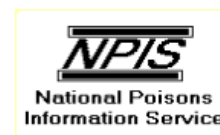




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A service commissioned by
Public Health England (PHE)
on behalf of the UK Health Departments

POISONING WITH AN UNKNOWN SUBSTANCE

Poisoned patients are sometimes unaware, unable or, occasionally, unwilling to give a history of substances that they may have been exposed to. In such cases the potential poison(s) can sometimes be inferred by comparing patient features to those commonly associated with known poisons (toxidromes). The information below is intended to assist in this process. This may be helpful in differential diagnosis, in determining the need for specific toxicological interventions and in anticipating and avoiding complications. Poisoning from animal toxins (including envenoming) is presented separately for convenience. Microbial pathogens have not been presented here; they are outside the scope of this document.

- It is important to be aware that some non-toxicological conditions can produce features similar to poisons.
- The list of poisons presented here is not exhaustive, and features described here may sometimes be presented by other poisons.
- Poisons may not produce all the features listed here in any one patient, and may sometimes also produce other unlisted features.

Discuss severe cases with the National Poisons Information Service 0844 892 0111 (in Ireland NPIC (01) 809 2566).

The index table lists:

- 1) Symptoms/signs often seen in intoxicated patients
- 2) Symptoms/signs that are sometimes caused by poisons
- 3) Biochemical abnormalities sometimes associated with poisons
- 4) ECG changes sometimes associated with poisons
- 5) Poisoning from toxins

Tables 1 to 5 expand on these in more detail (left hand column) and provide a list of suggested intoxicants (right hand column)

INDEX TABLE

<p>1. Symptoms/signs often seen in intoxicated patients:</p> <ul style="list-style-type: none"> • Acute liver failure • Acute kidney injury • Anticholinergic syndrome • Antimitotic syndrome • Cholinergic syndrome • Corrosive syndrome • Fume fever • Hypotension with bradycardia • Metabolic acidosis • Methaemoglobinaemia • Opioid syndrome • Sedative-hypnotic syndrome • Serotonin-agonist syndrome • Sympathomimetic syndrome • Vesicant poisoning 	<p>2. Symptoms/signs that are sometimes caused by poisons:</p> <ul style="list-style-type: none"> • Blindness • Bone marrow suppression • Acneiform eruptions • Deafness • Intermittent 'flu-like' illness • Hyperventilation • Lung fibrosis • Neuropathy
<p>3. Biochemical abnormalities sometimes associated with poisons:</p> <ul style="list-style-type: none"> • Hypernatraemia • Hyponatraemia • Hyperkalaemia • Hypokalaemia • Hyperglycaemia • Hypoglycaemia • Hypocalcaemia • Increased anion gap • Increased osmolar gap • Metabolic acidosis • Respiratory acidosis • Metabolic alkalosis • Respiratory alkalosis 	<p>4. ECG changes associated with poisons:</p> <ul style="list-style-type: none"> • QRS prolongation • QT prolongation • Bradycardia (+/- AV block) <p>5. Poisoning from animal toxins</p> <ul style="list-style-type: none"> • Jelly fish stings • Less serious insect stings • Scorpion stings • Scombrototoxic fish poisoning • Shell fish poisoning • Snake envenoming • Spider bites • Venomous fish stings

TABLE 1: SYMPTOMS/SIGNS SOMETIMES SEEN IN INTOXICATED PATIENTS

Clinical features	Example agent(s)
Acute liver failure	Paracetamol Ethanol Iron Carbon tetrachloride Kava Kava Amanita and other hepatotoxic mushrooms
Acute kidney injury	Ethylene glycol Methanol ACE-I Cortinarius mushrooms Any toxicological cause of severe hypotension NSAIDs Paracetamol (rarely in the absence of liver failure)
Anticholinergic syndrome (muscarinic antagonist) Confusion Agitation Dry skin Hyperthermia Thirst Dry mouth Mydriasis Tachycardia Urinary retention Paralytic ileus and decreased bowel sounds	Antimuscarinic drugs (e.g. hyoscine) Tricyclic antidepressants (TCA) Antipsychotics (eg chlorpromazine, pericyazine) Antihistamines (sedating eg diphenhydramine) <i>Atropa belladonna</i> Inocybe mushrooms <i>Datura stramonium</i> (Jimson weed)
Antimitotic syndrome (cytotoxic to dividing cells) Bone marrow suppression (aplastic anaemia, leucopaenia, thrombocytopaenia) Alopecia Vomiting, diarrhoea, mucositis	Antineoplastic drugs Colchicine Immunosuppressants Podophylline Radiation exposure Arsenic Thallium
Cholinergic syndrome (nicotinic and muscarinic agonist) Increased sweating and lacrimation Wheezing and breathing difficulty Pupillary constriction and visual disturbance Vomiting Involuntary defecation or urination Bradycardia (nicotinic agonists may initially cause tachycardia) Muscle paralysis and respiratory failure	Organophosphorus insecticides Carbamate insecticides Nicotine Laburnum species Hemlock species Inocybe mushrooms

