

Misses & Near Misses: Drug Administration Errors

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Background: Mistakes made during administration of drugs to patients can be lethal. In order to analyse these mishaps we need to study the particular circumstances of each accident and define the reasons behind the mistake or lapse. This paper reports the findings of a confidential pilot study designed to highlight the frequency of such unfortunate incidences and formulate recommendations applicable in our society to prevent some of these tragic outcomes. **Methods:** Sixty doctors and nurses from different hospitals were randomly enquired about the personal knowledge of pharmacological mistakes with which they were either closely associated or they had first hand information of the incident. All data was collected in confidence on condition of anonymity. **Results:** We discovered 21 instances of drug administration errors. Dispensation of wrong drug to a patient was the commonest mistake discovered. Nurses gave majority of these injections during the night. Half the victims of these mishaps lost their lives. **Conclusions:** From this confidential inquiry, we have found that tragedies with loss of life are not infrequent in our set up: Typical scenario involved muscle relaxant given instead of narcotic analgesic by a student nurse during the night. When the mistake was not detected in time it frequently ended in tragic loss of life. It is disturbing to note that minimum basic facilities of proper cardiopulmonary resuscitation were not available in some hospitals. **Recommendations:** Only senior nurses / doctors should give IV injections. Conscious effort should be made to minimise the use of IV medication, drugs should be used only with proper indications when suitable oral alternatives are not feasible. The nurses' training as well as nurse patient ratio needs to be improved. Muscle relaxants should not be available outside operating rooms and critical care units. We need to set up a central confidential data-reporting centre for voluntary (anonymous?) reporting of such mistakes or mishaps so that they could be analysed and concrete preventive measures recommended.

Key words: Adverse events: Drug administration errors.

Adverse events during hospital admission are unfortunately not uncommon here or abroad. On a single day, 4 patients died in one hospital possibly because of anaesthetic drug overdose¹. Two Harvard studies^{2,3} found 3.7% adverse incidences in hospital admissions while 16.6% admissions in Australia were found to have an adverse event⁴. A recent British study⁵, using retrospective chart review, reported 11.4 % incidence of adverse events including medication errors. An alarming recent report in American college of surgeons bulletin⁶ implies that number of deaths (estimated between 44,000 to 98,000) from medical errors in US exceeds the eight leading of cause of death (suicide) over there.

Mistakes made during administration of drug to the patients can be lethal or they can produce long term disability. In order to analyse these mishaps we need to study the particular circumstances of each accident and define the reason(s) behind these mistakes or lapses. Because of the medico-legal implications, mistakes are generally hushed up and not discussed in open. The people responsible turn tight-lipped and become unwilling to cooperate. Fear of punishment provides the incentive to hide the truth. Unfortunately this attitude does nothing to prevent further similar happenings in future. Because of the generally deficient record keeping in our hospitals, a review of hospital records is unlikely to prove an effective modality for finding out the truth about medication errors or lapses. One way to investigate is talk to the responsible

individuals in confidence on condition of anonymity and report data thus collected in an objective way. Confidential enquiries into perioperative deaths conducted in UK^{7,8} have provided some insight into what might be happening. Upon search of Medical Literature Indexing for Pakistan (MEDLIP 1995-2000) and other local journals available in our library, we could not find any data reported previously from this country on this subject.

This is our attempt to report the findings of one such confidential pilot study. The purpose is to highlight the frequency of such unfortunate incidences and formulate recommendations applicable in our society to prevent some of these tragic outcomes.

Materials and methods

Sixty doctors and nurses from different hospitals in different cities of Pakistan were randomly chosen. We enquired from them about the personal knowledge of drug administration mistakes with which they were either closely associated or they had first hand information of the incident. Whenever possible the nurses involved were interviewed by one of authors to determine the exact circumstances of the accident. Although adverse events other than medication errors were discovered, we have selected only medication errors for this report. All data was collected in confidence on condition of anonymity and hospitals from different cities have been randomly assigned letters from A - G for reporting purposes.

A proforma was filled for each patient and was analysed to pinpoint the exact mistake and contributory factors leading to the incident. Study period lasted 2 months and the incidences reported span over a period of 3 years from January 1999-November 2001.

Results

We discovered 21 instances of drug administration errors. Dispensation of wrong drug to a patient was the commonest mistake discovered (Table I). This wrong drug was most often a muscle relaxant given instead of a pain-killer (Table II). Nurses gave majority of these injections during the night although in some cases we could not ascertain the status of the nurse (Tables III, IV). Half the victims of these mishaps lost their lives (Table V). Brief circumstances of each mishap are noted below

Case No.1 (Hospital A)

A 14 years old boy, admitted after road traffic accident, had skin grafting to his leg. He was injected I/V Suxamethonium (Succinyl Asta) instead of Nalbufin (Nalbine), on the night of 2nd day after operation. Patient went into respiratory arrest, which was discovered late. Delayed cardiopulmonary resuscitation could not save this patient. The second year student nurse was the only one on duty during the night for 48 patients.

