

## Incident reporting in post-operative patients managed by acute pain service

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### ABSTRACT

**Background and Aims:** Incident reporting is a reliable and inexpensive tool used in anaesthesia to identify errors in patient management. A hospital incident reporting system was already present in our hospital, but we were unable to find any incident related to acute pain management. Hence, acute pain service (APS) was started for voluntary incident reporting in post-operative patients to identify critical incidents, review the root cause and suggest remedial measures. **Methods:** All post-operative patients managed by APS were included in this observational study. A proforma was developed by APS, which included information about the type of incident (equipment and patient-related, human errors), severity of incident, person responsible and suggestions to prevent the same incident in the future. Patients and medical staff were informed about the reporting system. Whenever an incident was identified, a proforma was filled out by APS resident and data entered in SPSS programme. **Results:** Total of 98 (1.80%) incidents were reported in 5432 patients managed by APS during 3 years period. Average age of the patients was  $46 \pm 17$  years. Majority of incidents were related to epidural care (71%) and occurred in surgical wards (87%). Most of the incidents occurred due to human error and infusion delivery set-related defects. **Conclusion:** Incident reporting proved to be a feasible method of improving quality care in developing countries. It not only provides valuable information about areas which needed improvement, but also helped in developing strategies to improve care. Knowledge and attitudes of medical and paramedical staff are identified as the targeted area for improvement.

**Key words:** Acute pain service, developing countries, hospital incident reporting, pain management, quality improvement

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### INTRODUCTION

Incident reporting is one of the inexpensive and reliable methods,<sup>[1]</sup> through which errors in medical care are discovered. It has also been used as a tool for quality assurance.<sup>[2]</sup> Other commonly used methods to identify errors in medical management include retrospective chart review and computerised surveillance.<sup>[3]</sup> Adverse incidents are typically caused by organisational and structural defects<sup>[4]</sup> as well as unpredictable human errors.

Cooper *et al.*<sup>[5]</sup> published incident reporting in anaesthesia first, in 1978. Since then critical incident reporting found some early applications in medicine. Incident reporting can be anonymous<sup>[6]</sup> and voluntary by the patient, family, press or from medical personnel.

Since the introduction of acute pain service (APS) in our hospital, several preventable incidents came to light, which had led to increased morbidity and poor patient satisfaction. Although a hospital incident reporting system was already present in our hospital, we were unable to find any incident related to acute pain management. The aim of the study was to prospectively compile the critical incidents

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in APS, review the root cause, analyse and provide recommendations to improve patient safety and satisfaction.

**METHODS**

This prospective observational study of 3 years duration (2005–2007) was conducted by APS at a university level hospital. Necessary approval from Ethical Committee of the Hospital was obtained. APS in our hospital is supervised by an anaesthesia consultant and comprises one resident and one acute pain nurse. All post-operative patients managed by acute pain team were included in the study. Post-operative surgical patients who bypassed the recovery room and were shifted to the Intensive Care Unit were excluded. In addition, chronic pain patients and acute pain consultations for medical patients were also excluded.

Patients and nursing staff were informed about the reporting system and they were encouraged to fill out the incident reporting form or inform the APS team. When an acute pain-related critical incident was identified, reported verbally or in writing by medical staff or as a complaint raised by patient/relative, the acute pain team was given responsibility to investigate this incident and they filled out a proforma. Detailed description of incident and suggestions for improvement were also recorded in the proforma. This data was entered in the Statistical Package for Social Sciences (SPSS, Chicago, IL, USA) version 19 and analysed for frequencies. Chi-square test was applied for categorical data. *P* < 0.05 was considered significant. Any physiological change due to pain management was also checked. Minor physiological change was defined as any change in heart rate or blood pressure which did not require treatment, whereas major physiological change was documented when patient required management of changes in heart rate and blood pressure. Incident was defined as an event that affected or could have affected the quality of pain relief and safety of patient during pain relief method.