TABLE 1: SYMPTOMS/SIGNS SOMETIMES SEEN IN INTOXICATED PATIENTS

Clinical features	Example agent(s)
Corrosive poisoning GI tract pain Vomiting Hematemesis Dyspnoea Drooling Stridor/pneumonitis (if aspirated) Pain, ulceration or necrosis from skin contact Inflammation of all layers from eye contact	Hydrofluoric acid Strong acids (sulphuric, nitric, hydrochloric) Strong alkalis (e.g. sodium hydroxide) Paraquat Copper salts
Fume fever History of unpleasant smells Chills Cough Dyspnea Headache Myalgia Malaise	Metal oxides (esp zinc oxide) Polymer fumes (e.g. fumes released during heat-decomposition of fluorine-containing polymers such as Teflon) Other toxic industrial chemicals
Gastrointestinal irritation (severe) Severe vomiting Abdominal pain Diarrhoea Haematemesis Melaena Hypovolaemia may lead to shock and/or acute kidney injury.	Ingestion of corrosives NSAIDs Salts of iron, arsenic, thallium and other metals Cardiac glycosides (mainly upper GI symptoms associated with ECG abnormalities) Aconitine (associated with ECG changes and neuropathy) Ricin (mainly lower GI symptoms, even with injection, may be associated with seizures and eye or lung signs) Aluminium phosphide (may be associated with local swelling, metabolic abnormalities and eye or lung signs)
Hypotension with bradycardia	Beta blockers Calcium channel blockers Digoxin and other cardiac glycosides
Metabolic acidosis (More details under Biochemical abnormalities sometimes associated with toxins) Deep and rapid (Kussmaul's) breathing Obtunded consciousness Tachycardia Hypotension	Ethylene glycol Methanol Aspirin Paracetamol (uncommon unless AKI) Iron Cyanide Carbon monoxide Acids Sodium fluoroacetate

TABLE 1: SYMPTOMS/SIGNS SOMETIMES SEEN IN INTOXICATED PATIENTS

Clinical features	Example agent(s)
Methaemoglobinaemia Blue-grey 'apparent' central cyanosis (blue to grey lips, tongue and mucus membranes, and slate grey skin) Persistent cyanosis despite oxygenation Fatigue, dizziness, headaches Depressed consciousness Seizures Urine may be discoloured black or brown	Benzene derivatives (Phenols, Cresols, Aniline) Sodium nitrite Organic nitrites Chlorates Copper salts Prilocaine
Opioid syndrome Depressed consciousness Decreased respiratory rate (although this may not occur in patients with airway obstruction) Decreased tidal volume Miosis Naloxone response Hypotension Pulmonary oedema	Opioids (morphine, heroin, methadone, codeine, oxycodone, etc) Olanzapine can also cause coma and miosis
Sedative – hypnotic poisoning Depressed consciousness Ataxia Dysarthria Nystagmus	Ethanol Benzodiazepines and related drugs Gamma hydroxybutyrate (GHB) Gamma butyrolactone (GBL) Barbiturates
Serotonin agonist syndrome Neuromuscular features (hyperreflexia and clonus, tremor, shivering, hypertonia) Altered sensorium (restlessness, agitation, confusion) Autonomic instability (fever/hyperthermia, unstable BP or pulse, bladder/bowel problems) Flushing Seizures	Serotonin-Specific Re-uptake Inhibitors (SSRI) Monoamine Oxidase Inhibitors (MAOI) Tricyclic antidepressants Venlafaxine Methylenedioxymethamphetamine (MDMA) Amphetamines Cocaine Tramadol Tryptans Linezolid St John's Wort 'Legal highs' Psilocybe mushrooms Any combination of the above, even in therapeutic doses
Sympathomimetic syndrome Hyper/hypotension Tachycardia Neurological excitation Tremor Hyperreflexia Seizures	Cocaine Amphetamines 'Legal highs'

