

Title page:

Title: Neuraxial Medication Administration Errors During Anaesthesia and Perioperative Management, Consequences, Contributing Human and Systemic Factors and Their Prevention - A Systematic Review

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Presentation: This report was previously presented, in part, at the annual meeting of the American Society of Anesthesiologists annual meeting, October 2020.

Short running title: Neuraxial medication administration errors

Supplemental File 1: Search strategies

PubMed:

("intrathecal" [TIAB] OR "spinal" [TIAB] OR "epidural" [TIAB] OR "peridural" [TIAB])
AND
("accidental" [TIAB] OR "inadvertent" [TIAB] OR "mistake" [TIAB] OR "unintentional" [TIAB])

SCOPUS:

(TITLE-ABS("intrathecal") OR TITLE-ABS("spinal") OR TITLE-ABS("epidural")) AND
(TITLE-ABS("accidental") OR TITLE-ABS("inadvertent") OR TITLE-ABS("unintentional"))
AND PUBYEAR > 1980 AND PUBYEAR < 2026 AND PUBYEAR > 1980 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE,"ar") OR LIMIT-TO (DOCTYPE,"le")) AND (LIMIT-TO (EXACTKEYWORD,"Humans")) AND (LIMIT-TO (SUBJAREA,"MEDI") OR LIMIT-TO (SUBJAREA,"NURS") OR LIMIT-TO (SUBJAREA,"HEAL") OR LIMIT-TO (SUBJAREA,"PHAR"))

EBSCOhost: In the title

("intrathecal" OR "spinal" OR "epidural" OR "peridural") AND ("accidental" OR "inadvertent" OR "mistake" OR "unintentional")

Web of Science:

Ti=("intrathecal" OR "spinal" OR "epidural" OR "peridural") AND ("accidental" OR "inadvertent" OR "mistake" OR "unintentional")

Google Scholar: All in title.

Accidental epidural – 270 (1981-2025)
Inadvertent epidural – 157 (173- 1981-2025)
Unintentional epidural – 52
Accidental intrathecal – 152
Accidental spinal: 116 (1981-2025)
Inadvertent intrathecal – 146 (1981-2025)
Unintentional intrathecal - 13

Reference list of the articles:

Cited by function on the Google Scholar for reports included:

Supplemental file 2: Human factors analysis classification system framework.

<https://www.hfacs.com/hfacs-framework.html>

(Ref: Shappell, S. and Wiegmann, D. (2001). Applying Reason: The human factors analysis and classification system. Human Factors and Aerospace Safety. 2001; 1: 59-86.

Organizational Influences
Organizational Climate
Organizational Process
Resources
Supervision
Inadequate Supervision
Planned Inappropriate actions
Failure to correct known problem
Supervisory Violations
Preconditions to acts
Physical environmental factors
Technological environmental factors
Adverse mental state
Adverse psychological state
Physical/Mental limitations
Interpersonal factors
Personal readiness
Unsafe acts
Skill-based error
Perceptual error
Decision error
Routine violation
Exceptional violation

SUPPLEMENTAL FILE 3:

Applied Harm scale and Examples: Please see manuscript also.

Level 1: No or minimal clinical symptoms. No change in progress of clinical care and life.

Examples: Interruptions in clinical care, but independent cardiorespiratory and neurological functions. Additional measures (e.g. medications, procedure) during the provision of care, modifications in clinical care or specific measures to prevent harm.

Level 2: Reversible clinical signs and symptoms requiring changes in Clinical care or life interfering due to deviation in the progress of care (e.g. Mild to moderate, short term systemic including cardiovascular, respiratory and neurological clinical features which deviates clinical care and demands additional measures in the provision of care).

Examples: Additional monitoring, investigations while continuing care e.g. blood, cerebrospinal fluid (CSF), radiological, neurophysiological). Minimal extra care or interventions (e.g. one or two medications, one or two investigations). Prolonged stay for observations only (ICU, ward), Other speciality involvement e.g. neurology, cardiology. Epidural catheter removed due to error. Failed spinal anesthesia requiring GA. Epidural anesthesia or analgesia planned but abandoned. Patient required one or multiple follow-ups due to the incident

Level 3: Reversible life-threatening clinical changes requiring major interventions in provision of Clinical care (e.g. severe systemic changes including cardiac, respiratory and neurological disturbances).

