TLALELETSO

BOTSWANA-UPENN PARTNERSHIP

ACUTE POISONING

JUNE 2012,
ISSUE 6

GUIDELINES UPDATE: ACUTE POISONING

Acute poisoning is a common reason for visits to emergency departments and for hospitalization worldwide. The prevalence of acute poisoning in Southern Africa varies between 1 and 17%[1] and available evidence from Botswana suggests that acute poisoning ranks third among injuries leading to hospitalization.[2]

While only a small fraction of all drug overdoses and poison exposures require hospitalization, it was one of most common reasons for admission to Princess Marina Hospital among HIV negative patients in 2009.[2]

Poisoning can result from exposure to a variety of substances, ranging from household cleaning products to pesticides. However, prescription and over the counter medications account for nearly one half of poisoning exposures.[3] The most common medication poisonings in adults include analgesics, sedatives, antidepressants, stimulants, cough/cold preparations and illicit drugs.[4]

Poisoning from medications can happen for many different reasons, including intentional overdose, inadvertently taking an extra dose, dispensing errors and exposure through breast milk[3]. Medical officers should be familiar with treatment of accidental and intentional medication ingestions; therefore this month's Tlaleletso focuses primarily on the management of acute poisoning caused by *medication* ingestion.

Evaluation involves recognition that poisoning has occurred, identification of agents involved, assessment of severity and prediction of toxicity. Management is directed to the provision of supportive care, prevention of poison absorption and when appropriate, the administration of antidotes or enhancement of elimination of the poison. In this edition of Tlaleletso we discuss evaluation and management of specific, common poison exposures and review the new *draft* national guidelines for managing patients presenting to hospital with acute poisoning.

UPCOMING LECTURES

July	Topics in HIV: Tuberculosis Co-infection
August	Guidelines Update: Acute Kidney Injury
Sept	Topics in HIV: HIV and Aging
Oct	Guidelines Update: Acute Resp Distress
Nov	Topics in HIV HIV and Cancer

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INITIAL EVALUATION: RESUSCITATION

ABCDEs: Clinicians who treat poisoned patients should have a systematic and consistent approach to evaluation and management. This should start with the standard **Airways, Breathing, Circulation, Disability and Exposure (ABCDE)** approach:

ABCDES OF ACUTE POISONING

AIRWAY: It is essential to assess the patient's airway patency. If the patient is unable to protect their airway they are at an increased risk of aspiration.

There is a risk of corrosive injury from acids or alkalis, glyophospate, and paraquat. It is vital to assess for stridor, dysphagia, dysphonia. Early intubation or surgical airway is often required in such settings and these patients should be referred early to higher level of care.

BREATHING: Evaluate respiratory rate and if available, oxygen saturation. If there is no oxygen monitor available but the patient has an elevated respiratory rate, consider supplemental oxygen.

Special case: paraquat. Avoid supplemental oxygen in patients that have ingested paraquat, only give if O2 sat <90%, and titrate oxygen supply to O2 sat of 90%.

Special case: acidosis (e.g. Salicylates, toxic alcohols). Hyperventilation is an essential component of the management of patients that have ingested toxic quantities of aspirin. These patients should be referred early to a higher level of care.

Special case: opioids (e.g. Codeine, DF118, morphine). These patients may have profound respiratory depression.

PARACETAMOL OVERDOSE

In Botswana, one of the most important dangerous drugs taken in overdose is paracetamol. It is essential that medical officers are familiar with is the management of paracetamol overdose. Single or repeated doses totaling as little as 10-15g or 150 mg/kg of paracetamol taken within 24 hours may cause severe hepatotoxicity and, less frequently, renal tubular necrosis.

Patients at *high risk* of liver damage including those taking liver-enzyme inducing drugs (e.g., carbamazepine, phenytoin, rifampicin, alcohol) or those that are malnourished (especially HIV positive) or have not eaten for a few days. Nausea and vomiting, the only early features usually settle within 24 hours. However, liver necrosis, associated with encephalopathy, hypoglycemia, cerebral oedema and death, may follow in 3-4 days.

