

Risks with Intravenous Paracetamol

Issue

While paracetamol has been used orally for many decades, the introduction of an IV formulation brought new risks, some of which were not experienced with oral and rectal products:

1. **Dose Adjustment:** failure to adjust the dose of IV paracetamol for patients weighing 50kg and under. A reduction in the total daily dose is required for patients with risk factors for hepatotoxicity.¹
2. **Confusion between mg and mL:** erroneously giving the same number of mL as the prescribed dose in mg will result in a dose 10 times that prescribed.
3. **Risk of dose duplication:** where a dose is duplicated in different clinical settings e.g. in theatres with subsequent paracetamol dosing on ward; or where multiple drug administration records, routes of administration and paracetamol preparations are in use.
4. **Chemical incompatibility:** risk of precipitation if other medications are mixed with IV paracetamol
5. **Use in babies and children:** babies and children are particularly at risk of dosing errors with IV paracetamol.^{2,3} Dosing is based on patient weight and lower doses per kg are required in babies, 10kg and under.¹

Evidence of Harm

There have been a number of reports of accidental overdose of IV paracetamol 10mg/mL nationally and internationally.^{4,5} There has been at least one death from liver failure, in a 35kg female 19 year old who was given 1g paracetamol IV, four times daily for 5 days in the UK.⁶

Anecdotal reports from Irish hospitals suggests that additional doses of paracetamol have been administered to patients within 4 hours of having received a dose in the operating theatre/Emergency Department. Reports worldwide also suggest that there have been cases of accidental overdose in children, including at least one fatality. The prescription of IV paracetamol being in **mg**, but doses having been administered (particularly to children) in **mL** is also a concern.⁷

How to Reduce the Risks

- **Restrict Use:** IV paracetamol should only be prescribed when the oral or rectal routes are not appropriate. The continued need for IV paracetamol should be reviewed regularly.
- **Dose by body weight (50kg and under):** For children and adults 50kg and under, the dose of paracetamol should be calculated according to body weight and independently checked by a second person. **Remember babies 10kg and under require lower doses per kg¹. The dose should always be stated in mg on the prescription. If prescribed 'As required', the maximum daily dose should always be written on the prescription.**
- **Use 500mg in 50mL IV paracetamol presentation for smaller patients:** For neonates and infants the risk of overdose is greater, as the weight based dose required is far less than the amount of paracetamol in the ready-made in 50mL product.³ The 1000mg (1g) in 100mL presentation should not be used for children or adults 33kg and under.^{1,3} For these patients, a 50mL vial should be used and if the prescribed dose is less than 500mg it should be withdrawn from the vial into an appropriately sized syringe.³
- For neonates, infants and children doses should always be **administered using a rate controlled pump**. In this patient population also, particular consideration should be given to the use of Smart Pumps (i.e. pumps which utilize dose error-reduction software) if available in order to help reduce dosing errors and overdoses.^{3,9}
- **Patients at risk of toxicity:** Adjust dose in patients with hepatocellular insufficiency, chronic alcoholism, chronic malnutrition, or dehydration (maximum daily dose 3g); for patients with severe renal insufficiency (crcl ≤ 30ml/min) the minimum dosage interval is six hours.¹
- **Check last dose:** Before administering, check when paracetamol was last administered and the cumulative dose over the previous 24 hours. Bear in mind there may be multiple administration routes and paracetamol preparations in use. Particular caution is needed in patients with multiple administration records e.g. anaesthetic sheets or ED triage notes.
- **Mixing:** Other drugs should not be mixed with IV paracetamol in same solution.¹
- **For ALL CASES of IV paracetamol overdose** contact **National Poisons Information centre Ph 01 8092566** for management advice.⁸

References

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5. BMJ (2015) Where are we now with paracetamol Available at <https://doi.org/10.1136/bmj.h3705>
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7. MRHA Direct Healthcare Professional Communication on serious cases of accidental overdose reported in infants and children with IV paracetamol <http://bit.ly/2ISAWQ5>
8. Toxbase – Intravenous Paracetamol Overdose. www.toxbase.org.uk (Login required for access)
9. ISMP Targeted Medication Safety Best Practice for Hospitals 2018/2019. <http://bit.ly/2lu8cwS>
10. DTB Bulletin (2018) What dose of paracetamol for older adults? Available <http://dx.doi.org/10.1136/dtb.2018.6.0636>

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