

CRITICAL INCIDENT MONITORING IN A TEACHING HOSPITAL

- The Third Report 2003-2008 -

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Abstract

Several factors have been incriminated in the etiologies of critical incidents: shortages in organizing rules, anesthesia technique, patient environment, human factor, team work and communication. This is the third follow up report describing our performance during the last five years (2003-2008). The possible incriminating causes were identified with the objective of avoiding such eventualities and consequently providing a better patient outcome.

Patients & Methods: The computerized database and the medical records of critical incidents reports in our Department during the period of 2003-2008 were reviewed on case-by-case basis. Seventy reported incidents were discussed in the Department's Morbidity & Mortality Meetings (MMM). Incidents were classified as per possible incriminating causes: pulmonary, cardiovascular, central nervous system, metabolic, inadvertent drug injection, communicating failure, equipment failure and miscellaneous causes.

Results: Most of the critical incidents reports occurred during maintenance of anesthesia, followed next by during induction and next by same operative day later in the ward. The majority of cases were respiratory events (29 cases), followed by communication failure (12 cases), failure of equipment (9 cases) and inadvertent drug injection (4 cases).

Conclusions: Respiratory events, human errors, team communication and equipment failures, continue to be the leading causes of critical incidents. Critical incidents are apt to occur so long as the human factor is involved. Vigilance in operational efficiency and the scrutiny in drug administration, supervision and training should be closely monitored in order to minimize critical incident reports.

Keywords: Critical incident, General anesthesia, Complications.

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Introduction

Critical incident is defined as any untoward and preventable mishap that is associated with the administration of general or regional anesthesia, and which leads to, or could have led to, an undesirable patient outcome. Staender et al¹ have reported that death is definitely no longer an incident, it is a complication, or in the language of error-psychologists, an accident.

Several factors have been reported as possible etiologies of critical incidents: shortcomings in organization rules, anesthesia technique, patient environment, human factor, team work and communication, all of which are preventable.

In 1998² we published our first report on critical incidents covering the period 1991-1997, and 143 incidents were reported. The possible causes given then which led to critical incidents were: human error, lack of communication, anesthetic technique, patient condition factor and equipment failure.

Our second report³ covering the period 1998-2002 included 71 incidents and the possible reasons for those incidents were: human factor, team communication, patient condition and technical problems.

The present third report covering the period 2003-2008 is a follow-up of our performance in this field during the last five years and identifying the possible incriminating factors leading to such an eventuality, the main objective being better patient outcome.

Patients and Materials

The computerized data base and the medical records of critical incidents reported to our Department during the period of August 2003-May 2008 were reviewed on case-by-case basis.

The adopted Department's Incident Form includes:

- Free text description where the narrator describes the incident as it occurred.
- A section on the classification of the incident and its possible etiology.
- Reports of any communication failures.
- The prescription, preparation and administration of drugs. The incident was classified as to whether the incident was aborted before or discovered

after it had been inadvertently injected.

- Time and location of the incident.

Seventy incidents reported were discussed in the monthly Morbidity & Mortality Meetings (MMM). After thorough discussions the incidents were categorized as per the possible incriminating cause into: pulmonary, cardiovascular, central nervous system, metabolic, inadvertent drug injection, communication failure, equipment failure and miscellaneous. Incidents were also classified by their actual or potential seriousness as low, moderate or major life threatening. Recommendations were subsequently collected aiming at avoiding repetitions of such incidents, the objective being offering a better patient outcome.

Results

All 70 critical incidents reported were given general anesthesia and had varying ASA classification. Most of the incidents occurred during maintenance of anesthesia, followed next during induction, and next on same operative day later in the ward.

Incidents and frequency were classified as: (Table 1)

Table 1
Reasons & no. of patients of the critical incidents (2003-2008)

Reasons	Number of Patients
Pulmonary	29
Central nervous system	3
Cardiovascular system	5
Metabolic	3
Communication failure	12
Equipment failure	9
Inadvertent drug injection	4
Miscellaneous	5
Total	70

- Respiratory events were the majority (29 cases).
- Communication failures (12 cases).
- Failure of equipment (9 cases).
- Inadvertent drug injection (4 cases).
- Cardiovascular events (5 cases).
- Miscellaneous (5 cases).

Of the respiratory events, there were 7 trauma cases of aspiration pneumonitis, were endotracheal intubation was performed in the Emergency Department requiring

prolonged intubation in the surgical intensive care unit (SICU). There was one case of fatal air embolism and two cases of postoperative pulmonary embolism and one case of severe intraoperative hypoxia during thoracotomy in a pediatric patient.

Failures of equipment consisted of failure of anesthesia machine, failure of patient controlled analgesia (PCA) pump and one rare case where the stomach was perforated during introduction of nasogastric tube. The drugs contemplated for inadvertent injections were insulin, bupivacaine and potassium.

In the cardiovascular events, one case of intraoperative cardiac arrest occurred due to severe hypotension during knee replacement surgery, which was resuscitated successfully with no postoperative sequelae.

Under miscellaneous events is listed a corneal abrasion, prolonged surgical hours and unavailability of blood transfusion.

Discussion

In the first published report² covering the period 1991-1997, 143 critical incidents were analyzed and the following leading possible reasons were identified: human errors, lack of communication, anesthetic techniques, patient condition and equipment failure. In the second published report³ of 71 incidents for 1998-2002, the following leading causes of incidents were recognized: human error, team communication, patient condition and technical problems. In this third report for 2003-2008, the same reasons that led to the incidents of the previous two reports, have repeated themselves.

It is apparent that human error and communication failures are common reasons in the three reports. Human error is defined as failure of planned action to be completed as planned⁴. Human error can be classified into active and latent. Active error refers to an event occurring immediately before an incident. Latent error refers to problems occurring within the system that cause accidents to occur under situations resulting from inappropriate decisions made by a careless staff e.g. an anesthetic drug trolley

loaded with an incorrect drug⁵.

In a retrospective review and analysis of all critical incidents at Birmingham Children Hospital⁶, showed that human factors occur in 42.5% of in-theatre incidents in pediatric anesthesia. Similarly, analysis of the first 2000 incidents in Australia⁷ providing data on all aspects of anesthetic error, 79% were due to human error. In our present Third Report, the most common problems were related to respiratory issues (41%), human factors (communication failure and inadvertent drug injection) (23%) and equipment failure (13%). This is in accordance with two recently published reports on critical incidents where the most common problems were related to respiratory events^{8,9}.

In a recent study on incidents reported to UK National Safety Agency, 12,084 submitted were associated with medications, most commonly morphine, gentamycin and noradrenaline¹⁰. In our Third Report, one case of inadvertent potassium was given i.v. instead of sodium bicarbonate because of the similarities of the two vials and lack of a double check procedure. The patient developed near fatal cardiac arrhythmia and was successfully resuscitated with no further sequelae. At the time a decision was taken to remove all potassium vials out of the operating rooms and make it only available at submission of a prescription order.

Equipment failure still presents an ongoing problem and in spite of machine upgrading by company authorities, the problem still exists.

Conclusion

Respiratory events, human errors, team work and equipment failure are continuing to be the leading causes of critical incidents. We believe that critical incidents will still occur so long as the human factor is involved. Therefore vigilance in checking the anesthesia machine and its maintenance and double checking the administered drugs, better supervision and training, are essential to minimize the frequency of critical incidents and thus provide better patient outcome.

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