Examples: Requires invasive or non-invasive ventilatory support. Severe hypotension requiring infusion of vasopressors / inotropes, Neurological function loss, convulsions.

Surgical: e.g. emergency LSCS (due to maternal or foetal condition).

Level 4: Life changing permanent harm

Examples: Residual neurological deficits needing support to maintain routine life

Level 5: Death

Examples: Immediate or delayed death

Table: The Neuraxial Route, Dose, Clinical manifestations and management, and Outcome of Glucose, Parental fluids, Water, Total parental nutrition and Insulin.

Group or Medication	Dose/ Route	Age / G /Surgery	Clinical features	Management	Outcome / Comments
Glucose (Dextrose in water) [used in place of NS to dilute Morphine]	10.8 gram infused over 36 hrs Epidural (L)	67/M Laparotomy (small bowel obstruction)	During postoperative period, the patient developed generalized, coarse, nonrhythmic tremor of all four extremities coupled with marked disorientation to time and place. Muscle tone and strength were normal. No lateralising signs. After epidural catheter removal, symptoms began to abate. Normal neurological features within 24 hrs.	Epidural catheter removed. ABG. Neurology consultation. CT head, EEG Lumbar puncture CSF hyperglycaemia- 1422mg/dl. Blood glucose – 147mg/dl.	Follow up at 4 months.
Glucose Saline [with KCL 20 mmol]	21 ml for 1 hr. Epidural (T)	10/F Scoliosis correction	During postoperative period on day 3 via 3-way tap connected to epidural filer. The patient was receiving Fentanyl infusion 6 ml/hour. No Sensory or motor symptoms.	Epidural catheter discontinued. Daily neurological assessment for 2 weeks.	Discharged from the hospital after 3 weeks.
Hypertonic Saline [In place of normal saline]	20 ml 20% Epidural (L)	53/ Chronic pain procedure	Severe chest and lumbar pain, tachypnoea, tachycardia and hypertension. Hyperaesthesia of lower limbs. LA given. Pain and paraesthesia disappeared after administration of epidural LA and distilled water.	Fentanyl IV 100 microgram twice. Epidural space relocated and 10 ml lidocaine 1%- and 40-ml distilled water injected.	Regularly followed for 3 months.
Hypertonic Saline (3%)	18.5 ml over 3 hrs Epidural (T)	63/F Fundoplication	The epidural solution bag had a label of hypertonic saline. Error noted after 3 hrs after the surgery. No neurology symptoms and signs.	Epidural 5 ml NS flushed, and 5 ml 1% lignocaine bolus after the incident. PCEA for post op pain	Follow-up until discharge. .
Water [In place of NS]	4 ml Epidural (L)	32 Labour analgesia	Loss of resistance with water. Sudden, severe, burning thoracolumbar pain. No motor or sensory deficits. Pain gradually improved.	Epidural Saline 5 ml injected, 20 ml ropivacaine 0.1% with sufentanil administered. Epidural catheter was used	Daily neurological follow-up for 10 days.
Water (in place of NS)	2 ml Epidural (L)	45/F Hysterectomy	Immediately, excruciating back pain, sweating, tachycardia and hypertension. No neurological sequelae.	Epidural catheter flushed with lidocaine 3 ml. Epidural removed next day.	Discharged on day 7.

