

Drug Overdose and Poisoning

Definition / Supporting Information

Drug overdose occurs when a child ingests or is given an amount of a substance that exceeds the recommended dose. This can be deliberate or accidental and the substance may not always be known. Symptoms alone may indicate toxicity even though, by history, neither the agent nor the dose would have predicted it. See also Ingestion of Caustic Substances (Caustic Injury of the Oesophagus)

When no specific history of toxic exposure can be found, the diagnosis of poisoning can be challenging as signs and symptoms of poisoning can mimic those of many acute illnesses.

All cases of potentially toxic exposures should be referred to trained poison information specialists at local and regional poison control centres.

- For the UK this is the [National Poisons Information Service \(NPIS\)](#)
 - The NPIS is the UK Department of Health approved, and Public Health England commissioned, national service that provides expert advice on all aspects of acute and chronic poisoning.
 - [Toxbase](#) is a free online service provided to all Emergency Departments and should be consulted before calling the NPIS in most cases.

Essential History

Ask about:

- Name and type of agent if known, quantity involved, and weight of child
 - Includes medications, gases, and fumes
- Time of ingestion, timing of symptoms
- Any co-morbidities or medication that could affect metabolism of agent taken (eg, anticonvulsant medication)
- Behavioural characteristics that increase the risk of ingestion:
 - Hyperactivity
 - Impulsive risk-taking behaviour
 - Rebelliousness
 - Negative attitude
 - Social isolation
- History of previous overdose or depression
- History of mental health problems in child / adolescent or parent
 - Consider HEADSS (Home, Education, Activities, Drug use and abuse, Sexual behaviour, Suicidality / depression) assessment for adolescents.

- The possibility of pregnancy in adolescent females
- Known social care or safeguarding issues in family
- History of any metabolic condition (eg, diabetes)
- Presence in the home of medications (prescribed or over the counter) or substances (see Table 1)
- Risk factors in the child's home or garden:
 - Cleaning products stored in easily accessible locations and / or improper storage containers
 - Medications left out / lack of child-resistant containers

Table 1: Some of the common drugs / poisons in childhood are mentioned below with the presentations. This list is not exhaustive and advice should be sought from the NPIS

Agent	Symptoms / signs
	Vomiting
Ethanol (ethyl alcohol)	At high doses, ethanol intoxication progresses to CNS depression, with coma and death resulting from respiratory suppression
Alcohol	
Methanol (picnic stove fuel)	Nausea, headache, decreased vision with mydriasis, weakness If untreated progressing to blindness, coma, death
Ethylene glycol (antifreeze, windscreen washing fluid, deicer)	Drunkenness, coma, tachypnoea, pulmonary oedema, acute kidney injury
Analgesics	
Paracetamol	Jaundice, loss of coordination, sweating, trembling, and irritability
Salicylates	Altered mental status, hypovolaemic shock, seizures, coma, hyperthermia
Antidepressants	
Tricyclic antidepressants	Seizures, delirium, coma
Selective serotonin reuptake inhibitors (SSRIs)	Altered mental status, agitation, myoclonus, hyperreflexia, diaphoresis, tremor, diarrhoea, incoordination
Antihistamines	Fever and altered mental status (CNS depression with somnolence or coma or CNS excitation with tremor, hyperactivity, hallucinations, or seizures) May cause anticholinergic 'toxidrome'

