Management of self poisoning

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Abstract
Around 15% to 20% of the workload of medical units and 10% of the workload of accident and emergency departments in the United Kingdom are due to self poisoning. Episodes of self poisoning in the United Kingdom continue to rise, particularly in young men, and alcohol is often taken with the overdose. In general the severity of poisoning has diminished over the past 10 years with the introduction of safer drugs, such as newer serotonin reuptake inhibitors, but the total number of deaths from poisoning in the United Kingdom remains steady at 4000 per year, and the commonest cause of death by poisoning is carbon monoxide. This article highlights several specific advances in the management of poisoning over the past two or three years.

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Clinical review

Recent advances
Management of self poisoning
Alison L Jones, Glyn Volans

Introduction

Around 15%-20% of the workload of medical units and 10% of the workload of accident and emergency departments in the United Kingdom are due to self poisoning.\(^1\) Episodesto self poisoning in the United Kingdom continue to rise, particularly in young men, and alcohol is often taken with the overdose.\(^2\) In general the severity of poisoning has diminished over the past 10 years with the introduction of safer drugs, such as newer serotonin reuptake inhibitors, but the total number of deaths from poisoning in the United Kingdom remains steady at 4000 per year, and the commonest cause of death by poisoning is carbon monoxide.\(^2\) This article highlights several specific advances in the management of poisoning over the past two or three years.

Methods

We searched Medline and Embase with the keywords “poisoning,” “intoxication,” “toxin,” and “overdose.” We included topics as a result of discussion with colleagues in clinical toxicology in the United Kingdom, Europe, Australia, and the United States.

New guidelines on gut decontamination

The American Academy of Clinical Toxicology and the European Association of Poisons Centres and Clinical Toxicologists have recently produced new guidelines on gut decontamination on the basis of consensus and evidence based statements.\(^4\) It is important to understand the advances in understanding and changes in practice that come from the guidelines, but the evidence base for them is limited.\(^4\)

**Activated charcoal**

Activated charcoal should be given as a single dose (50 g for an adult, 1 g/kg body weight for a child up to 12 years) up to 1 hour after ingestion of a substantial amount of toxin.\(^4\) Beyond this time adsorption is reduced.\(^5\) What constitutes a substantial amount of toxin depends on the toxin but in general it is a dose expected to cause moderate to severe toxicity. The guidelines do not apply to agents for which multiple dose charcoal would be beneficial or for substances that are not readily adsorbed to charcoal (box 1).\(^4\) Charcoal should never be given if the airway cannot be protected, as aspiration pneumonitis is a risk.\(^5\)

**Gastric lavage**

Gastric lavage is only used up to 1 hour after ingestion of a substantial amount of toxin; many clinical toxicologists rarely use this method now.\(^6\) One study
surgically. The alternative is to wait for the packet to pass through the body naturally, which it is possible to do with less toxic drugs such as cannabis.

### Carbon monoxide poisoning

#### Hyperbaric oxygen

Carbon monoxide causes severe hypoxia by forming carboxyhaemoglobin, which impairs oxygen delivery from blood to tissues and prevents the use of available oxygen by combining with cytochrome oxidase. Death may result from cardiac and neurological sequelae acutely but subacute and chronic exposure are also important. The scientific rationale for hyperbaric oxygen improving outcome in carbon monoxide poisoning is that the half-life of carboxyhaemoglobin is reduced, and that the reduced amounts of carbon monoxide bind to the enzyme. To date, however, five randomised trials have disagreed on whether treatment with hyperbaric oxygen works in clinical practice. Limitations to the trials were too few patients, inclusion of patients exposed to other toxins in fires, and different protocols for hyperbaric oxygen therapy. The latest study suggested that hyperbaric oxygen therapy might be harmful, but only 46% of patients attended follow up. The current recommendation is that hyperbaric oxygen therapy should be considered if a patient has been unconscious at any stage since exposure, if carboxyhaemoglobin concentrations have exceeded 40% at any time, or if there are neurological or psychiatric features. The logistical difficulties in transporting patients to hyperbaric oxygen chambers should not be underestimated.