TABLE 1: SYMPTOMS/SIGNS SOMETIMES SEEN IN INTOXICATED PATIENTS

Clinical features	Example agent(s)
Vesicant poisoning Conjunctivitis Keratitis Dermatitis Severe blistering	Nitrogen and sulphur mustards Methyl bromide Hexylresorcinol Croton oil

TABLE 2: SYMPTOMS/SIGNS THAT ARE SOMETIMES CAUSED BY POISONS

Clinical features	Example agent(s)
Blindness	Methanol Quinine
Bone marrow suppression	Chemotherapy agents Colchicine Radiation poisoning
Acneiform eruptions	Dioxins Steroids (chronic use)
Deafness	Salicylates Quinine Loop diuretics
'Flu-like' symptoms only occurring in a certain place or in several people present in the same place	Noxious gas or vapour exposure (eg Carbon Monoxide)
Hyperventilation	Salicylates Metabolic acidosis
Lung fibrosis	Paraquat poisoning Adverse reaction to antineoplastic drugs (cyclophosphamide, busulphan, bleomycin, chlorambucil) or amiodarone
Neuropathy	Lead Chronic arsenic poisoning Thallium Ethylene glycol Organophosphates (intermediate syndrome or delayed effects)

**TABLE 3: BIOCHEMICAL ABNORMALITIES
SOMETIMES ASSOCIATED WITH POISONS¹**

Clinical features	Example agent(s)
Hypernatraemia	Ecstasy (rarely)
Hyponatraemia	Ecstasy (commonly) SSRIs Levamisole (adulterant in cocaine) Diuretics (chronic)
Hyperkalaemia	Digoxin Potassium sparing diuretics ACE inhibitors
Hypokalaemia	Theophylline Salbutamol Digoxin Diuretics (chronic) Insulin Sulphonylureas Paracetamol
Hyperglycaemia	Theophylline Salicylates Calcium channel antagonists Beta blockers
Hypoglycaemia	Insulin Sulphonylureas Ethanol Salicylates Sodium valproate
Hypocalcaemia	Ethylene glycol Hydrofluoric acid Sodium monofluoroacetate
Increased anion gap {=(Na + K) - (HCO ₃ + Cl), Normal (12 – 16 mmol/L)}	Ethanol Ethylene glycol Iron salts Isoniazid Methanol Metformin Paraldehyde Salicylates Toluene
Increased osmolar gap {=measured – calculated osmolarity; Calculated osmolarity = 2Na+urea+glucose; Normal (less than 10 mmol/L)}	Ethanol Ethylene glycol Acetone Isopropanol Hyperosmolar IV solutions (e.g. mannitol)

**TABLE 3: BIOCHEMICAL ABNORMALITIES
SOMETIMES ASSOCIATED WITH POISONS¹**

Clinical features	Example agent(s)
Metabolic acidosis {pH less than 7.35, pCO ₂ less than 4.5 kPa (34 mmHg) base deficit present}	Carbon monoxide Cyanide Ecstasy Ethylene glycol Gamma hydroxybutyrate Iron Isoniazid Metformin Methanol Paracetamol Paraldehyde Salicylates Sodium valproate Theophylline Tricyclic antidepressants
Respiratory acidosis {pH less than 7.35, pCO ₂ greater than 6.0 kPa (45 mmHg), base deficit absent }	Sedative agents e.g Barbiturates Benzodiazepines Gamma hydroxybutyrate Ethanol Opiates Tricyclic antidepressants
Metabolic alkalosis {pH greater than 7.45, pCO ₂ normal base excess present}	Bicarbonate
Respiratory alkalosis {pH greater than 7.45, pCO ₂ less than 4.5 kPa (34 mmHg) base excess absent}	Salicylates Theophylline Ecstasy

TABLE 4: ECG CHANGES ASSOCIATED WITH POISONS

Clinical features	Example agent(s)
QRS prolongation	Tricyclic antidepressants Local anaesthetics Quinine
QT prolongation	Antipsychotics Serotonin-Specific Re-uptake Inhibitors (SSRI) Tricyclic antidepressants
Bradycardia (often associated with delayed atrio-ventricular conduction)	Beta-blockers Rate-limiting calcium channel blockers Cardiac glycosides (e.g. digoxin)