It is therefore vital that all patients who have taken an overdose of paracetamol be evaluated and managed promptly even if they are asymptomatic:

- Administration of activated charcoal should be considered if the quantity of paracetamol ingested is in excess of 150MG/KG or 12g, *which ever is smaller,* is thought to have been ingested within the previous hour.
- N-acetlycycsteine protects the liver if administered within 24 hours of ingesting paracetamol. It is most effective if given within 8 hours:

1. If >10g ingestion or more than 150mg/kg and presenting within 8 hours→n-acetylcysteine indicated
2. For below criteria would consult with Emergency specialist and refer to a center that has N-Acetylcysteine:
    - There is evidence of hepatotoxicity- elevated transaminases
    - Staggered overdose
    - Timing of overdose unknown
    - Amount of paracetamol ingested unknown

Special case: organophosphates. These patients develop respiratory failure secondary to respiratory secretions. The treatment is with atropine 1-2mg IV which can be doubled every 5 minutes until there is resolution of bradycardia, drying of secretions and good air entry.
The treatment is naloxone. Giving a bolus dose of naloxone 200mcg may prevent need for intubation and ventilation, but repeat dosing may be required.

CIRCULATION: A prompt assessment of vital signs and hydration status is essential.

Administration of crystalloid IV fluid (Normal saline or Ringers Lactate) is necessary if HR>100 and SBP <90, and the patient is not in acute heart failure or has chronic renal failure.

Special case: calcium channel blockers (e.g. nifedipine). If the patient has ingested toxic quantities of calcium channel blockers, treatment should involve IV 10% calcium gluconate 60ml over 15 minutes. Consider early transfer to higher level of care

This may be repeated up to three times as necessary. If the patient is hypotensive secondary to overdose, then prompt initiation of IV fluids is also vital. In patients with persistent hypotension despite standard therapies, discuss with an Emergency Specialist and

Special case: sodium channel blockers (e.g. tricyclic antidepressants, propranolol, quinine, chloroquine, local anaesthetic agents). These patients are at risk for developing cardiac arrhythmias –Ventricular Tachycardia or Ventricular Fibrillation. The management of these arrhythmias should involve bolus of (IV) $NaHCO_3$ 1-2 mmol/kg every 2 minutes until restoration of perfusing rhythm, followed by transfer to a higher level of care. Note amiodarone is CONTRAINDICATED in these patients.

Special case: Digoxin. If signs of toxicity (hyperkalemia, bradycardia, visual complaints, GI intolerance and/or if no ECG available) transfer to a higher level of care.

DISABILITY: In patients that present with **seizures**, it is important to check the blood sugar level. If the blood sugar level is <4.0 mmol/l, then administer 50ml of 50% dextrose IV (5ml/kg 10% dextrose in children). Toxic seizures should be treated with IV benzodiazepines (e.g. midazolam 1-2mg IV prn). Note phenytoin is contraindicated.

Seizures refractory to benzodiazepines can be treated with barbiturates.

Toxic seizures are generalized. Focal /partial seizures indicate a focal neurological disorder that is either a complication of the poisoning or a result of a non-toxicological cause, and further investigation is required.

Special case: Isoniazid. Pyridoxine is a 3rd line agent for intractable seizures in these patients.

EXPOSURE: evaluation of temperature Consider the possibility of toxic syndromes associated with hyperthermia (toxic levels of certain drugs can lead to significantly elevated body temperature, e.g., fluoxetine, sertraline). Manage as appropriate – discuss with Emergency Specialist.

A temperature >39.5 in the setting of acute poisoning is an emergency. The patient should be immediately referred to a higher level of care, discuss management with an Emergency Specialist.