	Carbon monoxide (CO) - eg, from faulty heating	Headache, malaise, nausea, dizziness, altered mental status, seizure, syncope, coma
Cardiovascular medications	Cardiac glycosides	Nausea, vomiting, headache, weakness, confusion, changes in vision, palpitations, dizziness, bradycardia, hypotension, dysrhythmia
	Beta blockers and calcium channel blockers	CNS depression ranging from drowsiness to coma and seizures Bronchospasm in patients with a history of asthma Hypotension, bradycardia, wide QRS and PR intervals on ECG, bundle branch block, ventricular dysrhythmias such as ventricular tachycardia and torsades de pointes Hyperkalaemia, hypoglycaemia
	α2-Adrenergic agonists (clonidine)	Altered mental status, coma, respiratory depression, miosis, hypotension, bradycardia, dysrhythmias, such as first- and second-degree atrioventricular block
	Hydrocarbons	Kerosene, gasoline, mineral seal oil, solvents, paint thinners, butane in cigarette lighters, industrial solvents, turpentine, pine oils Gasping, choking, gagging, vomiting, cough, tachypnoea, wheeze, haemorrhagic pulmonary oedema, respiratory failure
Household cleaners and products	Detergents - eg, washing liquid tabs / gels for utensils and for clothes (see Ingestion of caustic substances)	Dysphagia, odynophagia (painful swallowing), drooling, stridor, hoarseness, abdominal pain, nausea, vomiting, gastrointestinal haemorrhage and perforation
Insect repellents	Diethyltoluamide	Confusion, ataxia, generalised seizures, encephalopathy, hypotension, bradycardia Chronic exposure symptoms include insomnia, muscle cramps, mood changes, and rash
	Lindane (used topically to treat scabies and pediculosis)	Headache, dizziness, ataxia, and tremors may be followed within 1–2 hours by self-limited seizures
	Iron (often pregnant mothers)	Abdominal pain, nausea, vomiting, diarrhoea, haematemesis, melaena
	Warfarin-like rodenticides	Single toddler exposures to standard warfarin or superwarfarin rodenticides do not typically lead to toxicity; signs of coagulopathy appear on repeated ingestion or in large suicidal ingestions by adolescents
Lead	Old pipes, lead paint, lead-based plumbing	Pallor, hearing impairment, constipation, behavioural disturbances, loss of developmental milestones, decline in school performance, anorexia, intermittent abdominal pain, nausea, vomiting, ataxia, incoordination, lethargy, irritability, coma, intractable seizures
Pesticides	Organophosphates	Pinpoint pupils, vomiting, changes in mental status, copious secretions Delayed symptoms (up to 3 weeks after exposure) include polyneuropathy, ataxia, neuropsychiatric symptoms, peripheral neuropathy, spasticity
Opioids	Morphine, meperidine, codeine, hydrocodone, oxycodone, propoxyphene, heroin, methadone	Respiratory depression, Central Nervous System depression, miosis
Recreation drugs (substance abuse)	Marijuana	Euphoria, impaired motor co-ordination and speech, impaired short-term memory, paranoia and agitation, dry mouth, conjunctival injection, tachycardia, urinary retention, hallucinations, delusions, psychosis
	Lysergic acid diethylamide (LSD)	Tachycardia, palpitations, blurred vision, tremors, incoordination, mydriasis
	Phencyclidine (PCP) and ketamine	Nystagmus, ataxia, sensory impairment, catatonia, tachycardia, hypertension, increased secretions
	Stimulants - cocaine, amphetamines (methylenedioxymethamphetamine (MDMA) - ecstasy)	Seizures, tachycardia, hypertension, myocardial ischaemia, dysrhythmias
Sedative-hypnotic agents	Benzodiazepines, barbiturates, ethanol, and γ-hydroxybutyrate (GHB)	CNS depression with or without respiratory depression

‘Red Flag’ Symptoms and Signs

Ask about:

- Vomiting

- Altered mental status (lethargic or aggressive) (see Altered Conscious Level)
- Laboured breathing (see Dyspnoea)
- Constricted (opiates, phenothiazines) or dilated (anticholinergics, amphetamines) pupils

Look for:

- Typical constellation of signs and symptoms known as a toxidrome, or toxic syndrome produced by some toxins, such as opioids or anticholinergic agents
 - Sympathomimetic (eg, cocaine, amphetamines, caffeine, decongestants)
 - Agitation
 - Diaphoresis (profuse sweating)
 - Fever
 - Mydriasis (dilated pupils)
 - Tachycardia
 - Opioid (eg, methadone, morphine)
 - Respiratory depression
 - Miosis
 - Coma
 - Bradycardia
 - Anticholinergic (eg, tricyclic antidepressants, antihistamines, anti-parkinsonian)
 - 'Blind as a bat' (mydriasis)
 - 'Dry as a bone' (dry skin)
 - 'Hot as Hades' (fever)
 - 'Red as a beet' (red skin)
 - 'Mad as a hatter' (central nervous system (CNS) stimulation)
 - Decreased gastrointestinal motility (decreased bowel sounds)
 - Urinary retention (full bladder)
 - Cholinergic (eg, organophosphates)
 - **D**efaecation (increased stool frequency)
 - **U**rination (increased frequency of micturition)
 - **M**iosis (muscle fasciculations, muscle weakness)
 - **B**ronchorrhoea, bradycardia, bronchospasm
 - **E**mesis
 - **L**acrimation
 - **S**alivation

Differential Diagnosis / Conditions

Intoxication or poisoning is only one cause of altered mental status. Other important causes include:

- Head trauma
 - Especially important to consider because intoxication is common before trauma
 - Adolescents who have head trauma may have ingested ethanol or recreational drugs
 - Head injury with drug overdose in a child may indicate child maltreatment (see [When to suspect child maltreatment \[NICE clinical guideline 89\]](#)).
- Infections of the CNS, particularly viral encephalitis
- Metabolic conditions:
 - Diabetes mellitus
 - Hypoglycaemia
 - Addisonian crisis
- Psychiatric illness
 - May develop tremors, hallucinations, or hysterical paralysis
- Spontaneous intracranial haemorrhage
 - Rare in children
 - Usually produces focal neurological signs rather than global depression of consciousness

Investigations

Evaluation should progress only after the ABCs (airway, breathing, circulation) of resuscitation have been addressed.