TABLE 5: ENVENOMING SYNDROMES

Clinical features	Example agent(s)
<p>Jellyfish stings Immediate pain and local urticaria. Immediate or delayed systemic features may occur including headache, dizziness, muscle cramps and sweating. In severe cases severe chest and abdominal pain, abdominal rigidity, dysphagia and anaphylaxis.</p>	<p>Most jellyfish found around the UK are harmless. Those which may sting include:</p> <ul style="list-style-type: none"> • <i>Chrysaora hyoscella</i> (compass jellyfish) • <i>Cyanea capillata</i> (lion's mane) • <i>Cyanea lamarckii</i> (sea nettle) • <i>Physalia physalis</i> (Portuguese man-o-war).
<p>Less serious insect stings These may cause local pain and swelling but very rarely cause severe toxicity. Severe anaphylactic reactions have occurred in individuals sensitive to the insect venoms, occasionally resulting in fatalities. Deaths have occurred as a result of upper airway blockage due to oedema caused by stings in the mouth or on the neck or head regions.</p>	<p>Bees, wasps, etc.</p>
<p>Scorpion stings Usually cause only severe pain at sting site. Occasional features include local paraesthesiae or paralysis or skin changes including necrosis or allergy. Rare effects include autonomic dysfunction including autonomic storm, severe gastrointestinal, haematological, and systemic neurological</p>	<p>Various scorpions</p>
<p>Scombrototoxic fish poisoning Closely resembles features of histamine reaction, including flushing, dizziness, headache, palpitations, nausea, vomiting, abdominal pain, diarrhoea. Bronchospasm and urticaria are less common.</p>	<p>Spoiled dark meat marine fish e.g. mackerel, tuna, bonito and skipjack.</p>
<p>Shell fish poisoning Paralytic poisoning usually starts within 3 hours with a feeling of floating, dizziness, incoordination, weakness, numbness and paraesthesiae around the mouth and in the extremities. Respiratory failure (due to muscle weakness) may develop.</p> <p>Diarrhetic poisoning is characterised by gastro-intestinal disorders including nausea, vomiting, diarrhoea, abdominal pain, headache and fever. Symptoms can develop in between 30 minutes and 3 hours after consumption</p>	<p>Naturally occurring algal blooms on which the shellfish feed can sometimes contain toxins that accumulate in the shellfish. The toxins responsible for paralytic poisoning are derivatives of saxitoxin, while it is thought that dinophysins toxins, pectenotoxins and yessotoxins, cause diarrhetic poisoning. Neurotoxic poisoning is caused by brevetoxins and amnesic poisoning is caused by domoic acid, a contaminant in shellfish.</p>

TABLE 5: ENVENOMING SYNDROMES

Clinical features	Example agent(s)
<p>Neurotoxic poisoning is very rare in the UK, and causes rapid onset of tingling, numbness of legs, tongue and throat, muscular aches, dizziness, diarrhoea and vomiting. Paralysis does not occur</p> <p>Amnesic poisoning starts within 24 hours of consumption with gastro-intestinal disorders including vomiting, diarrhoea, and abdominal pain; and later onset of neurological effects including confusion, memory loss, disorientation, seizure and coma.</p>	
<p>Snake envenoming Bites usually occur in summer and envenoming usually results in local features (swelling, bleeding, bruising, lymphangitis, blistering, necrosis, secondary infection, and painful regional lymph node enlargement), but can very rarely cause anaphylaxis, bleeding diatheses, acute kidney injury (especially in children), arrhythmias and shock or GI effects.</p>	<p><i>Vipera berus</i> (adder or viper) is the only native British species to cause envenoming. For more details see [link to adder entry]</p> <p>Exotic snakes may cause features similar to adder envenoming, or cause other syndromes including descending paralysis, eye effects from venom spat into eyes. For more details see [link to non-British snake entry]</p>
<p>Spider bites A bite feels like a painful bee-sting. Redness, local swelling and irritation at the site of the bite may occur. Enzymes injected by the spider cause necrosis of the skin. Systemic features are very unlikely, except for allergic reactions in susceptible individuals.</p>	<p>Various spiders</p>
<p>Venomous fish stings In the UK, the most common effects are local severe pain with a burning sensation and swelling. Rare features include vomiting and headache with tachycardia and respiratory distress.</p>	<p>Weever fish envenoming occurs in shallow UK waters, such as that favoured by bathers and paddlers, with most injuries occurring to the feet. Lion fish and stone fish may be kept by tropical fish enthusiasts and cause stings to hands.</p>

¹ Adapted from: National Poisons Information Service; Association of Clinical Biochemists. Laboratory analyses for poisoned patients: joint position paper. Ann Clin Biochem. 2002;39(Pt 4):337.