RISK ASSESSMENT

An early, accurate risk assessment is the key to managing acutely poisoned patients. It enables you to predict the likely clinical course, potential complications, and to plan the management of the patient.

5 steps of a risk assessment:

1. **Agent(s)**
   - Assess whether the particular agents ingested are likely to cause significant toxicity.
2. **Dose(s)**
   - Calculate the dose taken in mg/kg body weight. Use this information to predict likelihood of significant toxicity.
3. **Time since ingestion**
   - This is important for determining the likely clinical progress of the patient, and to guide management.
4. **Clinical features and progress**
   - Correlate the patient's clinical features and progress with the dose taken and time since ingestion. The risk assessment may need to be revised, depending upon the patient's clinical status.
5. **Patient factors (weight and co-morbidities)**
   - Consider individual patient factors that may put the patient at particular risk

HISTORY: the history is often an unreliable source of information when provided by a patient after an intestinal ingestion[5], especially if the patient is suicidal.

The patient's history should be confirmed wherever possible and correlated with the signs, symptoms and laboratory data expected. It is critically important to ask about ingestion of over the counter medications and traditional medications. These are often regarded as benign by the patients and may not be volunteered during questioning by the patient.

Tablet count – ask ambulance drivers/relatives to search for empty pill packets, then count the number of pills missing. It is also important to review old OPD cards, patient's list of medications, other medications available at home. If in doubt, go with the "worst case scenario" – e.g. if several children have possibly ingested some pills, assume each of the children has ingested all of the missing tablets.)

PHYSICAL EXAMINATION: This may provide invaluable clues as to what the drugs ingested were. The mental state examination, vital signs and pupillary examination are the most useful elements of the examination. Important aspects of the examination include:

- Vital signs (PR, RR, BP, temp, O2 saturation if available)
- Neurological exam (pupil size, GCS, mental state, tone, reflexes, clonus, focal signs)
- Skin (colour, sweating absent/present, pressure areas)
- Dry mouth/salivation, bowel sounds, urinary retention
- Evidence of trauma

MEDICATION	SIGNS AND SYMPTOMS	TREATMENT
Paracetamol	Anorexia, elevated liver enzymes, jaundice, lethargy, liver failure, nausea and vomiting, pallor	If >10g ingestion or more than 150mg/kg and presenting within 8 hours then n-acetylcysteine indicated. See box on paracetamol.
Benzodiazepines (diazepam)	Amnesia, ataxia, coma, confusion, drowsiness, lethargy, sedation	Activated charcoal if patient presents within 1 hour of ingestion. Flumazenil: given as an initial dose of 2.5mg. Dose can be repeated, titrating to effect. It should be used on expert advice. Flumazenil is contraindicated in patients with a history of seizures or chronic benzo use, or co-ingestion with other medications that might induce seizures (amitriptyline).
Beta Blockers (atenolol)	Acidosis, bradycardia, bronchospasm, coma, hyper or hypoglycemia, hyperkalemia, hypotension, seizures. The effects of massive over dosage can vary from one beta-blocker to another: propranolol overdose is associated with coma and seizures	If available, glucagon can be given. Calcium gluconate 10% bolus at 0.6ml/kg and Sodium bicarbonate bolus of 50 mEq/ml should be administered. 3mg of atropine (iv) is required to treat bradycardia and hypotension.
Calcium Channel Blockers (nifedipine)	Coma, dizziness, hypotension, lethargy, seizures. Metabolic acidosis and hyperglycemia can occur. Nifedipine can cause profound hypotension secondary to peripheral vasodilatation.	Activated charcoal if patient presents within 1 hour of ingestion. Calcium gluconate 10% bolus at 0.6ml/kg and Sodium bicarbonate bolus of 50 mEq/ml should be administered. In severe cases glucose and insulin may be necessary may be necessary
Opioids (codeine)	CNS depression, coma, lethargy, stupor, constipation, nausea, vomiting, flushing, respiratory depression, seizures	If available, naloxone is administered at an initial dose of 0.1 to 0.4 mg. Larger doses may be required if significant respiratory depression.
Salicylates (aspirin)	Alkalosis or acidosis, coma diaphoresis, electrolyte abnormalities, hyper or hypoglycemia, nausea and vomiting, renal failure, tinnitus, deafness	These patients should be transferred to PMH/HRN for specialist input +/- intensive care admission
Sulphonylureas (glibenclamide)	Coma, decreased appetite, dizziness, hypoglycemia, lethargy, seizures, weakness	Dextrose bolus with dosing based on degree of hypoglycemia. Alternatively, glucagon (1mg dose) may also be given if available
Tricyclic Antidepressants (amitriptyline)	Coma, confusion, delirium, dilated pupils, dry mouth, seizures, tachycardia, urinary incontinence)	Benzodiazepines for seizures, Sodium bicarbonate for prolonged QRS and consider dopamine for hypotension refractory to iv fluids.
Antimalarial (chloroquine and hydroxychloroquine)	Life threatening features include arrhythmias, which can have a very rapid onset, and convulsions, which can be intractable.	Overdose is very difficult to treat. Seek expert help from Emergency Specialists.

