) were detected by bed side nursing staff. Most of the incidents occurred due to human error. In conclusion critical incidents reporting technique is useful in revealing trends, as an educational tool and as a method of quality improvement. We emphasize that strategies and protocols should be developed for increasing and updating knowledge to avoid errors of judgment.

Keywords: Post anesthesia care unit; Prospective internal audit

Introduction

Emergence from anesthesia is the critical period of recovery of consciousness, neuromuscular conduction and airway protective reflexes. This early emergence period is rife with potential complications involving all major physiological systems including respiratory, cardiovascular, central nervous and gastrointestinal system. In order to enable early detection and prompt treatment of these potential complications by the practitioner, there needs to be an effective system of detection and reporting of all adverse events occurring during the period of emergence. Critical incident monitoring is a useful means of detecting new problems and analyzing factors or events leading to mishaps. A critical incident is defined as "any adverse and reversible event in operating theatre, during or immediately after surgery that if it persisted without correction would cause harm to the patient" [1]. Despite low mortality, the practice of anesthesia is associated with significant morbidity [2]. If the frequency of error has to be decreased, a clearer understanding of that process involved is needed with identification of the circumstances that encourage error and the establishment of relative frequencies of different classes of errors. Since its early adoption in the field of aviation [3] and later in the field of anesthesia [4]; the collection of data on critical incidents is widely gaining acceptance. The practice of anesthesia is a complex and dynamic system in which there is interaction between human (anaesthesiologist, patient), machine (anesthesia machine and monitors) and the environment (surgeons, nurses, the operating room and hospital). Failures or errors involving any of the components of this system have the potential to compromise patient outcomes, thus giving rise to critical incidents. The severity of the incident may range from transient damage with full recovery to unanticipated mortality. Therefore, critical incident monitoring in anesthesia is an important tool for quality improvement and maintenance of high safety standards in anesthesia services. It is now widely accepted as a useful quality improvement technique for reducing morbidity and mortality in anesthesia and has become part of the quality assurance programs of many general hospitals [5]. The purpose of this audit was to determine an accurate and comprehensive prospective analysis of all untoward critical incidents and their sequelae in a post anesthesia care unit (PACU) of a tertiary care hospital over a period of 2 years.

Material and Methods

After approval from departmental research and ethical review committees, this prospective audit was conducted in a tertiary care hospital from January 2010 to December 2011. Since it was an observational study without any intervention, consent from patient was not required. An institutionally approved critical incident reporting form is already available in the department for reporting critical incidents. This form consists of a single sheet of paper with the required information categories printed on both sides. Information requested includes the timing of the incident, system involved, the nature of the event, i.e. airway, pulmonary, circuit, equipment, positioning,

***Corresponding author:** Muhammad Asghar Ali, Department of Anesthesia, Aga Khan University, Karachi, Pakistan, Tel: 0922134864636; E-mail: asghar.ashraf@aku.edu

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Nature of errors	n	(%)
Human errors	45	53.5
Knowledge based	9	10.7
Skill based	2	2.3
System error	7	8.4
Technical	4	4.8
Insufficient contextual details	5	6
Equipment error	12	14.3

Table 1: Nature of error.

or miscellaneous. Enquiry is also made of the contribution of the patient's condition, personal and team factors. Outcome was defined according to the sequelae as no effect, minor or severe physiological disturbance, morbidity or mortality. A tick box method was used for ease of entry. One third of the page was left for contextual information. Anaesthesiologists were asked to report 24-hour-postoperative critical incidents as per their understanding in the postanesthesia care unit (PACU).

Results

During the two year study period, 84 critical incidents were reported with complete recovery. Distribution of critical incidents was almost same in males and females (51.8% and 48.2% respectively). Majority of critical incidents occurred in ASA II patients (53%) as compared to ASA I (20%), ASA III (15.6%) and ASA IV (11.4%) patients.

Incidence was maximum in patients with respiratory (20.7%) and cardiovascular (12.3%) involvements. Incidents were observed more in elective patients (61.6%), and in patients admitted for neurosurgery. General anesthesia was administered in 95% of the reported incidents. Critical incidents most commonly occurred during the first hour of recovery room stay. Majority of these incidents (56.5%) were detected by bed side nursing staff followed by on duty anesthesiologists (43.5%) either clinically or by monitoring equipment. Out of 84 reported critical incidents, cardiac arrest occurred in 5 cases, all of which recovered completely. Most of the incidents occurred due to human error as shown in table 1.