Case No.2 (Hospital A)

A 17-year-old girl, who has had subtotal thyroidectomy, was injected Norcuronium bromide (Norcuron) instead of injection Nalbufine (Akanol) 2 days after operation. Respiratory arrest occurred, duty doctor was informed 15 minutes after the mistake. The delayed cardiopulmonary resuscitation proved futile. Only one second-year student nurse was on duty for 40 patients.

Case No. 3 (Hospital A)

A young female patient, suffering from acute appendicitis, was injected suxamethonium (Leptosucca) instead of injection Cimetidine (Ulcerax). Nurse ran away without informing any doctor. A passing by doctor resuscitated the patient. Patient required ventilatory support for few hours and made uneventful recovery.

Case No.4 (Hospital A)

A 20 years old boy with crush injury to lower limb was injected leptosuxa (suxamethonium) instead of an antibiotic at midnight by a student nurse. Respiratory arrest occurred. Cardiopulmonary resuscitation was done but the patient expired.

Case No.5 (Hospital B)

Injection Pavulon was injected to a young mother 2 hours after caesarean section in place of a pain-killer. Resuscitation was delayed for 15 minutes leading to the death of this young mother.

Case No. 6 (Hospital C)

Ten-year-old boy was overdosed with I/V diazepam at night. Patient died in sleep with out being noticed early.

Case No. 7 (Hospital C)

A 70-year-old man was admitted to a CCU for observation following an episode of atrial fibrillation during the night. Insulin was injected to him although he was not a diabetic. This insulin was intended for the patient previously on the same bed during the day. Patient's relative who was a doctor discovered hypoglycaemic coma. Intravenous glucose retrieved the situation. The patient later on stated that insulin was injected by the nurse in spite of the fact that he informed the nurse beforehand that he was not a diabetic but the nurse insisted that the injection was intended for him as per night round orders!

Case No. 8 (Hospital D)

A 3-year-old boy, waiting for vesicolithotomy, was injected suxamethonium instead of ampicillin for bad chest. Doctor was informed. Proper facilities for cardiopulmonary resuscitation were not immediately available and the patient died.

Case No. 9 (Hospital E)

Four-year-old female child, already on ventilator, was injected tracrrium instead of injection pentozocin. The patient was unharmed as she was already being ventilated.

Case No. 10 (Hospital A)

A 3-year-old boy was injected Pavulon instead of xylocaine in operating room. Respiratory arrest occurred, resuscitation was done and the child survive

Case No.11 (Hospital A)

Two months old infant was injected overdose of 2 % xylocaine (7ml) for operation of circumcision. Convulsions started. The infant was successfully resuscitated.

Case No.12 (Hospital F)

13-year-old female was injected Pavulon instead of premedication while waiting for a gynecological procedure. The patient was intubated, resuscitated and put on ventilator. She made full recovery.

Case No. 13 (Hospital A)

Inj. Suxamethonium was injected instead of antibiotic to a young man with fracture tibia. Cardiopulmonary arrest occurred from which he was successfully resuscitated.

Case No. 14 (Hospital A)

Fourteen years old boy with liver injury received I/V Heparin for two days. This drug was intended for the patient on the next bed who has had a vascular repair. The problem was detected before a major complication.

Case No.15 (Hospital A)

Twenty-two years old female with renal colic attended the emergency department. She was prescribed Hyoscine butyl bromide to be given intravenously. Instead of this, she was injected diclofenac sodium I/V, by a student nurse. Severe anaphylaxis developed. The patient was resuscitated and saved. Only 3 nurses were working in this emergency for a turn over of about three hundred patients daily.

Case No.16 (Hospital E)

An anaesthetist in place of muscle relaxant gave injection potassium chloride I/V. An assistant drew the drug, while

the anaesthetist did not read the label. The ampoules looked similar. In spite of calcium and sodium bicarbonate administration, the patient died. The blood sample for potassium taken after the wrong injection had been given showed a reading of 9mmol/decilitre.

Case No. 17 (Hospital E)

A child was given Chloral Hydrate to sedate him for a radiological investigation. He vomited after the first dose. He was given the same drug again and he again vomited. Chloral hydrate dosage was repeated third time. Child became extremely drowsy and died.

Case No. 18 (Hospital E)

Instead of seven units of insulin, seventy units were put in the I/V drip. A doctor happened to see the large volume of solution being added to the intra venous bag. On enquiring, the mistake was discovered and the drip was discontinued. The patient stayed unharmed.