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SUPPORTIVE CARE AND MONITORING

Remember that acute poisoning is a dynamic illness and the patient's condition may fluctuate over time. Therefore repeated examinations and ongoing clinical assessment and management are required.

- Airway, Breathing, Circulation: ongoing management as clinically indicated.
- Seizures – IV benzodiazepines
- Sedation – IV benzodiazepines
- Metabolic – ensure euglycaemia
- Fluid and electrolytes, renal function
- General

INVESTIGATIONS

1. Blood sugar level
2. ECG – look for:

Rate

Bradycardia – e.g. beta blockers (such as atenolol), calcium channel blockers (such as nifedipine)

Tachycardia – e.g. sympathomimetics (such as epinephrine), anticholinergics (such as amitriptyline)

Rhythm

Heart block – e.g. calcium channel blockers, beta blockers

- QRS duration in lead II
- e.g. sodium channel blocker poisoning (such as propranolol). QRS>100ms predictive of seizures, QRS>160ms predictive of VT.
- R wave in AVR
- E.g. sodium channel blockers. R wave greater than 3mm, or R:S ratio >0.7 is considered significant.
- QT interval
- ST and T wave morphology

DECONTAMINATION

Gastrointestinal decontamination is reserved for cases where the risk assessment predicts severe or life threatening toxicity and where supportive care or antidote treatment alone is insufficient to ensure a satisfactory outcome.

Activated Charcoal

- If gastrointestinal decontamination is indicated, activated charcoal is generally the preferred method.
- Major risk is charcoal pulmonary aspiration.
- Activated charcoal only of benefit in carefully selected patients.
- If administered via NGT, great caution is required because of risk of misplaced tube and subsequent pulmonary aspiration. Only administer once x-ray has confirmed correct placement of NGT in stomach.

Indications: (all of these must be met)

- Within one hour of time of ingestion (Special case: slow release calcium channel blockers, sulphonylureas – consider charcoal up to 4 hours post ingestion)
- Patient at risk of significant toxic effects
- Patient NOT at risk of airway compromise

Contraindications:

- Non-toxic/sub-toxic ingestion
- Risk assessment indicates good outcome with supportive care and antidote therapy alone
- Seizures, decreased level of consciousness, delirium or poor cooperation
- Risk assessment indicates POTENTIAL for seizures or decreased level of consciousness within the next few hours
- Corrosive ingestion
- Agent not bound to activated charcoal:
    - Hydrocarbons and alcohols (ethanol, methanol, ethylene glycol, isopropyl alcohol)
    - Metals (lithium, iron, potassium, lead, arsenic, mercury)
    - Corrosives (acids, alkalis)

Gastric lavage

Gastric lavage is VERY RARELY indicated. Furthermore, gastric lavage should NOT be done, without discussion with an Emergency Specialist or Consultant Physician. It is of negligible benefit and has significant risks .[6]

Other techniques of gastrointestinal decontamination and enhanced elimination are beyond the scope of this edition of Tlaleletso, and should be discussed with an Emergency Specialist or Consultant Physician on a case-by-case basis.

