TOXICOLOGICAL EMERGENCIES

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- This document summarises the assessment and management of common poisoning & envenoming scenarios likely to be encountered in the Emergency Department. It is intended for use by medical and nursing staff.
- For information and advice regarding the management of poisoned & envenomed patients call the **NSW Poisons Information Centre** (24/7) on 13 11 26 (or ext 53111 from inside CHW) or if at SCH, contact South Eastern Area Toxicology Service (**SEATS**) on 0423366022.

CHANGE SUMMARY

- This document is a SCHN guideline and replaces guidelines from SCH and CHW of the same subject matter.
- The section on Paracetamol has been removed from this document and is now a new 'stand-alone' SCHN guideline.

READ ACKNOWLEDGEMENT

- This document is intended for use by doctors and nurses working with poisoned & envenomed patients at SCHN; this will primarily be those in the Emergency Department.
- There is no training requirement attached to this document, however, staff in the ED should be aware of its existence.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st January 2015	**Review Period:** 3 years
Team Leader:	Doctor	**Area/Dept:** NSW Poisons Information Centre

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Information and Help

When to call for HELP?

You can call for help regarding any patient presenting to the ED where poisoning is known or suspected.

Local expertise

- Senior ED staff (e.g. Emergency Physician)
- South Eastern Area Toxicology Service – SEATS) - Ph: 0423366022 (local toxicology service)
- NSW Poisons Information Centre at CHW – Ph: (ext) 53111

NSW Poisons Information Centre 13 11 26

- 24-hour hotline for advice on the management of the poisoned patient
- Staffed by experienced Pharmacists and Consultant Toxicologists

Websites

- Therapeutic Guidelines – Toxicology section available through CIAP
- CIAP – Micromedex/Poisindex: www.ciap.health.nsw.gov.au
- Clinical Toxinology website: www.toxinology.com

Textbooks

- Murray, L *et al*. Toxicology Handbook. Elsevier, 2007.
- Dart, R. Medical Toxicology, 3rd Ed. Lippincott, Williams & Wilkins, 2003.
- Goldfrank's Toxicological Emergencies, 10th Ed. McGraw-Hill, 2014.

1 General Principles

What is poisoning?

- Poisoning is the exposure to a toxic chemical or substance thus causing physical harm to a person. The exposure may be through a variety of routes including:
  - Oral
  - Inhalational
  - Dermal/subcutaneous
  - Ocular
  - Mucosal
  - Intravenous
- **Reasons for the exposure may be:**
  - Accidental
  - Deliberate (either self-harm or poisoned by someone else)
  - Therapeutic misadventure, e.g. excess paracetamol for toothache
  - Recreational, e.g. drug abuse
  - Industrial/occupational
  - Disaster/terrorist activity
  - Envenomation, e.g. spider bite, snake bite
  - Iatrogenic, i.e. during the course of medical treatment
- Whatever the reason for the toxicologic presentation, it is a symptom of the underlying social, psychological or medical stressor.

Triage of the poisoned patient

- Patients who present with a history of poisoning should be triaged as per the Australasian Triage Scale (ACEM 2000).
- An assessment needs to be made according to type of drug ingestion or poison exposure, time since exposure, clinical appearance of patient and vital signs (HR, BP, RR, temperature, saturation). Consider triaging poisoned patients as Category 3 or higher. This means that they should be seen be a senior ED doctor within 30 minutes of presentation.

Paediatric Poisoning

- Poisoning in children is usually accidental, particularly in the under 6 age group.
- Deliberate self-poisoning may become apparent as they mature into teenage years.
- Non-accidental poisoning (either deliberate or due to neglect) should be considered and excluded. There should be a low threshold of suspicion to refer a poisoned child to the Child Protection Unit or Community Services.
- Poisoning in children manifests clinically in a similar manner to adults. The management of poisoning in children is also similar.

2 Assessment of the poisoned patient

Poisoned patients should be assessed by a standard process which includes history, examination and appropriate investigations. The following outlines a typical assessment of a poisoned patient; there are situations where additional history, examination or investigations are appropriate.