Water (in place of NS)	Volume not reported Epidural (T)	76/M Laparotomy	Immediately, excruciating generalised pain including chest. Epidural catheters removed and recited.	Epidural used for post op analgesia	Post op no neurological sequelae
TPN	160 ml over 2 hrs. Epidural (T)	UK / M Esophagectomy	Post op in ICU. Nurse thought 'filter' of epidural was for TPN. Pump kept alarming. Nurse removed filter and reconnected the TPN to epidural catheter. The patient remained asymptomatic and pain free.	After that epidural used. Epidural analgesia effective. Neurological examination up to 3 days.	No problem till discharge.
TPN With morphine 1mg/hr.	300 ml 60 ml/hr Epidural (L)	21/M Total colectomy	TPN was piggybacked on to port of infusion set of epidural infusion set. The 'label' at one of the ports was lost. No neurological problems.	Epidural site inspected. Epidural catheter was removed.	. Daily follow up.
Insulin (in addition to IV insulin 3 IU/hr infusion)	50 IU over 5 hours. Epidural (T)	67/F Liver resection	No neurological signs or symptoms. Blood glucose levels decreased significantly from 17.4 to 6.8 mmol.l)1 over a period of 7 h. Hospital pharmacist was contacted.	Both infusions stopped. Blood glucose monitored. Empty syringes sent to pharmacy for confirmation.	Manufacturer of insulin was contacted.
Insulin	25 units short acting Infusion Epidural (L)	39 Labour pain	Six hours after insertion of epidural, inefficient analgesia. Hypoglycaemia (56 mg/dL). No hemodynamic and neurologic instability. The parturient vital signs, neurological status and foetal heart rate were monitored continuously until delivery.	8 mL of 2% lidocaine for pain. Anesthesiologist was notified. Oral intake of 15 g of fast-acting carbohydrate. After administering saline solution (5 mL), 8 mL of 0,2% ropivacaine was injected. PCEA restarted.	Neurological assessment at 24 hours, 48 hours, and hospital discharge.

Table: The Neuraxial Route, Dose, Clinical manifestations and management, and Outcome of Anticholinergic (Atropine), Anticholinesterase (Neostigmine) and Antiemetic drug errors.

Group or Medication	Dose/ Route	Age / G /Surgery	Clinical features	Management	Outcome / Comments
Atropine (In place of IV atropine)	0.3 mg (in ½ ml) Epidural (L)	64/F TKR	In hurray, soon after the start of surgery, epidural atropine given to manage bradycardia following epidural clonidine. Error realised while injecting. Mild hypotension, bradycardia. No neurological abnormalities.	Phenylephrine given. IV 0.6 mg Atropine given. Post op epidural used for analgesia. Post op HDU admission for 2 days.	Discharged 12 th day. Follow up at 3 months.
Atropine 3 patients (in place of Morphine) (Bupivacaine)	100 µg (In place of 100 µg Morphine) Intrathecal	Unknown / All 3 patients - LSCS	Quality of spinal block was satisfactory for LSCS. Post op after 4 hours: All 3 patients: Severe headache, confusion, agitation. One patient developed refractory seizure, Baby of all three patients- no problems	Paracetamol, tramadol, diazepam, Oxygen. One patient: Sedation, tracheal intubation, mechanical ventilation in ICU. Recovered after 3 days.	No mention about follow-up
Atropine (in place of Morphine)	0.2 mg Intrathecal	Not mentioned	Error realised after surgery started under general anesthesia. Surgery completed. Following error. The patient developed anaphylactic shock due to metamizole allergy.	For anaphylactic shock (not related to the error), management was done with ephedrine and phenylephrine.	No sequelae
Neostigmine [In place of bupivacaine]	1.25 mg in 2.5 ml Intrathecal	26/M Hernia repair	No spinal block even after 20 minutes. No clinical problems. General anesthesia after 1 hr Neuromuscular junction monitored for muscle relaxant effect. Reversal with IV atropine (1.2 mg) and neostigmine (2.5 mg). Few episodes of PONV. Urinary retention.	Prophylactic IV Ondansetron 4 mg. monitoring. Pancuronium was used. Post op to ICU for monitoring. Did not require post op analgesics. Urinary catheterisation.	Discharged on day 3.
Neostigmine & Atropine (In place of Bupivacaine with Epinephrine)	0.9 mg and 0.3 mg respectively. Epidural (L)	12 / F ureterone ocystostomy	GA administered. Epidural performed. Error occurred during surgery. Immediately error realised. Patient was haemodynamic stable. Post operative shifted to paediatric ward. PONV and abdominal pain 5 times during early post op period. Pain well controlled.	Prophylactic Ondansetron given 4 mg during surgery. Epidural catheter removed at the end of surgery. Enema because of abdominal pain. The patient did not require analgesics for 2 days.	Discharged after 1 week.