### Paracetamol poisoning

Paracetamol continues to generate the greatest number of emergency inquiries to the National Poisons Information Service of any single agent, and it constitutes 48% of hospital admissions for poisoning in the United Kingdom. A practical wall chart for management of paracetamol poisoning has been approved by physicians of the National Poisons Information Service, paediatricians, and accident and emergency clinicians.

Patients at increased risk from paracetamol poisoning are those with enzyme induction such as patients taking anticonvulsants or those with glutathione depletion such as anorexic patients. Such patients should receive N-acetylcysteine at lower plasma paracetamol concentrations than patients at normal risk. Defining those at risk is not new, but there is greater awareness both of who they are and of failure to provide appropriate antidotal treatment. The main message in paracetamol poisoning is "if in doubt, treat with N-acetylcysteine." Anaphylactoid reactions occur in about 5% of patients given N-acetylcysteine, often within an hour of starting the infusion.

Management difficulties in paracetamol poisoning include patients presenting 15 hours or more after ingestion of the drug or patients taking staggered overdoses—in excess of 150 mg/kg/day body weight or 12 g for an adult, whichever is the lesser. A poisons centre or a liver transplant unit should be contacted if there is evidence of hepatotoxicity or doubt about its management. This ensures that referral takes place.
A current vogue is the use of sidafenil (Viagra) with ecstasy for enhanced effects, so called sextasy.

Liquid Ecstasy

Another recent drug of misuse is gamma-hydroxybutyric acid (GHB or “liquid ecstasy”). The drug is dissolved in water to produce a clear liquid and is consumed until a “high” is reached. Liquid ecstasy increases intracerebral dopamine and if taken in excess causes drowsiness followed by seizures, hypoventilation, and loss of consciousness. The response is unpredictable, and coma and seizures have been produced by as little as 5 ml in an adult. Liquid ecstasy acts synergistically with ethanol to produce central nervous system and respiratory depression. Naloxone has been shown to reverse some of the effects of liquid ecstasy in animals, but its efficacy in man is unknown.

Ethylene glycol and methanol poisoning

Poisoning with ethylene glycol and methanol have traditionally been treated by a combination of haemodialysis to remove toxic metabolites and ethanol to competitively inhibit enzymes responsible for production of the toxic metabolites. Like ethanol, 4-methylpyrazole is a competitive inhibitor of alcohol dehydrogenase, blocking the metabolism of ethylene glycol into its toxic metabolites glycolate and oxalate.

4-Methylpyrazole is licensed for use in several countries, including the United States and United Kingdom, and is used to treat severe methanol or ethylene glycol poisoning. Compared with treatment with ethanol it has the advantage of reduced central nervous system depression, although haemodialysis may still be needed to remove accumulated metabolites and for the management of renal failure.

Poisons databases

In the United Kingdom several databases have been developed to meet the increasing needs of doctors and nurses for information on poisons (box 3). In addition, easy internet access to a wide variety of sources of poisons information, including lethal “recipes,” enables people both to be better informed and to be at greater risk from serious poisoning.

Self poisoning is an important clinical problem, and several advances in recent years have been initiated by cases reports, which are then developed into multicentre—often multinational—collaborations. Information on the management of particularly unusual or serious cases can be obtained from the National Poisons Information Service.

