Summary
Unintentional paracetamol overdose in adult inpatients with low bodyweight

Independent report by the Healthcare Safety Investigation Branch I2020/027

February 2022
Providing feedback and comment on HSIB reports

At the Healthcare Safety Investigation Branch (HSIB) we welcome feedback on our investigation reports. The best way to share your views and comments is to email us at enquiries@hsib.org.uk or complete our online feedback form at www.hsib.org.uk/tell-us-what-you-think.

We aim to provide a response to all correspondence within five working days.

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About HSIB

We conduct independent investigations of patient safety concerns in NHS-funded care across England. Most harm in healthcare results from problems within the systems and processes that determine how care is delivered. Our investigations identify the contributory factors that have led to harm or the potential for harm to patients. The safety recommendations we make aim to improve healthcare systems and processes, to reduce risk and improve safety.

We work closely with patients, families and healthcare staff affected by patient safety incidents, and we never attribute blame or liability.

Considerations in light of coronavirus (COVID-19)

A number of national investigations were in progress when the COVID-19 pandemic significantly affected the UK in 2020. Much of the work associated with developing the investigation reports necessarily ceased as HSIB’s response was redirected.

For this national report, while the learning described has not changed due to COVID-19, the processes HSIB used to engage with staff had to be adapted. This included fewer face-to-face interviews and interactions and an increased use of virtual interviewing. Owing to the nature of this investigation there was no need to visit clinical areas to observe work in practice.

A note of acknowledgement

We would like to thank the Patient whose experience is documented in this report, and her family. We would also like to thank the healthcare staff who engaged with the investigation for their openness and willingness to support improvements in this area of care.

About this report

This report is intended for healthcare organisations, policymakers and the public to help improve patient safety in relation to prescribing oral paracetamol to adults with a low bodyweight (less than 50kg) who have been admitted to hospital. For readers less familiar with this area of healthcare, terminology and systems are explained in the ‘Background and context’ section.
Our investigations

Our investigators and analysts have diverse experience of healthcare and other safety-critical industries and are trained in human factors and safety science. We consult widely in England and internationally to ensure that our work is informed by appropriate clinical and other relevant expertise.

We undertake patient safety investigations through two programmes:

**National investigations**

Concerns about patient safety in any area of NHS-funded healthcare in England can be referred to us by any person, group or organisation. We review these concerns against our investigation criteria to decide whether to conduct a national investigation. National investigation reports are published on our website and include safety recommendations for specific organisations. These organisations are requested to respond to our safety recommendations within 90 days, and we publish their responses on our website.

**Maternity investigations**

We investigate incidents in NHS maternity services that meet criteria set out within one of the following national maternity healthcare programmes:

- Royal College of Obstetricians and Gynaecologists’ ‘Each Baby Counts’ report
- MBRRACE-UK ‘Saving Lives, Improving Mothers’ Care’ report.

Incidents are referred to us by the NHS trust where the incident took place, and, where an incident meets the criteria, our investigation replaces the trust’s own local investigation. Our investigation report is shared with the family and trust, and the trust is responsible for carrying out any safety recommendations made in the report.

In addition, we identify and examine recurring themes that arise from trust-level investigations in order to make safety recommendations to local and national organisations for system-level improvements in maternity services.

For full information on our national and maternity investigations please visit our website.
Executive Summary

Background

This investigation explores the prescription of oral paracetamol in adult inpatients who, on admission to hospital, have low bodyweight (less than 50kg). It specifically focuses on the dose of oral paracetamol prescribed and given to this group of patients while in hospital, and the processes for ensuring weight is accurately recorded.

As an example, which is referred to as ‘the reference event’, the investigation considered the experience of Dora, an 83-year-old woman who weighed less than 50kg on admission and lost further weight in hospital. While in hospital, Dora was prescribed oral paracetamol 1g four times a day. Towards the end of her admission, Dora developed multiorgan failure due to sepsis and was diagnosed with paracetamol-induced liver toxicity.