**RESULTS**

During the 3 years study period, a total of 5432 patients were managed by APS. Total 98 (1.80%) incidents were reported in 83 patients during this period. Average age of these 83 patients was 46 ± 17 years and it included five paediatric patients (<16 years). Thirty patients were males whereas 53 were females.

Modalities of pain management included 1570 epidurals, 1369 patient controlled intravenous analgesia (PCIA), 2445 intravenous (IV) infusions and 48 miscellaneous (caudal and extra pleural).

Most of the incidents occurred during epidural catheter care (71%) whereas PCIA and IV infusion were accounted for 19% and 8%, respectively.

These 98 incidents fell in the following categories [Table 1]: Equipment factors 19 (19.4%), human factors 29 (29.6%), patient factors one (1%), infusion delivery set related 35 (35.7%) and drug administration related 14 (14.3%). Four out of 14 drug-related incidents were due to under dosage of analgesics leading to pain whereas ten patients had over-dosage.

Majority of incidents (87%) occurred in the surgical wards and acute pain team mainly identified (89%) and reported these incidents during daily rounds. Most of the incidents occurred either on day 2 (53%) or first post-operative day (27%). Of these 83 patients, 31 underwent obstetric and gynaecological surgeries,

**Table 1: Type of incidents in APS (total incidents=98)**

Incidents	Count	Percentage
Equipment factors	19	19.4
Battery problem	2	2.0
Pump malfunction	4	4.1
Mishandling/misuse	5	5.1
Mechanical problem with PCIA handset	2	2.0
Mechanical problem with filter	6	6.1
Human error	29	29.6
Orders not written	1	1.0
Epidural catheter not properly secured	11	11.2
Infusion discontinued without pain team consult	8	8.2
Analgesic infusion mixture not replaced in time	3	3.1
Documentation not done	4	4.1
Wrong documentation	1	1.0
Inappropriate selection of patients	1	1.0
Patient factor	1	1.0
Patient unable to push PCIA handset	1	1.0
Infusion delivery set	35	35.7
Disconnection	9	9.2
Intravenous extravasation	4	4.1
Misconnection	4	4.1
Epidural catheter malposition	6	6.1
Epidural catheter pulled out	12	12.2
Drug administration	14	14.3
Under dosage	10	10.2
Over dosage	4	4.1
Total number of incidents ( <i>n</i> )	98	
Total number of patients ( <i>n</i> )	83	

Values are number and percentage. PCIA – Patient-controlled intravenous analgesia; APS – Acute pain service

19 orthopaedic, 20 general, 10 urology and three, miscellaneous surgeries.

Incidents rate was identical in initial 2 years (36% and 37%), but reduced to 26.3% in the last year. No death was reported during the 3 years period due to these incidents but inadequate analgesia was reported in 60.6% of patients [Figure 1]. Lack of knowledge and inattention by medical staff was recognised as the responsible factor for majority of incidents [Figure 2]. Responsibility for adverse events was mainly assigned to ward nurse and primary anaesthesiologist. No significant difference was found between incidents and gender. When incidents were compared at different locations of the hospital [Table 2], correlation was found in recovery room and patient factors ( $P < 0.05$ ).

### DISCUSSION

Although incident reporting has been used successfully to reduce adverse events in different disciplines of medicine,<sup>[7,8]</sup> it is still underutilised in healthcare.<sup>[9]</sup> Auditing of incidents can provide valuable information to target problem areas.<sup>[10]</sup> This tool can also be utilised in APS to identify target areas where improvement is required. In addition, defects in process and equipment can also be identified.