Neostigmine & Glycopyrrolate	2.5 mg 0.5 mg Epidural	No details	No sequelae	No details	

Table Antiemetics and H₂ receptor blocker

Ondansetron in place of 0.5% bupivacaine	8 mg (4 ml) ondansetron injected. Epidural (T)	55/M Abdominal Perineal resection	Every hour bolus of 4 ml 0.5% bupivacaine was administered during the surgery. 30 minutes before the surgery error occurred. Mean arterial BP decreased after 5min by 20 mm of Hg. No neurological problems.	Epidural saline Epidural Dexamethasone 10 mg given. Post op epidural used for 4 days	Discharged after 21 days
Ondansetron (in place of fentanyl, mixed with 8 ml 2% lidocaine)	2 mg Epidural (L)	23 LSCS	Epidural was inserted for labour pain. During top up for LSCS error occurred. Error realised during. Injection. Epidural block was established with further lidocaine administration. Baby was delivered. No clinical problems. No problems on neurological examination in recovery room	No intraoperative nausea/vomiting. Post op epidural used. Epidural catheter was removed after 24 hours. Neurological examination throughout hospital admission normal.	Discharged home on post op day 3.
Ondansetron in place of Fentanyl, mixed with Morphine	0.3 ml (2 mg/ml) Intrathecal	36 Elective LSCS	After delivery of baby error noted when IV ondansetron was planned to administer. Empty Ondansetron and unopened Fentanyl ampoule were found. Surgery completed.	No Intra or post PONV. No Intra or post pruritus. Close follow up for 24 hours	Follow up at 6 weeks.
Droperidol (the ampoule also contained fentanyl).	0.1 mg (0.4 ml) Intrathecal	72/M proctosig moidectomy with ileostomy	Spinal and general anesthesia (GA) was planned. Error occurred during spinal anaesthesia (the patient received bupivacaine, morphine, droperidol and fentanyl). GA administered. Severe hypotension – BP decreased to 60/30 mmHg despite vasopressor boluses.	Several doses of ephedrine before and after GA. Norepinephrine infusion during entire surgery. Post op follow up for 3 days.	Discharged from the hospital after three days. Follow up after one week.
Metoclopramide in place of Fentanyl, mixed with hyperbaric 5% bupivacaine	0.5 ml Dose? Intrathecal	17 36 weeks Emergency LSCS	Spinal block onset was normal. Sensory block up to T4. Severe hypertension 190/120 and Tachycardia (heart rate 145 beats per minute). Severe headache, agitation, blurred vision, nausea and vomiting and drowsy 20 min after, the patient was more alert and no headache. However, tachycardia and hypertension persisted. Surgery completed.	Oxygen by face mask. Head up position. Baby was delivered. Apgar score was ok. Tramadol, Metamizole, Ondansetron Detailed neurological follow up after 24 hrs.	No neurological and hemodynamic problems in RR. Discharged after 2 days

Ranitidine (containing phenol)	15 mg (3 mg phenol) (30 ml over Epidural (L)	36/F Pyeloplas ty	Post op patient was also receiving epidural fentanyl infusion. No neurological symptoms or signs. Neurology examination daily for a week	Epidural fentanyl continued. Epidural catheter flushed with 10 ml NS	Discharged with no neurological sequelae. .
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Table: Anticoagulant (heparin) and reversal (protamine)

Heparin (in place of morphine)	5000 IU (twice 2 hrs apart) Epidural (L)	58/M Partial gastrectomy	Error occurred in recovery room. Receiving nurse noted error. Neurological monitoring for epidural hematoma. No neurological problems	Epidural catheter not used after the error. Protamine 100 mg given diluted in 500 ml NS.	Overnight the patient was kept in recovery room.
Protamine In place of Bupivacaine.	1.5 ml Intrathecal	Age unknown LSCS (elective)	No neurological or haemodynamic problems. The patient's condition and CTG were observed Patient was observed in recovery room for 4 hours and subsequently in ward.	Surgery cancelled. Surgery was performed next day under spinal anaesthesia	No details.

