

What's new in Toxicology and Toxinology 2024

Some of the new information and major changes included in *Therapeutic Guidelines*

In line with Therapeutic Guidelines' living guidelines approach, the Toxicology and Toxinology guidelines have been updated with new advice in specific areas. Updates have been made in response to important new evidence and significant changes in practice since the guidelines were published in 2020. In addition, several new topics have been included in the Toxicology and Toxinology guidelines.

An increase in nonmedical use of nitrous oxide has led to more frequent presentations of significant chronic **nitrous oxide poisoning** to health care services. New guidance, with a particular focus on the management of chronic nitrous oxide toxicity, has now been included.

Previously covered in the Addiction guidelines, **ethanol intoxication** has been moved into the Toxicology and Toxinology guidelines and has been expanded to provide greater detail. This includes the treatment of hypoglycaemia, in the context of ethanol intoxication, as well as risk assessment, clinical presentation and patient disposition advice.

Isopropyl alcohol is one of the main components commonly found in hand sanitisers. The COVID-19 pandemic has resulted in more hand sanitiser use, and therefore increased accessibility in higher volumes, in the community. This update provides more specific advice for the treatment of **isopropyl alcohol poisoning**, particularly in children.

Tramadol poisoning and **tapentadol poisoning** are commonly implicated in poisonings. Previously, guidance on these was provided only in the context of serotonin and noradrenaline reuptake inhibitor (SNRI) or opioid poisoning. Detailed advice on the management of both these poisonings has been provided in dedicated monographs.

Although previously covered as a subsection of the **lead poisoning** topic, the management of **lead object ingestion** has been expanded on and clarified.

The similarities and differences in management of poisonings between the selective alpha-2a adrenoreceptors **clonidine and guanfacine** have been highlighted. Specific advice has been provided for guanfacine, a modified-release preparation, relating to the use of activated charcoal and the duration of observation after poisoning.

Advice for naloxone to treat **opioid poisoning** and **buprenorphine poisoning** has been refined. Detail has been added to clarify the total initial bolus dose of naloxone, as well as the indication for starting a naloxone infusion.

Other important changes in the Toxicology and Toxinology guidelines include:

- a new recommendation for corticosteroid treatment for **methanol poisoning** to prevent optic neuropathy, which can lead to severe visual impairment or even blindness
- revised advice on when to start sodium bicarbonate treatment for urinary alkalisation in patients with **aspirin poisoning** and **chlorophenoxy herbicide poisoning**
- updates to haemodialysis recommendations for **baclofen poisoning**, **beta-blocker poisoning** and **isoniazid poisoning**, prompted by the Extracorporeal Treatments in Poisoning Workgroup (EXTRIP) advice
- a new nomogram to determine the need for haemodialysis for **chronic lithium accumulation**
- revised advice on when to repeat measurement of serum paracetamol concentration as part of assessment of **paracetamol poisoning** associated with liquid formulations in children younger than 6 years
- clarification of information on D-dimer testing (including timing and specific test cut-offs) for **snake bite**, based on newly published evidence
- clarification of the indication for high-flow oxygen therapy and admission to hospital for **carbon monoxide poisoning**.

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What's new in Toxicology and Toxinology (2020)

Some of the new information and major changes included in the Toxicology and Toxinology guidelines in *eTG complete*.

The Toxicology and Toxinology guidelines have been extensively revised and expanded. The updated treatment recommendations are based on available evidence and the consensus of our expert group. The guidelines are targeted towards hospital doctors, especially emergency department staff, as well as primary care providers (first responders, general practitioners, rural and remote practitioners) and poisons information specialists.

What is covered in Toxicology and Toxinology?

The guidelines provide practical advice on managing a wide range of poisonings, exposures to toxic agents and envenomings. Toxicology and Toxinology now comprises:

- 14 topics on the general approach to managing poisoning
- 7 topics on specific toxidromes (toxic syndromes)
- 117 monographs about individual drug poisonings, envenomings and exposures to other toxic agents.