**Table 2: Comparison of type of incidents, location wise**

Incidents	Recovery room (%)	Ward (%)	Other (%)	P
Equipment factors	1 (14.3)	18 (25)	0 (0)	0.43
Human error	1 (14.3)	27 (37.5)	1 (25)	0.42
Patient factor	1 (14.3)	0 (0)	0 (0)	0.004
Infusion delivery set	3 (42.9)	31 (43.1)	1 (25)	0.77
Drug administration	1 (14.3)	13 (18.1)	0 (0)	0.63

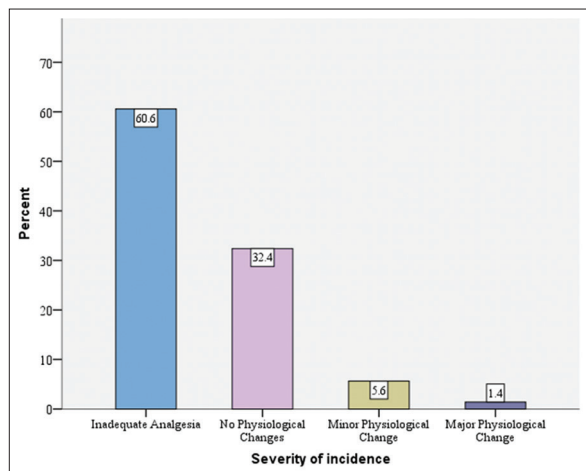


Figure 1: Severity of reported incidents

Most of the incidents in this study were related to epidural catheter care. This technique uses a sophisticated infusion pump and delivery set which includes an epidural catheter, filter, luer lock and infusion tubing. In addition, it needs to be handled properly at several stages of catheter care in operating room, recovery room, surgical ward, and during physiotherapy and positioning. Various team members involved in the care include primary anaesthesiologist, APS resident and nurse, floor nursing staff and recovery room nurse. Incidence of mistakes is higher when more people are involved in the care. Their knowledge, attitude and adherence to the epidural catheter care policy become very important to manage these patients on the floor. Another factor which needs to be considered is the number of days epidural catheter is needed. More attention is required when dealing with sophisticated pain management modalities such as epidural infusions. Training of individuals involved in epidural care becomes very important to identify and prevent potentially lethal complications.<sup>[11]</sup>

Low incidents rate in IV infusion technique is probably related to familiarity and comfort level of ward nurses. IV infusion was much easier to handle by nursing staff as they were skilled to handle infusion equipment, and dose adjustment was much easier. Nursing staff was allowed to handle IV infusion pumps, but epidural and PCIA were only managed by APS team. Numbers of medications given through IV infusion were also limited to three, which may have played a part in avoiding any medication error.<sup>[12]</sup>

Under-reporting by medical staff is a major problem.<sup>[13]</sup> Chen *et al.*<sup>[2]</sup> have reported a low incidence of reporting

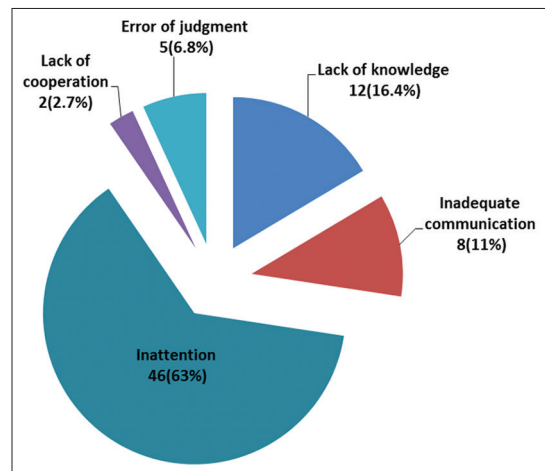


Figure 2: Responsible factors which led to the incident (as identified in incident form)

by ward nurses. Reporting rate by ward nurses was also very low in the present study despite the higher occurrence of these incidents on surgical floors. There were few incidents where they did call APS team because patient was in pain, but they were unable to recognise the problem. This may be related to their knowledge,<sup>[14]</sup> lack of familiarity with the technique and high volume load. Junior nurses were not familiar with the technique and senior staff lacked knowledge and willingness to handle the problem. Few of them thought epidural care is an extra burden on them. They were more comfortable with intramuscular and IV techniques.

Involvement of patient in adverse incident reporting should also be considered to identify avoidable incidents as suggested by Weingart *et al.*<sup>[15]</sup> Early and frequent feedbacks<sup>[16]</sup> to medical staff may also help to stimulate voluntary participation and their continued engagement in incidents reporting.<sup>[7]</sup> Regular dissemination of knowledge regarding the adverse events and near misses will improve reporting.