Table: Antiseptics

Chlorhexidine (in alcohol) (in place of NS)	Volume? Epidural (L)	32 Primigravida Labour analgesia	Severe back pain, progressive tetra paresis, sphincter dysfunction. Unable to sit, walk, breast feed her baby. Secondary hydrocephalus.	Chronic pain management Rehabilitation V-P shunt	Tetraplegia
Chlorhexidine (in place of LA)	Volume? Epidural	34 / F Achilli's tendon repair	Tetraplegic. Unable to swallow.	Rehabilitation.	Died 3 years after the incident
Chlorhexidine	3 ml Epidural				
Glutaraldehyde In place of bupivacaine.	3 ml 3% along with 3 ml NS Epidural (L)	72/M Vascular (F- P Bypass)	Incident occurred in 6 hrs after the surgery. Hypotension , tachycardia, nausea and Vomiting. Symptoms lasted for an hour and disappeared with supportive treatment. Muscular clonus right thigh. Paraplegia and hypoesthesia. No reflexes and Babinski sign negative. Perineal sensations and reflexes lost.	IV Dexamethasone 16 mg daily. Supportive treatment MRI; L4-L5, disc bulging and hypertrophy of flaval ligaments. EMG- loss of motor potentials Sensory Evoked Potential– no response. Rehabilitation	Paraplegia EMG at the end of year. No motor power. No reflexes.
Glutaraldehyde (In place of CSF)	5% Intrathecal	64 / M Maxillectomy	Hypotension, Coma.	Postmortem examination	Death after five days
Mercurochrome	5 mg (26 mg of mercury) Intrathecal	69 / F Post spine surgery	The patient had developed a cerebrospinal fluid (CSF) fistula with a subcutaneous cavity. Within 24 hrs of injection, she developed arachnoiditis, meningitis and encephalitis.	CT scan, MRI, CSF, blood, urine analysis, CSF drainage, surgery Chelating agent parentally Mechanical ventilation 3 days	Residual polyneuropath y with ataxia and memory impairment

Table: NSAIDs: The Neuraxial Route, Dose, Clinical manifestations and management, and Outcome of Analgesics drug errors.

Metamizole (along with Morphine)	160 mg over 4 hrs Epidural (L)	75/F Total knee replacement	Post op PCEA. Bupivacaine + Fentanyl During the night, error occurred. for 4 hours. The patient also received morphine 1 mg/hr. No cardiorespiratory or neurological changes.	Epidural catheter was removed. Periodic follow up to 18 months	Discharged next day. No problems.
Nefopam (with heavy Bupivacaine) (in place of sufentanyl)	5 mg (0.5 ml of 10 mg/ml solution) . Intrathecal	18/M Patellar fracture.	Spinal block was effective. No haemodynamic changes. No adverse neuro effects. Motor block lasted 3.5 and sensory block for 5 hrs. Following days – no neurological problems.	Post op ICU for monitoring of side effects. Four days after the incident MRI spine.	Discharged 5 th day. Follow up to 1 month.
Ketorolac (in place of Dexamethasone)	30 mg Epidural (L)	32/M Chronic low back pain	The patient's pain improved. No adverse sequelae.	Epidural 10 ml sterile water injected	Follow-up at 2 months.