All cases of potentially toxic exposures should be referred to trained poison information specialists at local and regional poison control centres.

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To be undertaken by non-specialist practitioners (eg, General Practitioner (GP) / Primary Care Team(s)):

- Check Toxbase / NPIS

- All patients with altered mental status (see [Altered Conscious Level](#)) should be evaluated for hypoglycaemia.
- In the case of non-toxic exposures, reassurance is appropriate with safety netting.

To be undertaken by specialist practitioners (eg, Emergency Department / Paediatric Team(s)):

- Toxbase / NPIS will direct investigations required.
- All patients with altered mental status (see [Altered Conscious Level](#)) should be evaluated for hypoglycaemia.
- Other tests may include:
 - Biochemistry including renal and liver function, venous / capillary blood gas (acidosis, carbon monoxide level)
 - Specific drug levels and at specific times (eg, paracetamol levels at 4 hours, salicylate levels)
 - Blood alcohol level
 - Urine for toxicology screen
- When the cause of altered mental status (see [Altered Conscious Level](#)) is unclear, cranial computerised tomography should be considered.
- Lumbar puncture may be indicated in cases of altered mental status (see [Altered Conscious Level](#)), especially in the presence of fever.
- Screening tests that are generally appropriate, especially for adolescent patients, include:
 - ECG for agents, such as tricyclic antidepressants, that have characteristic ECG findings
 - Pregnancy testing in adolescent girls, because suicidal adolescents often have an acute stressor (such as pregnancy)
 - HEADSS (Home, Education, Activities, Drug use and abuse, Sexual behaviour, Suicidality / depression) assessment for adolescents
 - Paracetamol levels should be assessed after any suicidal ingestion
 - Paracetamol is widely available
 - Most patients are asymptomatic after paracetamol ingestion
 - A limited window exists for antidotal therapy

Treatment Approach

Evaluation should progress only after the ABCs (airway, breathing, circulation) of resuscitation have been addressed.

To be undertaken by non-specialist practitioners (eg, GP / Primary Care Team(s)):

- Telephone triage can be an important first step in managing potentially toxic exposures.
 - Many exposures can be managed over the telephone, although home therapy of serious poisonings is limited.
- Prompt decontamination may reduce subsequent symptoms and need for further treatment.
 - Skin and eyes may be washed in the home if appropriate and then referred to the Emergency Department.
 - It is not usual practice to induce vomiting.
 - Activated charcoal is available in some areas for use by ambulance staff but is used infrequently as there are limited indications for its use.
- Ask carers to take any suspected substances to the Emergency Department with the child.

To be undertaken by specialist practitioners (eg, Emergency Department / Paediatric Team(s)):

Resuscitation

- Use an ABCDE approach as advocated by advanced life support (EPLS / APLS) guidelines
- Attend immediately to:
 - Airway obstruction
 - May require assisted ventilation or endotracheal intubation
 - Difficulty breathing (see Dyspnoea)
 - Dysrhythmias
 - Hypotension
 - Seizures
- Give antidotes as advised by the NPIS.
- Administer an empirical trial of naloxone hydrochloride by intravenous injection to patients with respiratory depression:
 - Neonate - 12 years: 100 micrograms/kg max. 2 mg. If no response, repeat at intervals of 1 minute to a total max. 2 mg, then review.
 - Child 12 - 18 years: 400 micrograms stat, then increase to 800 micrograms after 1 minute if no response. If still unresponsive after another 1 minute, repeat the 800 microgram dose. If still no response, give 2 mg (4 mg may be required in a seriously poisoned patient), then review.
 - Both diagnostic and therapeutic for opioid (or clonidine) intoxication
 - May preclude the need for intubation
 - Escalating the dosing scheme allows administration of sufficient naloxone to reverse respiratory depression without precipitating withdrawal in a long-term user.