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Box 3: Poisons databases

TOXBASE
Primary toxicology database of the United Kingdom, produced by the National Poisons Information Service Centres; free access to healthcare professionals (in viewdata format but internet version available soon). Contact Scottish Poisons Information Bureau (tel 0151 536 2363)

CD Roms
Poisonous plants in Britain and Ireland and Poissons fungi in Britain and Ireland. Contact National Poisons Information Service London (tel 0171 771 5383)

toxnet.nlm.nih.gov/servlets/simple-search
Toxicology database of the National Library of Medicine—access to Pubmed, Toxline, and hazardous substance database

www.pharmacy.arizona.edu/centers/poison-center/
Arizona Poisons Centre

www.intox.org
World Health Organisation and international programme on chemical safety

www.nihs.go.jp/GINC/index.html
Global information network on chemicals

www.nihs.go.jp/GINC/webguide/csinfo.html
Comprehensive global information network on chemicals

www.rpmcdc.org/poisoncenter/index.cfm
Rocky Mountain Poisons Center

www.atsdr.cdc.gov/atsdrhome.html
Agency for Toxic Substance and Disease Registry; slow access from NHS Net

before the criteria for liver transplantation are met (a prothrombin time greater than 100 seconds, serum creatinine concentration greater than 300 mol/l, and grade III or IV encephalopathy or a pH of less than 7.3 at 24 hours or more after ingestion, after correction of hypovolaemia) and that intensive care support is appropriate. N-acetylcysteine is also used in patients with fulminant hepatic failure (encephalopathy and renal failure) due to paracetamol and it is not acting by glutathione repletion at this stage. N-acetylcysteine may scavenge free radicals or exert some haemodynamic effect, although its role is debatable.

Drugs of misuse

Ecstasy
Drugs of misuse continue to present problems, particularly in inner city areas. Ecstasy (methylendioxymethamphetamine or MDMA) causes dehydration with hyperthermia, agitation, and fits. Deaths still result from ecstasy poisoning. Treatments that may decrease mortality, particularly if the rectal temperature exceeds 40°C, include active cooling measures such as cool intravascular fluids, and use of the muscle relaxant dantrolene. The extent to which dantrolene is of value is, however, in doubt and it has dose dependent adverse effects such as hepatitis. Hepatotoxicity has occurred with ecstasy poisoning, and this has been treated with liver transplantation.

Other features of ecstasy poisoning include hyponatraemia, cerebral infarction or haemorrhage due to uncontrolled hypertension, or vasculitis. Many substances are now added to ecstasy tablets such as caffeine and ketamine. Ketamine is a veterinary anaesthetic, which in man causes a dissociative state and has led to it being used for “date rapes.” Ketamine has also resulted in accidents as the drug causes pain free floating sensations with vivid dreams.
Lessons of the week

Insulin as a substance of misuse in a patient with insulin dependent diabetes mellitus

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The relation between substance misuse and poor compliance with treatment is well established in both general medicine and psychiatry. However, although young patients with insulin dependent diabetes mellitus may have lower rates of comorbid substance misuse,1,2 there is direct evidence that their compliance with treatment is poor. Patients with insulin dependent diabetes mellitus have an increased risk of developing a psychiatric disorder, particularly in the early course of their illness,3 and treating the psychiatric disorder improves glycaemic control.4 Hypoglycaemic events are common in people with insulin dependent diabetes mellitus and may be associated with cognitive, affective, and sometimes life threatening sequelae.5 Specific mood changes caused by changes in blood glucose concentrations are idiosyncratic, and although negative affective states are the most common, positive changes such as giddiness and euphoria are also seen.6 Although there is a strong relation between severe hypoglycaemia and tight glycaemic control,7 cases of deliberate misuse of insulin have been reported. Typically, these patients either attempt suicide or feign illness.8 We report the rare case of a patient with insulin dependent diabetes mellitus and no history of a psychiatric disorder who misused insulin regularly over a two year period for its euphoric effects. The consequences were ultimately serious.

Case report

A 30 year old man with insulin dependent diabetes mellitus was admitted to hospital. He had lost consciousness for two hours as a result of severe hypoglycaemia, and had then experienced prolonged confusion. The man, a college lecturer, was unmarried. Since his diagnosis three years previously, his diabetic control had been erratic (HbA1c values ranged from 8% to 10%).

Doctors should be alert to the possibility of insulin misuse, and should consider psychological evaluation, in an insulin dependent diabetic patient with poor control.

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