Taking a history

- Background medical problems (particularly in teenagers).
  - Previous psychiatric history or contact.
  - Known depression.
  - Previous overdose or deliberate self-harm episodes.
- Medications (including all drugs which the patient has access to at home).
- Allergies & adverse drug reactions.
- Drug use – over-the-counter, herbal, recreational and illicit.
- Social history – home situation.
- History of the poisoning:
  - What did they get exposed to?
  - In which form (powder, liquid etc.)?
  - Through which route (oral, intravenous, etc.)?
  - How much?
  - When?
  - Was it all in one go or staggered over a period of time?
  - Where/from whom did they get access to this medication?
  - Where did the overdose happen (home, office, park etc.)?
  - Why (accidental, recreational, self-harm, etc.)?
  - Did they vomit after the overdose? Were there any tablets present in the vomitus?
  - Do they have any pain or other symptoms since the exposure?

Examination

As in any patient presenting to the ED, the priorities in poisoned patients begin with ABC.

- **1° survey**
  - Assess patency of airway
  - Assess adequacy of ventilation
  - Assess circulation
  - Check vital signs
  - Assess gcs and neurological exam (incl. Pupils, tone, reflexes, clonus)
  - Check BSL in all patients with altered level of consciousness
- **2° survey**
  - Full head-to-toe examination
  - Look for external signs of trauma
  - Does the patient have an odour? (e.g. Ethanol, cyanide, organophosphate)
  - Important systems to examine include the cardiovascular, respiratory, gastrointestinal, haematological and neurological systems
  - Look for pressure areas, bleeding/petechiae/ecchymoses, track marks, bite sites.

3 Toxidromes

Toxidromes are syndromes consisting of a cluster of symptoms and signs which characterise a particular type of poisoning. The main toxidromes to recognise are shown in Table 1 (below):

Toxidrome	Mechanism	Agents	Clinical features
Sympathomimetic	Adrenergic receptor stimulation	▪ Amphetamines ▪ MDMA (ecstasy) ▪ Cocaine ▪ Ketamine ▪ Ephedra alkaloids ▪ Synthetic cathinones	▪ Tachycardia ▪ Hypertension ▪ Mydriasis ▪ Sweating ▪ Agitation ▪ Delirium ▪ Fever
Anticholinergic	Muscarinic receptor blockade	▪ Atropine ▪ Hyoscine ▪ Scopolamine ▪ Cyclic anti-depressants ▪ Phenothiazines ▪ Anti-histamines ▪ Plants: Datura spp., Brugmansia spp. ▪ Mushrooms	▪ Tachycardia ▪ Mydriasis ▪ Loss of visual accommodation ▪ Flushed skin ▪ Dry skin/mouth/eyes ▪ Fever ▪ Delirium
Opiate	Opiate (μ receptor) stimulation	▪ Morphine ▪ Codeine ▪ Methadone ▪ Fentanyl ▪ Heroin ▪ Oxycodone ▪ Tramadol ▪ Clonidine	▪ Sedation ▪ Bradypnoea ▪ Hypotension ▪ Miosis
Cholinergic	Acetylcholinesterase enzyme blockade	▪ Organophosphates ▪ Carbamates ▪ Nerve agents	▪ Delirium ▪ Coma ▪ Seizures ▪ Excess secretions (DUMBELS) ▪ Weakness ▪ Fasciculations
Serotonergic	Serotonin (5-HT2 receptor) stimulation	▪ SSRIs ▪ MAOIs ▪ Cyclic anti-depressants ▪ Opiates ▪ Tramadol ▪ Lithium ▪ MDMA (ecstasy)	▪ CNS: o Delirium o agitation ▪ Neuromuscular: o Hypertonia o Hyperreflexia o Tremor o Clonus (ocular, spontaneous, inducible) ▪ Autonomic: o Diaphoresis o Fever o Hypertension
Neuroleptic	Dopamine and acetylcholine transmission blockade	▪ Anti-psychotics o Phenothiazines o Haloperidol o Risperidone o Clozapine o Olanzapine	▪ Fever ▪ Rigidity ▪ Rhabdomyolysis ▪ Leukocytosis ▪ Delirium

In any individual patient, toxidromes may not fully manifest with the classic symptoms and signs. The likely diagnosis is made on available history and signs elicited.