DISPOSITION

When determining whether to observe, admit, transfer or discharge a person who has been poisoned there are several factors to consider.

- Predicted clinical course of the patient
- Level of observation and monitoring required
- Level of medical care required
- Psychosocial factors

For unstable patients admission to an intensive care unit may be appropriate. For stable patients the amount of observation time is based on the half-life of the medication and the amount ingested. Any patient who develops signs or symptoms of toxicity that do not reverse during the observation period should be admitted for further observation[6-8]. When a patient is ready for discharge, his or her home situation must be taken into account, especially if the patient is a child. Patients who have attempted suicide will need a mental health evaluation. Patients with a history of substance abuse should be referred for counseling.

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SUMMARY

While poisonings can be fatal, the vast majority of patients presenting with a toxic exposure suffer minimal morbidity and recover fully. As a consequence it is important to weigh the risks of interventions against the possible benefits, which for many may be relatively small.

The essential elements of care for the poisoned patient are:

- Airway, Breathing, Circulation – stabilizing the patient, securing a patent airway, adequate gas exchange and stable blood pressure are all vital
- Obtain a thorough history of actual and potential poison exposures. Get collateral history from friends and family where appropriate. Always inquire about over the counter medications and traditional / herbal drugs.
- Perform a thorough physical examination to ascertain signs of a potential drug exposure, as well as complications of the toxic exposure
- Obtain laboratory tests as determined by the clinical presentation. Urinalysis, urea & electrolytes, blood glucose should be measured routinely in patients who present after a toxic exposure. Obtain a pregnancy test in women of child bearing age
- Supportive care in conjunction with decontamination procedures is sufficient for the vast majority of patients with toxic exposures.
- Ask for help. In unstable patients, patients that have ingested multiple drugs, and where there is any doubt about the appropriate management, it is always appropriate to contact the Emergency Specialist on call at PMH

BOTSWANA UPENN PARTNERSHIP

Got a clinical question about a complicated medical patient or a patient with HIV?

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WANT TO READ MORE? CHECK OUT THE REFERENCES BELOW:

1. Malangu N. Characteristics of acute poisoning at two referral hospitals in Francistown and Gaborone. SA Fam Pract 2008;50(3):67
2. Caruso, Ngaire—Emergency Specialist, University of Botswana Department of Emergency Medicine, PMH Accident and Emergency
3. Frithsen IL, Simpson WM, Jr. Recognition and management of acute medication poisoning. Am Fam Physician 2010;81:316-23.
4. Bronstein AC, Spyker DA, Cantilena LR, Jr., Green JL, Rumack BH, Giffin SL. 2009 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 27th Annual Report. Clin Toxicol (Phila) 2010;48:979-1178.
5. Daly FFS, Little M, Murray L. A risk assessment based approach to the management of acute poisoning. Emerg Med J 2006;23:396-9.
6. Heard K. Gastrointestinal Decontamination. Med Clin N Am 2005;89:1067-78.
7. Kloeck WGJ. A Guide to the Management of Common Medical Emergencies in Adults. 8th ed. 2007/2008.
8. Moulton C, Pennycook A, Makower R. Relation between Glasgow coma scale and the gag reflex. BMJ 1991;303:1240-1.
9. Murray L, Daly F, Little M, Cadogan M. Toxicology Handbook. Sydney (Australia): Elsevier Australia; 2007.
10. Vale JA, Kulig K.; American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. Position paper: gastric lavage. J Toxicol Clin Toxicol. 2004;42(7):933-43.