Dozens of new monographs have been added to encompass a larger number of rare but highly toxic drugs and other agents (eg *Amanita phalloides* mushroom poisoning, Button battery ingestion, specific herbicide poisonings including Paraquat, Glyphosate and Chlorophenoxy herbicides).

Other new poisoning monographs include Apixaban and rivaroxaban, Dabigatran, Buprenorphine, Cocaine, Insecticides, Isoniazid, Local anaesthetics, and Monoamine oxidase inhibitors. Some topics have been split to address the different treatments for acute poisoning versus chronic accumulation (eg Digoxin, Lithium).

Some drug classes include both a general monograph for the class, and specific monographs for individual drugs with specific issues in poisoning. For example:

- **Antidiabetic drug poisoning (general)**, plus specific monographs for Insulin, Metformin and Sulfonylurea poisonings
- **Antiepileptic drug poisoning (general)**, plus specific monographs for Barbiturates, Benzodiazepines, Carbamazepine and oxcarbazepine, Lamotrigine, Phenytoin, Pregabalin and gabapentin, Sodium valproate, Tiagabine and Topiramate poisonings
- **Antipsychotic drug poisoning (general)**, plus specific monographs for Amisulpride, Clozapine, Olanzapine and Quetiapine poisonings
- **Hydrocarbon poisoning (general)**, plus specific monographs for Ingestion, Inhalation and Injection of hydrocarbons
- **Novel psychoactive drug poisoning (introduction)**, plus specific monographs for Novel stimulant, Novel hallucinogen and Synthetic cannabinoid receptor agonist poisonings
- **Poisoning from plants (introduction)**, plus eight specific monographs for various plant toxins.

How do I use Toxicology and Toxinology?

The guidelines include content on the general approach to poisonings, and specific toxidromes (eg Cholinergic toxidrome, Serotonergic toxidrome), followed by the grouped and individual poisoning monographs, listed alphabetically.

Most of the poisoning monographs have the following consistent structure for ease of navigation:

- **Management overview**—drug(s)/agent(s) and preparations available; salient points about toxicity and urgency of management; key management priorities and pitfalls

- **Risk assessment**—toxic dose and toxic concentration (if available); clinical presentation; key investigations
- **Treatment**—resuscitation, including interventions for airway, breathing and circulation; decontamination and enhanced elimination techniques; specific treatments (eg antidotes, sedation, seizure control)
- **Observation and patient disposition**—optimal duration for observation; advice for admission to hospital; special considerations for discharge.

Throughout the guidelines, advice on **risk assessment** and **treatment** in specific monographs often links back to the general approach and toxidrome topics. Common interventions in the management of poisonings that are covered in the general topics include:

- **Inotropic support: first-line therapy**, including adrenaline (epinephrine) and noradrenaline (norepinephrine)
- **Inotropic support: high-dose insulin euglycaemia therapy (HIET)**, which may be recommended for second-line inotropic therapy
- **Cooling for drug-associated hyperthermia**, depending on availability, practicality and expertise
- **Decontamination for poisonings**, including detailed discussion on the risks of harm versus benefit of gastrointestinal decontamination with activated charcoal
- **Sedation in poisoning**, which may require higher than usual doses
- **Seizure control in poisoning**, which may require antiepileptic drugs other than benzodiazepines or phenytoin
- **Multiple-dose activated charcoal or extracorporeal elimination techniques** (including haemodialysis).

Flowcharts to aid in clinical decision-making have been updated based on the most recent evidence. Flowcharts available as printable figures and include:

- Management flowchart for a single ingestion of 10 grams (or 200 mg/kg in patients under 50 kg) or more of immediate-release paracetamol
- Management flowchart for modified-release paracetamol poisoning
- Summary of the acute management of suspected snake bite in Australia.

Is Toxicology and Toxinology evidence based?