- Neonate - 12 years: 1 microgram/kg, repeated every 2-3 minutes if required.
 - Child 12 - 18 years: 1.5 - 3 micrograms/kg; if response inadequate, give subsequent doses of 100 micrograms every 2 minutes.
 - For patients with a prolonged opioid effect that outlasts the effect of a single dose of naloxone, it can be administered as a continuous infusion.
 - All ages: initially, rate may be set at 60% of the initial resuscitative intravenous injection dose *per hour*, then adjusted according to response.
 - Naloxone administration may precipitate seizures as part of withdrawal in newborns born to opioid-dependent mothers.
 - Seizures are not a typical part of the withdrawal syndrome in long-term users.
- Treat hypotension
 - Give bolus of 10–20 ml/kg of 0.9% sodium chloride followed, if required, by infusion.
 - If unresponsive to fluid alone, may require use of a vasopressor or inotropic agent
 - Glucagon is used for refractory hypotension in poisoning by calcium channel blockers.
 - All ages: 50 - 150 micrograms/kg, max. 10 mg in glucose 5% followed by intravenous infusion of 50 micrograms/kg/hour (unlicensed indication and dose).
 - Consider giving flumazenil (benzodiazepine antagonist) to treat CNS depression after an overdose of an unknown agent.
 - Controversial – flumazenil administration is appropriate in a known acute benzodiazepine exposure associated with significant CNS or respiratory depression.
 - Flumazenil, by intravenous injection over 15 seconds:
 - All ages: 10 micrograms/kg (max. 200 micrograms), repeated at 1 minute intervals if required. Max. total dose of 50 micrograms/kg (1 mg; 2 mg in intensive care)
 - Flumazenil, by intravenous infusion, if drowsiness recurs after injection:
 - All ages: 2 - 10 micrograms/kg/hour, adjusted according to response. Max. 400 micrograms/hour.
 - Flumazenil may precipitate withdrawal seizures in the patient with benzodiazepine dependence.
 - It may induce dysrhythmias or seizures in patients exposed to tricyclic antidepressants.

- If the duration of flumazenil effect is shorter than that of the toxin, then repeat doses or a continuous intravenous infusion of flumazenil may be required.
- Treat seizures urgently
 - Use benzodiazepines, specifically lorazepam or diazepam, for the initial treatment of most toxin-induced seizures (use APLS protocol).
 - Lorazepam, by slow intravenous injection:
 - Neonate - 12 years: 100 micrograms/kg (max. 4 mg) as a single dose, repeated once after 10 minutes if necessary.
 - Child 12 - 18 years: 4 mg as a single dose, repeated once after 10 minutes if necessary.
 - Diazepam, by intravenous injection over 3 - 5 minutes:
 - Neonate - 12 years: 300 - 400 micrograms/kg (max. 10 mg) repeated once after 10 minutes if necessary.
 - Child 12 - 18 years: 10 mg repeated once after 10 minutes if necessary.
 - Diazepam, by rectum (as rectal solution):
 - Neonate: 1.25 - 2.5 mg repeated once after 10 minutes if necessary.
 - Child 1 month - 2 years: 5 mg repeated once after 10 minutes if necessary.
 - Child 2 - 12 years: 5 - 10 mg repeated once after 10 minutes if necessary.
 - Child 12 - 18 years: 10 - 20 mg repeated once after 10 minutes if necessary.
- Treat seizures related to hypoglycaemia with 2 ml/kg of 10% glucose.
- Agitation is a common manifestation of altered mental status and places the patient at risk of injury, hyperthermia, and rhabdomyolysis.
 - Benzodiazepines are the preferred sedative agents, and dose should be titrated to effect (extremely agitated patients may require high doses).
 - Diazepam, orally (this indication is unlicensed for use in children):
 - Child 1 month - 1 year: 50 microgram/kg twice a day.
 - Child 1 - 4 years: 500 microgram twice a day.
 - Child 5 - 12 years: 1 - 1.5 mg twice a day
 - Child 12 - 18 years: 2 mg twice a day

Decontamination (as advised by the NPIS)

- Considered in two large categories
 - Surface decontamination of the skin and eyes
 - Start lavage of eyes following pH testing if indicated by Toxbase.
 - Repeat pH testing and lavage as indicated.

- Use fluorescein sodium to check for corneal abrasions, if indicated, and refer for urgent ophthalmology assessment if required
 - Gastrointestinal decontamination (as advised by the NPIS)
- Enhanced elimination (as advised by the NPIS)
- Supportive care
 - Continuation of care given in resuscitation, with ongoing attention paid to cardiorespiratory and neurologic status

Specific Treatment

- These should be given as advised by the NPIS and Toxbase.

When to Refer

Refer urgently (arrange emergency transfer) to specialist practitioners (Emergency Department Team) if:

- Altered mental status (see Altered Conscious Level)
- Dehydration
- Known exposure to delayed-onset toxins / drugs, when the amount of toxin / drug exposed to is not known
- Exposure to cardiotoxic drugs
- Practitioner not familiar with the management of patient exposed to particular drugs / toxins.
 - A poison centre should be consulted
- In cases of deliberate ingestion, referral to Child and Adolescent Mental Health Services or local alcohol / drug counselling services should be discussed with the young person / parents.

