

ORIGINAL ARTICLE

Paracetamol overdose: an evidence based flowchart to guide management

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A flowchart for the management of patients with paracetamol poisoning is presented to help clinicians in the emergency department.

Paracetamol is the commonest drug taken in overdose in the United Kingdom. While the management of early paracetamol poisoning is straightforward, the management of late presenting cases, cases presenting after a staggered overdose, and patients with risk factors for paracetamol poisoning can be much more complex. The authors have developed and present here an evidence based flowchart that will guide clinicians step by step through the investigation and treatment of all patients presenting to hospital after this common, but often difficult to manage overdose. As well as a management guideline this flowchart can be used as an educational tool.

BACKGROUND

Paracetamol is the commonest drug taken in overdose in the United Kingdom, accounting for 48% of all poisoning admissions to hospital and an estimated 100–200 deaths per year.^{1–6} However, junior doctors' knowledge about the management of paracetamol poisoning is poor.⁷

The management of patients who present early (less than 15 hours) after ingestion of a single paracetamol overdose is straightforward. If the patient has taken a potentially toxic dose of paracetamol, management is guided by the plasma paracetamol concentration; treatment with N-acetylcysteine in patients with a toxic plasma paracetamol concentration provides complete protection against paracetamol induced hepatotoxicity.⁸ However, when cases stray from this simple scenario (such as with staggered overdoses, patients with high risk factors for paracetamol poisoning, or late presentation), management decisions are more complex.^{9–11}

Current guidelines for paracetamol poisoning are based on the consensus recommendations of the UK National Poisons Information Service (NPIS), they have also been adopted by the Royal College of Paediatrics and Child Health as a Good Practice Consensus Statement. The guidelines have been circulated to all accident and emergency departments in the form of a poster in prose format and we support their use.¹²

Our aim is to provide an evidence based, easy to follow, and visually attractive management guideline for paracetamol poisoning, aimed at emergency and general physicians (particularly junior doctors) dealing with this common, but

often difficult to manage overdose. The flowchart that we present will guide the clinician through the management of a patient presenting with a paracetamol overdose in a stepwise fashion. It can also be used as an educational tool because it indicates the evidence (or lack of it) for each management step. It therefore augments the current NPIS paracetamol poster.¹² The flowchart is a guideline however, and not a protocol, and individual decisions will need to be made for every patient based on their particular circumstances.

METHODS

We conducted a literature search of Medline, Toxline, and Embase using the terms "paracetamol" and "acetaminophen" with "intoxication", "poisoning" and "overdose". No language was barred and no other limitations were placed. The retrieved abstracts were reviewed and the most pertinent articles were reviewed in more detail. In addition, we took into account the consensus recommendations from the UK Toxicology Group (National Poisons Information Service (NPIS), Paracetamol Information Centre, and British Association of Accident and Emergency Medicine) on which the current UK guidelines for the management of paracetamol poisoning are based. This evidence base was then used to construct an algorithmic flowchart to guide the clinician through the management of both simple and complex paracetamol poisoning in a stepwise fashion.

RESULTS

See figure 1 for the flowchart used to guide the management of patients with paracetamol poisoning, together with the supporting references from the literature.^{8–45}

The paracetamol flowchart is structured around a few crucial branchpoints in the following order. Is the patient presenting after a single or staggered overdose? What is the time after ingestion? What are the results to the relevant investigations? Based upon the results of these questions, the clinician is guided through the appropriate steps in investigation and treatment of the paracetamol overdose. So that the flowchart can be used as a stand alone tool to guide patient management we have included the standard UK plasma paracetamol treatment nomogram,^{8 12 37} together with information boxes on risk factors for paracetamol poisoning,^{13–19} doses of N-acetylcysteine^{8 40} and management of adverse reactions to N-acetylcysteine.^{41 42}