4 Principles of Management

General management of poisoned patients should follow these principles:

1. **Resuscitation**
   - Ensure patent airway and oxygenate patient (may require intubation)
   - Support ventilation
   - Obtain intravenous access and support circulation
   - Maintain normothermia & euglycaemia
2. **Decontamination**, for example:
   - Remove patient from the source of toxicity into a well-ventilated area
   - Remove contaminated clothing; irrigate skin/eyes/mucosa
   - Activated charcoal
   - Whole bowel irrigation
   - Note that **inducing emesis (such as with Ipecac) is <u>not</u> recommended** in most situations because of a risk of aspiration and oesophageal trauma
3. **Antidotes**
   - There are many specific antidotes for particular poisonings (e.g. N-acetylcysteine for paracetamol poisoning, bicarbonate for tricyclic antidepressant poisoning)
4. **Supportive treatment**, including:
   - IV rehydration
   - Correction of electrolyte abnormalities
   - Analgesia and anti-emetics
   - Anticoagulation
   - Blood products
   - Thiamine
   - Treat complications such as seizures, aspiration, ARDS, arrhythmias, delirium
5. **Enhance elimination** – methods include:
   - Multidose activated charcoal
   - Alkaline diuresis
   - Haemodialysis
   - Charcoal haemoperfusion
6. **Consultation** – may need to consult with:
   - Toxicologist/Poisons Centre Specialist
   - Mental Health team
   - Child Protection Unit
   - Intensive Care
   - Others (e.g. Dentist: paracetamol OD for toothache)

7. **Disposition**
    - Admission or discharge (with appropriate follow-up)
    - If admitted, select level of care required in-hospital – e.g. ICU, HDU, general ward, special nurse

Each poison has its own specific management and set of tailored interventions. However, many poisonings are managed with supportive measures and no specific interventions exist. Advice on individual cases is best sought from experienced Toxicologists.

5 Charcoal

Activated charcoal is a synthetic preparation containing charcoal particles in colloidal suspension. It is not commonly indicated in paediatric poisoning.

- Available as 50g/250mL preparation.

Dose:

- 1g/kg orally or via gastric tube (max dose: 50g)

Indications for use in overdose:

- Drug ingested has significant potential for toxicity, **AND**
- Ingested drug is adsorbed by charcoal, **AND**
- Charcoal can be administered within 1 hour of ingestion, **AND**
- Patient is alert enough to drink charcoal (or via gastric tube in intubated patients).

Contraindications:

- Absent bowel sounds
- Bowel obstruction or ileus
- Unprotected airway
- Charcoal does not adsorb the following poisons and should **not** be used for:
    - Metals (e.g. lithium, iron, lead)
    - Corrosives (acids & alkalis)
    - Alcohols (e.g. methanol, ethylene glycol)
    - Hydrocarbons (e.g. petrol, kerosene)
- Charcoal is not recommended for pure benzodiazepine ingestions

Adverse effects:

- Black stools
- Bowel obstruction
- Potential for aspiration and pneumonitis

Important notes:

- DO NOT insert a gastric tube in patients with reduced level of consciousness (unless intubated) for charcoal administration
- Always check for the presence of bowel sounds prior to administering charcoal
- If giving charcoal via a gastric tube ensure proper position with a chest X-ray
- Charcoal administration beyond the 1-hour threshold may be justified in cases where the drugs ingested delay gastric emptying or are sustained-release preparations
- Multi-dose activated charcoal is a controversial treatment of certain types of poisoning; it is best utilised after consulting with a Toxicologist.

6 Paracetamol

For guidelines on management of paracetamol poisoning in children please refer to the SCHN Practice Guideline on "Paracetamol Overdose – Assessment and Management".

7 Benzodiazepines

The sequelae of sedative drug overdose include apnoea, coma, aspiration, hypothermia and rhabdomyolysis (from prolonged lying and local myonecrosis). Mortality can be prevented in these poisonings by the provision of supportive care.

Management of benzodiazepine poisoning:

1. **Resuscitation**
   - Oxygenate and monitor
   - Airway and ventilatory support
   - Prevent aspiration in obtunded patients
   - IV access and circulatory support
   - Prevent hypothermia and maintain euglycaemia
   - DON'T EVER FORGET GLUCOSE in any patient with altered level of consciousness
2. **Antidote**
   - Flumazenil (IV, IM) may be indicated in pure benzodiazepine overdose with hypoventilation: boluses of 5 – 10 microg/kg with titration to ventilation (respiratory rate and effort); do not titrate to GCS alone – see precautions in note below.
3. **Decontamination**
   - Activated charcoal for pure benzodiazepine ingestion is not recommended.
4. **Supportive treatment**
   - Hourly neurological observations in patients with reduced levels of consciousness until GCS 15.

5. **Consultation** (e.g. Child Protection Unit).
6. **Disposition**
   - Admit non-alert patients to a monitored bed.
   - Alert and asymptomatic patients who have been observed for >4hours may be toxicologically cleared.