Although the reporting person's name was optional, they still preferred to use their names in all incident forms. APS resident raised incident forms (79%) by himself or on the directions of his consultant. Only 5% ward incidents were reported by nursing staff despite their 24 h presence in wards and as mentioned earlier, the location of most of the incidents was surgical wards. This shows the importance of early feedback, regular teaching and workshops for nursing staff along with providing teaching material. In addition, nursing staff should also be involved in decision making regarding pain management.

Human error was mainly responsible for most of the incidents despite the presence of policies, information booklets and educational classes. These avoidable incidents were probably related to lack of knowledge, inattention<sup>[17]</sup> and insufficient coverage on the floor. Inattention by nursing staff was the main responsible factor. This reflects the lack of individual attention, inexperience and may be, high workload on nursing staff. Few members of the junior staff were not familiar with epidural and PCIA techniques. Lack of knowledge<sup>[18]</sup> was second to inattention and this was addressed by APS team by organising more teaching sessions, workshops and publication of booklets on epidural and PCIA care for nursing staff.

One patient went into septic shock and the epidural catheter was removed. This was the only patient who developed major physiological changes. Probably, this was a case of inappropriate selection of patient as he already had sepsis before surgery.

Nursing staff on the floor was identified as a responsible person in most of the incidents. As nursing staff spend more time in patient management, it was less likely to be just a coincidence. Although in some cases nursing staff had no control over incident such as equipment failure, delayed recognition and communication<sup>[17]</sup> to APS team was also considered in deciding about the responsible person.

Incident reporting in the initial 2 years was high, but then gradually reduced. Does it mean that incidents have reduced after applying remedial measures or the people were not willing to fill out the incident form in cases where patient had no untoward incident (near misses)? Repeat audit may provide an answer to this question.

Several strategies were suggested by acute pain team to avoid such incidents in the future. These included awareness classes and workshops for nurses, feedback to primary anaesthesiologist, need for more coverage by nursing staff, better supervision<sup>[10]</sup> and regular equipment maintenance. Improved communication with check list<sup>[12,19]</sup> was also suggested among members of acute pain team, nursing staff and surgical team. Another suggestion was to restrict epidural care to only senior and trained nursing staff and provide them monetary incentive if possible. Hospital should also take interest in replacing defective equipment. Some of the strategies which have been implemented are regular awareness classes for medical staff, epidural catheter care workshops for nursing staff and frequent feedback to primary anaesthesiologist and nursing staff. During awareness session, the medical staff is encouraged to report all kind of incidents. Strict policy has been adopted for maintenance of equipment and replacement of defective equipment.

There are few reports of changes in clinician's behaviour after a critical incident.<sup>[20]</sup> These emotional disturbances due to critical incident may lead to additional errors. Same may be true for paramedical staff in such situations. Fortunately, all the incidents during acute pain management were non-fatal, but still led to inadequate analgesia and minor physiological changes. Most of the incidents were related to human

error as observed in other studies and could have been easily avoided.<sup>[21]</sup>

## CONCLUSION

Incident reporting has provided valuable information regarding the areas which needed improvement. Human error, knowledge and attitudes of medical and paramedical staff were identified as the targeted area. Regular training of nurses, feedback to primary anaesthesiologist, increase in nurse-patient ratio and regular maintenance of equipment can reduce these incidents and improve patient care. Incident reporting has proved to be a valuable tool for quality assurance in anaesthesia practice and must be encouraged.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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## Announcement

### Dr. TN Jha and Dr. KP Chansoriya Travel Grants

For the year 2015 the Dr. TN Jha and Dr. KP Chansoriya travel grant will be awarded to the participants from 15 states. All the states can select their candidate during their annual conference and send them with the recommendation of the Secretary. Only one candidate is allowed from each state. In case if two states have a combined annual meet but separate as per the records, have to select one candidate from each state. If more than 15 states recommend the candidates for the award, selection will be made on first come first served basis.

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