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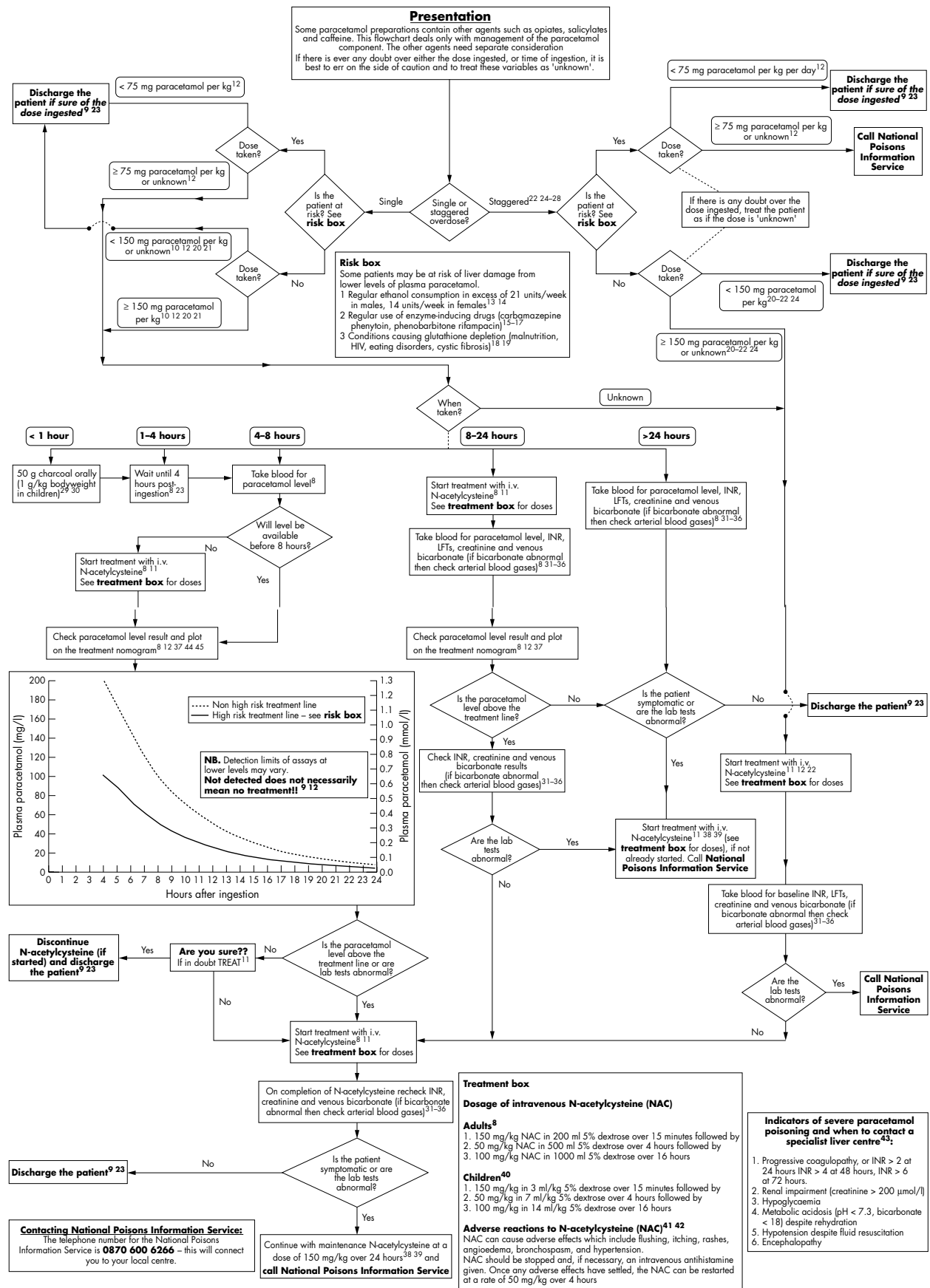


Figure 1 Paracetamol overdose: a flowchart to guide management. (The numbers in superscripts relate to the supporting references).

DISCUSSION

Paracetamol remains the most common agent taken in overdose in the UK,^{4,5} but junior doctors' knowledge about the management of paracetamol poisoning remains poor,⁷ despite the availability of UK guidelines as a poster in prose format.¹² The management of paracetamol poisoning has been reviewed in detail elsewhere and these review articles complement our management flowchart for readers who wish to study the background literature in more detail.^{9,10,23,46}

A study by Hardern *et al*⁴⁷ showed that the management of paracetamol poisoning is improved if staff have access to guidelines, but found no difference between the performance of prose and flowchart formats. However, two further studies, one in the US⁴⁸ and one in the UK⁴⁹ have shown that physicians prefer practice guidelines in the form of evidence based algorithms that are "user friendly". The management of paracetamol overdose entails multiple steps in both investigation and treatment. We feel that the presentation of these management decisions in the algorithmic, flowchart format that we present means that each step in the process can be focused upon separately (whereas the entire body of prose guidelines may need to be assimilated before understanding the individual steps). The management flowchart deals with both the well defined early cases and more complex cases such as patients with risk factors for paracetamol poisoning, staggered overdoses, and late presenters.

This flowchart will guide physicians through the management of the majority of patients presenting with a paracetamol overdose from the time of presentation to hospital to the time that they are medically fit for discharge. There are however situations where further advice tailored to the management of an individual patient from either a clinical toxicologist at the National Poisons Information Service, or a hepatologist at a liver transplant unit may be required and this has been indicated on the flowchart. This particularly applies to patients presenting either after a staggered paracetamol overdose or later than 24 hours after a single paracetamol overdose, where both the efficacy and mechanism of action of N-acetylcysteine are controversial.^{8,11,21} Patients with established hepatotoxicity, with markers of severe toxicity outlined in the flowchart, such as coagulopathy, should be discussed early with a hepatologist, as meticulous supportive care is critical to a good outcome in such cases.^{43,50}

CONCLUSION

Paracetamol is by far the commonest substance involved in self poisoning in the UK. While the management of early paracetamol poisoning is straightforward, the management of late presenting cases, cases presenting after a staggered overdose and patients with risk factors for paracetamol poisoning can be much more complex. We have developed an evidence based, easy to follow management guideline in the form of a flowchart that will guide clinicians step by step through the investigation and treatment of all patients presenting to hospital after a paracetamol overdose.

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Contributors

Craig Wallace and Paul Dargan were responsible for the literature review and designed the management flowchart. Alison Jones reviewed the literature review and the management flowchart. All three authors were involved in the writing of the paper and all three authors will act as guarantors.

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