Note: Some benzodiazepines are long-acting and patients may need to be observed for longer periods. The use of **flumazenil** in any overdose (including benzodiazepines) is not routinely recommended and advice from a Toxicologist should be sought. **Unmasking of any proconvulsant co-ingestants may lead to seizures after flumazenil administration**.

8 Opioids

Drugs such as heroin, morphine sulfate, methadone and oxycodone produce the opioid toxidrome (as described above) causing primarily reduced level of consciousness, respiratory failure and cardiovascular collapse. Opioid poisoning can be rapidly reversed by naloxone administration (usually intramuscular, intravenous, or intranasal). Complications of opioid poisoning include hypoxia, shock, coma, aspiration, and non-cardiogenic pulmonary oedema.

Management of opioid poisoning:

1. **Resuscitation**
   - Oxygenate and monitor
   - Airway and ventilatory support
   - Prevent aspiration in obtunded patients (by intubation)
   - IV access and circulatory support
   - Prevent hypothermia and maintain euglycaemia
   - DON'T EVER FORGET GLUCOSE in any patient with altered level of consciousness
2. **Antidote**
   - **Naloxone** (IM, IV, IN): 10microg/kg – intravenous boluses of 100microg (with titration to respiratory rate and effort); do not titrate naloxone dosing to GCS or pupil size.
   - Patients who ingest long-acting or extended-release opioids (e.g. methadone, MS-Contin) may require a naloxone infusion (consult Toxicologist).
3. **Decontamination**
   - Consider charcoal for large ingestions which present within 2 hours (please see contraindications in 'Charcoal' section above)
4. **Supportive treatment**
   - Anti-emetics
   - Hourly neurological observations in patients with reduced levels of consciousness
   - CXR to look for non-cardiogenic pulmonary oedema

5. **Consultation** (e.g. Toxicology, Child Protection Unit)
6. **Disposition**
    - Admit non-alert patients to a monitored bed
    - Alert and asymptomatic patients who have been observed for at least 2 hours post-overdose may be toxicologically cleared.

9 Snake Bite

Also refer to the NSW MoH Snakebite and Spiderbite Clinical Management Guidelines 2013, 3rd edition for more information.

- Australian elapid snakes are amongst the most venomous in the world. The primary effects of toxins in snake venom include:
    - **Local effects** – pain, redness, bleeding, swelling
    - **Systemic effects** – regional pain, lymphadenopathy, headache, nausea, vomiting
    - **Neurotoxicity** – ptosis, cranial nerve palsy, diplopia, limb weakness, respiratory paralysis
    - **Myotoxicity** – myalgia, rhabdomyolysis
    - **Coagulopathy** – both anticoagulant and consumptive forms are seen

Important questions to ask:

- When and where was the bite?
- Was it a pet snake? If so, what type of snake was it?
- Was pressure-immobilisation bandage applied? When? How effective is it?
- How were they transported to hospital?
- Any bleeding sites (bite site, haematuria, haematemesis)?
- Any symptoms (local or systemic) or collapse?

9.1 Management of snake bite

Contact the Poisons Information Centre (PIC) about all children with suspected snake bite.

1. **Resuscitation** (ABC) – manage all snake bite patients in an acute monitored area
2. **First aid**
    - If the patient presents under 4hrs, **apply a pressure immobilisation bandage (PIB)** – if it has already been applied, check that it has been correctly done.
    - Apply a firm crepe (or similar) bandage over bite site and then over the entire limb.
    - Immobilise limb with rigid splint.

- Do NOT remove PIB until antivenom availability has been confirmed.

3. **Further examination**
   - Examine bite site & regional lymph nodes.
   - Look for evidence of bleeding (skin, mucosa, urine) and muscle tenderness.
   - Examine neurological system (in particular cranial nerves) looking for weakness.
4. **Investigations**
   - BSL, Urinalysis.
   - Pathology: FBC, EUC, LFTs, Coagulation studies, D-Dimer, fibrinogen, CK.
   - Snake venom detection kit may be appropriate after speaking to the PIC: can be performed on bite site and/or urine (NOT from blood).
   - Spirometry and peak flow measurements of respiratory function.
   - Radiology sometimes may be important (such as CXR or CT brain).
   - Urinary myoglobin can be done to confirm rhabdomyolysis.
5. **Consultation**
   - In any patient with signs of systemic envenomation, call PIC and speak with the Toxicologist on call.
6. **Antidotes**
   - Check available stock of antivenom (AV) in ED & Pharmacy.
   - Appropriate antivenom should be administered when signs of systemic envenomation are present; pre-medication (with steroids & adrenalin) is not routinely recommended.
7. **Supportive treatment**
   - Analgesia.
   - Check tetanus status.
   - IV rehydration.
   - Monitor for and treat any anaphylactoid reactions to antivenom (e.g. rash, wheeze, hypotension) as usual with steroids, adrenalin and/or anti-histamines.
8. **Disposition**
   - Admit all patients with suspected snake bite for at least 12 hours (or overnight).
   - Inform all patients who have received AV regarding the potential for serum sickness in 7-21 days. If symptoms develop they should re-present to their GP or ED.