Many of the poisonings, envenomings and other exposures covered in the guideline are uncommon, and evidence in this field is often limited. The guidelines are based on the available evidence supported by the consensus of the expert group. Every monograph includes evidence-based treatment recommendations, including children's doses (if available) and maximum doses.

Specific recommendations for pregnant or breastfeeding women are not included because management for poisoning in this group is no different to the general population.

What practice-changing updates should I be aware of in Toxicology and Toinology?

• Paracetamol poisoning

It is now recommended to measure alanine amino-transferase (ALT) concentrations in addition to serum paracetamol concentrations in **all** patients, at least 4 hours after ingestion.

Changes to recommendations for acetylcysteine as an antidote for paracetamol poisoning include:

- a standard two-bag (20-hour) acetylcysteine protocol to replace the former three-bag protocol
- varying acetylcysteine protocols for poisonings due to immediate-release, liquid, and modified-release paracetamol preparations
- recommendation of high-dose (double-dose) acetylcysteine in the second infusion for high risk poisonings and for serum paracetamol concentrations that are more than double the paracetamol treatment nomogram line
- addition of specific treatment for unintentional paracetamol poisonings (also known as repeated supratherapeutic ingestion [RSTI])
- recommendation of extended acetylcysteine therapy for patients with evidence of hepatotoxicity.

• Acetylcysteine therapy for hepatoprotection in other poisonings

Acetylcysteine is recommended for hepatoprotection in a standard two-bag protocol for:

- *Amanita phalloides* mushroom poisoning
- arsenic poisoning
- paraquat poisoning
- some hydrocarbon poisonings, including benzene, carbon tetrachloride and chloroform
- some essential oil poisonings, including clove oil and pennyroyal oil.

• Snake bite

The critical steps in the management of snake bite in Australia are:

- determine if the patient has evidence of systemic envenoming
- if so, determine if antivenom is indicated
- if so, determine the snake group(s) likely to be responsible for the bite, to guide the choice of antivenom(s).

These decisions are supported by a new flowchart of management of suspected snake bite in Australia.

In most places, treatment of snake bite comprises combinations of single-dose monovalent antivenoms (eg tiger snake plus brown snake antivenom). Testing with a venom detection kit is no longer recommended.

• Red-back spider bite

Red-back spider antivenom is not recommended. Analgesia is the mainstay of therapy.

• Major box jellyfish (*Chironex fleckeri* species) sting

Intramuscular administration of box jellyfish antivenom is not recommended. Intravenous administration in hospital is recommended.

• Button battery ingestion

If there is any suggestion of a button battery ingestion, a time-critical X-ray of the neck, chest and abdomen is urgently recommended, as well as referral for endoscopic removal if a battery is seen.

• Digoxin poisoning

Titrated digoxin-specific immune antibody fragments (digoxin immune Fab) is now recommended for acute digoxin poisoning with life-threatening hyperkalaemia or arrhythmia, unless the patient is in cardiac arrest. Lower doses, also titrated, are used for the same complications in patients with chronic digoxin accumulation.

• Colchicine poisoning

Updated treatment recommendations rely on the dose of colchicine ingested to guide interventions, including gastrointestinal decontamination and enhanced elimination using activated charcoal. Patients at higher risk of developing colchicine toxicity have a lower dose threshold for these interventions.

• Gastrointestinal decontamination

Activated charcoal for gastrointestinal decontamination can be used to treat significant overdoses (after assessing the risk of harm versus benefit):

- up to 2 hours after ingestion of immediate-release preparations
- 4 hours or more after ingestion of modified-release preparations.

Whole bowel irrigation can be considered:

- up to 4 hours after ingestion of significantly toxic drugs (eg metals, modified-release preparations)
- for 'body packers' and 'body stuffers' (concealed illicit drugs).

• Maximum doses

Specific maximum total doses have been added for some drugs; for example:

- the maximum total dose of intravenous sodium bicarbonate 8.4% for serum alkalisation is 6 mmol/kg
- the maximum total dose of calcium gluconate 10% for cardiac stabilisation in hyperkalaemia is 60 mL.

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