Discussion

The critical incident monitoring was first used in aviation by Flanagan, a psychologist, in 1954 [3] and was later introduced in anesthesia by Cooper in 1978 [4]. Since the immediate post-operative recovery period is known to be high risk for anesthetic complications to occur [6], it poses a constant threat to millions of people undergoing surgical interventions across the globe. Whether patients are managed in a hospital setting, an ambulatory care facility, or in a free-standing operating suite, the development of postoperative complications can lead to long-term disability and potentially death. It is therefore imperative for healthcare professionals caring for patients during the postoperative period to be alert to the possibility of these complications and requires active inculcation of measures for risk reduction. The use of critical incident monitoring as a quality assurance measure has several advantages. It is useful in detecting new problems, identifies near misses which can be instructive for trainees, may reveal clusters of incidents or previously undiagnosed sources of errors and is economical [7]. The methods used to collect information about safety of anesthesia and to establish the risk factors have included peer reviews, hospital audit, reports to medical defense societies [8], retrospective and prospective studies [9]. In our institution we conducted a prospective survey of 24-hour perioperative critical incidents over a two year period and found 84 critical incidents with over all incidence of 0.63%. The frequency of incidents reported from different institutions have varied from 0.28% to 2.8% [10,11]. Reporting varies according to an individual's perception of an incident, and depends on motivation and universal acceptance that reporting will have a beneficial result [12]. The results of our audit showed no correlation between sex and occurrence of critical incidents. The incidence of critical incidents and mortalities was maximum in ASA I and II patients, as maximum surgical patients belonged to this physical status. In higher ASA physical status, stringent monitoring and extra vigilance could be the reason for a lower incidence. In contrast to other studies, which showed higher critical incidences in emergency procedures [3,13-15], our audit revealed a higher incidence in elective procedures and the likely reason is stringent monitoring and vigilance in patients undergoing emergency surgical procedures. The frequency of critical incidents was higher in patients receiving general anesthesia which may be attributed to a greater number of high risk surgeries being performed under general anesthesia including neurosurgical procedures. Respiratory problems were the most frequently encountered complications in the recovery room. The overwhelming majority were related to airway obstruction, hypoventilation, or hypoxemia with airway obstruction accounting for 59.6% of the incidents. Critical incidents most commonly occurred during the first hour of recovery room stay which emphasizes the need for meticulous attention during this vulnerable period to prevent complications leading to adverse patient outcomes. Most of the incidents were identified by the assigned bed side nurse, probably due to more interaction with the patient as compared to the physician.

In our audit human error has been implicated as the major cause of anesthesia related critical incidents which are comparable to study done by Gupta et al. [3]. As we know that all anaesthesiologists aspire to an anesthesia "system" that is completely safe. However, any system operated by human beings is subject to human failure; this is both normal and inevitable. Because patterns of human error in anesthesia as elsewhere, are identifiable predictable and repetitive, they lend themselves to classification and analysis. From such analysis we gain a clearer understanding of how anesthetists behave, which is an important step in the logical evaluation of strategies to make such failures less common. Lack of judgment or experience, skill and failure to check were the most frequently reported factors for human errors. Thus there are elements of human error in majority of anesthesia related critical incidents and mortalities, although the majority of such failures were recognized and intercepted before they led to an adverse outcome. It is known that the basis for all accidents or near accidents in any situation is unsafe practice or working condition [3].

There are some limitations of our audit. Under reporting is a genuine concern as the reporting of the incidents is based on individual perception and recall of the incidents. All reports were voluntarily submitted by on-duty anesthesiologist or nursing staff. Another one is the duration of the study which may represent only a proportion of all mishaps resulting in a very small sample size to calculate statistical significance of risk factors. In conclusion, critical incidents reporting technique is useful in revealing trends, as an educational tool and as a method of quality improvement, to help develop policies to prevent recurrence. It is particularly attractive to us because of low costs and ease of implementation. As evidenced by this audit, human error is the culminating factor in the majority of these incidents. We emphasize that strategies and protocols should be developed for increasing and updating knowledge to avoid errors of judgment.

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