10 Spider Bite

The medically important spider bites in Australia are those of the funnel-web spider (FWS) and red-back spider (RBS). Clinical features and management of these two types of spider bite is very different.

Also refer to the NSW MoH Snakebite and Spiderbite Clinical Management Guidelines 2013, 3rd edition for more information

10.1 Funnel-web spider bite (Atrax and Hadronyche genera)

All deaths due to FWS have been attributed to the male Atrax spp. prior to the availability of FWS antivenom; cause of death is due to pulmonary oedema or cardiovascular collapse. The FWS is a “big black spider” and there are other non-venomous spiders that look similar to the FWS.

Contact the NSW Poisons Information Centre about all children bitten by a “big black spider”.

Clinical features of FWS envenomation

- Local pain
- Perioral tingling, piloerection, fasciculations
- Muscle spasm (potential for laryngospasm)
- Nausea, vomiting, abdominal pain
- Tachycardia, hypertension
- Increased secretions (giving it an appearance similar to organophosphate poisoning)

Management

- Manage all big black spider bite patients in a resuscitation environment: support ABCs, oxygenate, monitor, IV access
- Remove spider with care if still attached
- **Apply pressure immobilisation bandage** (as for snake bite) – do NOT remove bandage until adequate antivenom supply is available
- Consult with Toxicologist through PIC for FWS bites with signs of envenomation
- If there are signs of systemic envenomation, administer 2 vials of FWS antivenom in 100mL normal saline given by slow IV infusion over 30 minutes; pre-medication (with steroids & adrenalin) is not routinely recommended.
- Administer analgesia and antiemetics as required
- Check tetanus status
- Monitor for and treat any anaphylactoid reactions to antivenom (e.g. rash, wheeze, hypotension) as usual with steroids, adrenalin and/or anti-histamines
- Observe all patients with suspected FWS bite for at least 2 hours
- Inform all patients/carers who have received AV regarding the potential for serum sickness in 7-21 days. If symptoms develop they should re-present to their GP or ED.

10.2 Red-back spider bite (Latrodectus hasselti)

Red back spider (RBS) envenomation (known as latrodectism) is the commonest envenomation syndrome to present to hospital in Australia. No deaths have been reported since the introduction of RBS antivenom in 1956.

Clinical features of RBS envenomation

- Local pain is the dominant feature.
- Local sweating, piloerection, fasciculations.
- Tachycardia, hypertension.
- Diaphoresis.
- Regional pain (e.g. pain over the entire limb).
- Chest and abdominal pain, headache.

Management

- Support ABCs, apply oxygen & monitoring, IV access.
- Ice packs over bite site may improve symptoms.
- Do NOT apply compressive bandages or tourniquets.
- Treat pain with analgesia such as paracetamol, ibuprofen and/or opiates.
- The use of RBS antivenom is controversial and unproven; it may be useful in severe envenoming with autonomic signs – discuss with a Toxicologist.
- If antivenom is indicated, give 2 vials of RBS antivenom by slow intravenous infusion (2 vials in 100mL normal saline) over 30 minutes; pre-medication (with steroids & adrenalin) is not routinely recommended.
- Administer analgesia and anti-emetics as required.
- Check tetanus status.
- If no improvement in symptoms in 1 hour, reconsider the diagnosis or contact the PIC.
- If you have any concerns with management, consult with Toxicologist through PIC.
- Monitor for and treat any anaphylactoid reactions to antivenom (e.g. rash, wheeze, hypotension) as usual with steroids, adrenalin and/or anti-histamines
- Inform all patients/carers who have received AV regarding the potential for serum sickness in 7-21 days. If symptoms develop they should re-present to their GP or ED.