Case No. 19 (Hospital D)

A 35 year old male was admitted for acute appendicitis. He was given antibiotic injection. Ampoule of muscle relaxant was mistaken for distilled water and used for preparation of IV injection. Injection resulted in respiratory arrest from which the patient could not be revived in time.

Case No. 20 (Hospital G)

A 45 years old lady underwent cholecystectomy as private patient. The ampoules of muscle relaxant (succinyl choline) left over from operation were returned with the patient to her room. Forty hours later she was wrongly injected the muscle relaxant instead of her prescribed antibiotic. She was intubated promptly and ventilated with Ambu bag for 15 minutes and recovered completely.

Case No. 21 (Hospital C)

A 55 year old lady who was recovering from her elective surgery received injection atrilex (atracurium) instead of ulcerex (cimetidine). In spite of quick resuscitation, she became brain dead and died 48 hours later.

Table I: Nature of mishaps in 21 patients

Wrong drug	13
Wrong dosage	6
Wrong patient	2
Total mishaps	21

Table II: Drugs wrongly given in 21 mishaps

Muscle relaxant	13
Sedative	2
Insulin	2
Local anaesthetic	1
IV Potassium Chloride	1
Analgesic	1
Heparin	1
TOTAL	21

Table III: Status of person Injecting

Student Nurse	7
Staff Nurse	4
Nurse (status unknown)	7
Doctor	3

Table IV: Time of the day when mishap occurred

10.00 p.m. to 6.00 a.m.	11
6.00 a.m. to 10 p.m.	10

Table V: Out come following mishaps

Deaths	11
Permanent disability	0
Complete recovery	10

Discussion

A cardinal principle of medical therapeutics is "First of all, do no harm". Although to err is human but in our profession to err can prove fatal. From this confidential inquiry, we have found out that tragedies with loss of life are not infrequent in our set up: Typical scenario involved muscle relaxant given instead of narcotic analgesic or anti-emetic by student nurse during the night shift. When the mistake is not detected in time it frequently ends in tragic loss of life.

Most of the mistakes represent sheer negligence on the part of ill trained or overworked nurses. Cases similar to these have lead to manslaughter charges in the western world in recent times⁹. A case similar to the ones mentioned here is now subject of a law suit here claiming damages to the tune of rupees 50 million¹⁰. It is disturbing to note that minimum basic facilities of proper cardiopulmonary resuscitation were not available in some hospitals. Resuscitation trolleys need to be provided on all hospital floors of the country on urgent basis. A typical life saving trolley with laryngoscope, airway, endotracheal tube, Ambu bag, IV canula, IV fluids, injection Adrenaline etc. costs less than Rs. 5000. No nurse or medical student should ever graduate without a certificate in basic cardiopulmonary resuscitation. One cause of mistake is similar sounding confusing trade names of antibiotics and muscle relaxants. In some instances, the patients were taking oral diet and could have easily been given oral analgesia instead of IV injections. Over-use of IV drugs, when patients can take orally needs to be curbed.

We also recommend the following further measures

- Only senior nurses/doctors should give IV injections. Conscious effort should be made to minimise the use of IV medication, drugs should be used only with proper indications when suitable oral or I/M alternatives are not feasible.
- The nurse patient ratio (which in some cases is as bad as 1:50) needs to be improved to prevent fatigue and resulting mistakes.

- Muscle relaxants should not be available outside operating rooms and critical care units and should all be labelled with the word "poison". Using generic names for muscle relaxants may help to prevent some disasters.

There is a need for setting up a central confidential data-reporting centre for voluntary (anonymous?) reporting of such mistakes or mishaps so that they could be analysed and concrete suggestions offered.

A poster designed by us may serve as a useful teaching aid (Appendix). We suggest it is displayed on all the nursing stations of our hospitals and may help prevent some of these tragedies.

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Appendix: Suggested poster for display at nurses' stations to serve as a reminder and a teaching aid

WRONG INJECTIONS KILL HUMAN BEINGS!!!

HANDLE WITH CARE

YOU CANNOT BE OVER CAREFUL WHEN THE RESULTS OF MISTAKES CAN BE DISASTROUS. BEFORE YOU INJECT A DRUG, PLEASE ENSURE THAT IT IS THE:

- ◆ RIGHT PATIENT
- ◆ RIGHT DRUG
- ◆ RIGHT ROUTE
- ◆ RIGHT DOSAGE
- ◆ RIGHT TIME

IF AN ERROR DOES HAPPEN PLEASE INFORM THE DUTY DOCTOR IMMEDIATELY AS THE PATIENT MAY STILL BE SAVED