Table Opioids and sedative

Group or Medication	Drug / /Dose/ Route	Age / G /Surgery	Clinical features	Management	Outcome / Comments
Remifentanyl (in place of ropivacaine)	840 µg (over 90 minutes?) Epidural	49/F Right hemicolectomy	The patient also received ropivacaine 84 mg IV. Error occurred during the surgery. No signs of motor or sensory block were observed. No haemodynamic changes.	Prolonged recovery room stay (for 8 hrs) to monitor the patient	No cardio- or neurological sequelae
Remifentanyl (in place of tetracaine) (with lidocaine & epinephrine)	567 µg (Intermittent 3 boluses (also 8.5 mg glycine) Epidural (T)	60 / F Laparoscopic cholecystectomy	The incident happened before the start of surgery. The patient felt light-headedness. SpO2 decreased to 36%. The patient became unconscious and developed rigidity of the chest and abdominal muscles. SpO2 increased to 100% after GA with muscle relaxant. with mask ventilation.	Mask ventilation was difficult. General anaesthesia. Surgery completed.	There were no neurological sequelae after the surgery.
Remifentanyl	300 µg (3 ml) (also 2.25 mg glycine) Epidural (T)	67 / F Emergency distal pancreatectomy	Error occurred after tracheal extubation at the end of 5 hrs surgery. After the incident, respiratory depression occurred at 5 min after the administration, and complete loss of consciousness was observed at 8 min. SpO2 decreased to 90%. Spontaneous respiration resumed after 45 minutes of the incident. Regained consciousness.	Mask ventilation for 5 minutes Tracheal reintubation without the use of muscle relaxant Mechanical ventilation Tracheal extubation	No neurological problems.
Remifentanyl (along with Propofol)	192 mcg (over 1 hr) (Propofol 330 mg) Intrathecal	F/51 Posterior fossa tumour	The lumbar drain was inserted for surgical purpose. The incident happened during the induction. TIVA line connected to intrathecal drain. GA was maintained with sevoflurane. No neurological, haemodynamic, or respiratory problems once the patient woke up.	30 ml of white opaque fluid drained from the lumbar drain. Surgery cancelled. Tracheal extubation. The patient was shifted to the ICU. In ICU- three CSF lavage with 10 ml NS. Next 48 hrs, CSF was drained 5 ml/hr.	The patient was operated once CSF was clear of propofol.
Morphine (3 patients)	Total dose? Epidural	F/55, 66, 60 Hysterectomy	Postoperatively, between 16-20 hrs, all three patients developed poor arousal, hypopnoea and hypercarbia in the ward.	Tracheal intubation. Mechanical ventilation for 24 hrs in the ICU.	No permanent clinical sequelae

(in place of levobupivacaine)		TKR (2 patients)	The patients received morphine 6-8 mg / hr	The contents of the batch of syringes sent for laboratory analysis	
Tramadol	25 mg Intrathecal (via catheter)	57 / F Chronic cancer pain	On palliative management. The incident happened on day 19 after intrathecal catheter placement. Within 10 minutes, diaphoresis and hypotension. Severe central back pain with spasms and myoclonic jerks in both lower limbs.	Intrathecal baclofen 0.5 mg – no effect `Phenobarbitone 200 mg sc (effective)	Death 48 hrs later
Midazolam (along with fentanyl) (in place of bupivacaine)	2.4 mg (with fentanyl 36 mcg) Over 2 hours Epidural (T)	. 70/F Laparotomy (for polytrauma)	On post op day 5 in ICU, the patient developed progressive sedated to the point of unconsciousness. Respiratory rate decreased from 14 to 6/min over 45 minutes. Hypotension not responding to IV fluids. BP improved after IV flumazenil. No neurological sequelae. Avoided re-ventilation.	IV Naloxone 0.4 mg IV Flumazenil 1mg – rapid awakening	No sequelae ,

Table: The Neuraxial Route, Dose, Clinical manifestations and management, and Outcome of syntocinon errors.