The investigation’s findings and safety observations aim to increase awareness of the potential for paracetamol toxicity in adults with low bodyweight. Some of the findings and conclusions may also be applicable to other medications that have the potential to cause harm in patients with low bodyweight.

The reference event

Dora was admitted to hospital following a fall at home. She had a longstanding lung condition that made her susceptible to infection. At hospital, Dora was found to have no injuries requiring treatment from her fall, but an X-ray showed infection in her lungs and she was admitted to a ward for antibiotic treatment. Dora’s knee was sore following her fall, so a doctor prescribed 1g paracetamol, four times a day, to help with the pain.

Dora was weighed on day 12 of her admission and was 40.5kg; on day 20 she was 39.7kg; and on day 25 she was 37.0kg. Dora’s prescription for paracetamol was not reduced until she was found to have liver toxicity on day 29.

During Dora’s stay in hospital she did not always require the maximum dose of 4g oral paracetamol per day. Her last daily dose of 4g was on day 20, and after that she received between 1g and 3g every 24 hours. Dora underwent liver function tests while she was in hospital, which did not indicate liver damage until day 29. Paracetamol was stopped at this point. By this time, Dora was unwell with sepsis as a result of her lung infection.
Dora’s paracetamol level was found to be significantly raised and treatment was started to correct this. Sadly, Dora died the day after the start of treatment. An inquest concluded that paracetamol-induced liver toxicity was a causal factor in her death.

**The national investigation**

The risk of oral paracetamol causing liver toxicity in adults with low bodyweight is recognised in the literature and in patient safety incident reports. HSIB contacted the hospital where the reference event occurred. The Trust welcomed HSIB’s involvement and collaborated with information gathering.

Following initial information gathering and evaluation against the HSIB patient safety risk criteria *(see section 3.2)*, the Chief Investigator authorised a national safety investigation.

**Findings**

- Oral paracetamol is a widely used medication that has few side effects for most people.

- There is limited data on how oral paracetamol affects adults with low bodyweight.

- Although liver toxicity is a recognised risk with oral paracetamol, evidence regarding the relationship between low bodyweight and the risk of liver toxicity is unclear.

- Two independent bodies are contracted to provide oral paracetamol prescribing guidance for clinicians. The information provided is not consistent.

- There is potential for electronic prescribing and medication administration systems to prompt healthcare providers to record a patient’s weight and consider liver toxicity in those who weigh less than 50kg.

- Environmental and other factors create challenges to the timely weighing of patients on a ward.
**HSIB makes the following safety observations**

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<tr>
<th>Safety observation O/2022/151:</th>
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<tr>
<td>It may be beneficial for electronic prescribing and medication administration systems to include an alert for oral paracetamol that prompts documentation of a patient’s weight and consideration of the risk of liver toxicity when their weight is less than 50kg.</td>
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<th>Safety observation O/2022/152:</th>
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<td>It may be beneficial for the evidence on oral paracetamol and low bodyweight to be reviewed by the relevant national bodies to reach a consensus and agree standardised prescribing guidance.</td>
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<th>Safety observation O/2022/153:</th>
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<tr>
<td>It may be beneficial for available technological solutions, such as beds with built-in scales, to be used to weigh patients. However, the cost of such equipment makes its widespread adoption within the NHS challenging.</td>
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Further information

More information about HSIB – including its team, investigations and history – is available at www.hsib.org.uk

If you would like to request an investigation then please read our guidance before contacting us.

@hsib_org is our Twitter handle. We use this feed to raise awareness of our work and to direct followers to our publications, news and events.

Contact us

If you would like a response to a query or concern please contact us via email using enquiries@hsib.org.uk

We monitor this inbox during normal office hours - Monday to Friday from 09:00 hours to 17:00 hours. We aim to respond to enquiries within five working days.

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