‘Safety Netting’ Advice

- Parents should be advised to seek further care for their child if any ‘red flag’ symptoms or signs develop, or any symptoms that may be specific to an ingested substance.

Patient / Carer Information

- Poisoning and injury prevention should be discussed with parents within a few days of a poison exposure call. This may be done by the health visitor.
 - Experience suggests that addressing prevention at the time of the initial call is more effective than doing so later.
 - Recent exposure focuses the mind of the parents, providing a valuable opportunity to impart advice on poison prevention.
- Prevention
 - Effective prevention strategies are directed towards the environment of all children and require parental co-operation.

- Primary care practitioners (eg, GPs, pharmacists, and health visitors) must educate parents and caregivers in the importance of:
 - Safe storage practices for household products and prescription drugs
 - Use of child-resistant closures
- All parents should be aware that they can call NHS 111 or consult online advice (eg, the NHS website) if there is any concern about their child.
- Parents should be advised to exercise particular care with agents that can be fatal to a toddler in small doses (check with NPIS).

There are a number of resources available for carers regarding poisoning / ingestions.

****Please note: whilst these resources have been developed to a high standard they may not be applicable to children.***

- [Carbon monoxide poisoning](#) (Web page), the NHS website
- [Keeping your child safe at home](#) (Web page), the NHS website
- [Drugs and alcohol: information for young people](#) (Web page), Royal College of Psychiatrists
- [Alcohol, drugs and addiction](#) (Web page), Royal College of Psychiatrists
- [Self-harm](#) (Web page), Royal College of Psychiatrists
- [Alcohol poisoning](#) (Web page), the NHS website
- [Self-harm](#) (Web page), the NHS website
- [Clinical depression](#) (Web page), the NHS website
- [Self-harm in young people: information for parents, carers and anyone who works with young people](#) (Web page), Royal College of Psychiatrists
- [Depression](#) (Web page), Mind
- [Suicidal feelings](#) (Web page), Mind

Resources

National Clinical Guidance

[National Poisons Information Service \(NPIS\)](#) (Web site).

[Self-harm: the short-term physical and psychological management and secondary prevention of self-harm in primary and secondary care](#) (Web page), NICE clinical guideline CG16, National Institute for Health and Care Excellence.

[Self-harm: longer-term management](#) (Web page), NICE clinical guideline CG133, National Institute for Health and Care Excellence.

[Preventing unintentional injuries among the under-15s in the home](#) (Web page), NICE public health guideline PH30, National Institute for Health and Care Excellence.

[Child maltreatment - when to suspect child maltreatment in under 18s](#) (Web page), NICE clinical guideline CG89, National Institute for Health and Care Excellence

Medical Decision Support

[Child Protection Companion](#) (Web site), RCPCH Child Protection Companion

Suggested Resources

****Please note: these resources include links to external websites. These resources may not have national accreditation and therefore PCO UK cannot guarantee the accuracy of the content.***

[Unintentional Poisoning](#) (Web page), Centers for Disease Control and Prevention.

[Substance Misuse](#) (e-Learning), MindEd.

[Secondary School Presentations](#) (e-Learning), MindEd.

[The Carbon Monoxide and Gas Safety Society](#) (Web site).

[Poisoning in Children](#) (pdf), Paediatric Pearls.

[Depression Alliance](#) (Web site).

[YoungMinds](#) (Web site).

[Depression](#) (Web page), Rethink Mental Illness.

[Child Accident Prevention Trust](#) (Web site).

[Keeping children safe from poisoning](#) (Web page), Child Accident Prevention Trust.

[The Royal Society for the Prevention of Accidents](#) (Web site).

[Poisoning](#) (Web page), St John Ambulance.

[First Signs](#) (Web site).

[Mental Health and Growing Up Factsheets](#) (Web page), Royal College of Psychiatrists.

Bailey S, Shooter M, eds. [The Young Mind](#). Royal College of Psychiatrists, 2009.

[Child Accident Prevention](#) (e-Learning), Institute of Health Visiting.

[Common Problems](#) (e-Learning), MindEd.

[Counselling MindEd](#) (e-Learning), MindEd.

[Specialist CAMHS Therapeutic Approaches](#) (e-Learning), MindEd.

[Safeguarding Children and Young People: The RCGP/NSPCC Safeguarding Children Toolkit for General Practice](#) (Web page), Royal College of General Practitioners

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