Medication	Dose/ Route	Age / Procedure			
Syntocinon (In place of LA-Fentanyl mixture)	10 units Epidural (L)	25 Labour analgesia	Moderate preeclampsia. Labour was augmented. with syntocinon infusion which was disconnected prior to patient transfer for caesarean section. The patient received intermittent Bupivacaine with Fentanyl during labour. Before transfer, the patient complained of pain. Midwife accidentally Injected whole syringe containing syntocinon 10 units. A sudden profound drop-in foetal heart rate followed, and the patient was rushed for an emergency caesarean section.	Caesarean delivery under GA Post op close monitoring	Discharged after 3 days. No neurological sequelae
Syntocinon	5 units Epidural (L)	20 Labour analgesia	Epidural done. Syntocinon infusion started. Failure to progress so LSCS. Immediately after baby was delivered, 5IU administered via epidural catheter. The error was immediately realised. No clinical side effects. IV syntocinon 5 + 5 IU followed by infusion given for uterine atony.	No fluid could be aspirated via epidural catheter. Manufacturer contacted which reported four other syntocinon errors.	The patient's follow-up at 2, 4, 6 weeks and 12 months postpartum revealed no sequelae . .
Syntocinon (In place of LA-Fentanyl mixture)	Dose unknown Epidural (L)	Age not mentioned Labour analgesia	Two test doses assumed to be – 0.1% bupivacaine with Fentanyl 2 Microgram/ml of Fentanyl. Both test doses were drawn from Syntocinon bag solution (30 units in 500 ml normal saline). Regular neurological checks performed every hour.	Use of epidural catheter abandoned.	Follow up after 10 days. No neurological deficit.
Syntocinon (In place of LA-Fentanyl mixture)	Epidural (L) Infusion		41 weeks. Error was realised during nursing shift change after few hours		

Table: The Neuraxial Route, Dose, Clinical manifestations and management, and Outcome of some routine and rare medication and chemical errors.

Medication	Dose / Route	Age/Gender / Surgery	Clinical features	Management	Outcome / Comments
Acetylcysteine in place of Bupivacaine.	2.4 ml (mg?) Intrathecal	21/F Orthopaedic	Immediately, intermittent tension spasms in lower and upper limbs Error realised during surgery. Post op in recovery room - recurrent spasms, hyperreflexia, tachycardia, hypertension, tachypnoea, Symptoms improved 2 hrs after admission in the RR.	GA administered, Paralysed. Dexamethasone 10 mg IV Post op: Pethidine 25 mg IV Midazolam 2 mg IV Arterial blood gas, ICU admission	Discharged after 3 days. Follow up at 1 month and 1 year.
Aminophylline In place of bupivacaine	75 mg Intrathecal	64/M Trans urethral resection of prostate	Immediately leg spasms and cramps. response. Error realised. Surgery lasted for 45 minutes. Post op immediately no neurological problems. For 24 hours, no symptoms. Discharged from the hospital. Patient came back within 24 hours of the discharge because weakness of lower limbs.	GA administered. Dexamethasone 8 mg IV CSF analysis- Protein elevated, Myelogram- thecal compression at L3-L5 levels. MRI facility not available.	Paraplegia. Died after 2 years.
Ether In place of morphine.	5 ml Epidural (L)	40 Elective LSCS	Error occurred towards the end of surgery. 2-3 minutes after injection Hot legs and burning pain in legs and up to abdomen. Paralysis developed and sensory block up to T8. Three hrs after the incident, symptoms improve. No neurological abnormalities 4 hrs after the incident. No haemodynamic changes.	Aspiration attempts. Epidural space rinsing with 10 ml of NS for three times. Epidural prednisolone 100 mg diluted in 10 ml NS. Epidural catheter removed at 6 hours.	At 24 hours and 10 days later no neurological sequelae.
Frusemide	2 ml – 40 mg Intrathecal	36/M I&D	Neither anaesthetic nor diuretic effects were marked. Surgery with another anaesthesia technique No neurological problems	Alternative anesthesia technique	Post op course uneventful
Paraldehyde	Epidural	35 Labour pain	Error during top-up dose administration. Immediate onset pain and paraplegia progressing to permanent, altered sensation, urinary/bowel incontinence.	Prolonged hospitalization.	Quadriplegia Chronic pain

RR-recovery room, NS- normal saline,