

HEALTH INNOVATION SERIES

Evidence based recommendations to improve care delivery and outcomes

Is the rounding rule in your dose calculator causing dose errors in children?

Dose calculators are helpful tools, particularly in the paediatric setting where the majority of medication doses are weight dependent. Calculators can have default rounding rules, which can be useful but can also lead to errors.

A rounding rule in a dose calculator can assist with determining the total dose and rounding a dose to ensure ease of administration, e.g. rounding a paracetamol dose from 495mg to 500mg to be consistent with a 500mg tablet.

While some rounding rules may be suitable when prescribing for adults and older children, these rounding rules may cause unsafe doses for young children of lower weight. For example, if the rounding rule to the “nearest whole number” is used as a default rule for ondansetron, there is the potential for underdosing or overdosing in young children.

In Example 1, for a 14.3kg child with an ondansetron intravenous (IV) target dose of 0.1mg/kg, the dose of 1.4mg will be automatically rounded down to 1mg, resulting in a lower mg/kg dose than intended. Instead of receiving 0.1mg/kg the child would receive 0.07mg/kg, a 30% lower dose than intended.

Example 1: Application of a rounding rule for ondansetron resulting in an underdose for a 14kg child

ondansetron				
Dose Values				
1) Target dose:	<input type="text" value="0.1"/>	<input type="text" value="mg/kg"/>		
2) Calculated dose:	<input type="text" value="1.4"/>	<input type="text" value="mg"/>		
3) Dose Adjustment:	<input type="text" value="1.4"/>	<input type="text" value="mg"/>	<input type="text" value="100"/>	<input type="text" value="0.0714"/>
4) Final dose:	<input type="text" value="1"/>	<input type="text" value="mg"/>	<input type="text" value="mg/kg"/>	
5) Standard dose:	<input type="text"/>	<input type="text" value="mg"/>	<input type="text" value="mg/kg"/>	
6) Rounding rule:	<input type="text" value="Nearest whole number"/>			
7) Adjust Reason:	<input type="text"/>			
8) Route:	<input type="text" value="IV Bolus"/>			



In contrast, in Example 2, a 0.15mg/kg dose in a 10kg child with the same default rounding rule will be rounded up to the nearest whole number. A 1.5mg dose will round up to 2mg (0.2mg/kg), 33% higher than the intended dose.

Example 2: Ondansetron overdose

ondansetron

Dose Values

1) Target dose:	<input type="text" value="0.15"/>	<input type="text" value="mg/kg"/>			
2) Calculated dose:	<input type="text" value="1.5"/>	<input type="text" value="mg"/>			
3) Dose Adjustment:	<input type="text" value="1.5"/>	<input type="text" value="mg"/>	<input type="text" value="100"/>	<input type="text" value=""/>	<input type="text" value=""/>
4) Final dose:	<input type="text" value="2"/>	<input type="text" value="mg"/>	<input type="text" value="0.2"/>	<input type="text" value="mg/kg"/>	
5) Standard dose:	<input type="text" value=""/>	<input type="text" value="mg"/>	<input type="text" value=""/>	<input type="text" value="mg/kg"/>	
6) Rounding rule:	<input type="text" value="Nearest whole number"/>				
7) Adjust Reason:	<input type="text" value=""/>				
8) Route:	<input type="text" value="IV Bolus"/>				



SYSTEM OPTIMISATION TIP

Choose wisely when selecting default rounding rules for medications, and consider and test the effects on doses for lower weight children.

References

1. AMH Children’s dosing companion online [Internet]. Adelaide (AU): Australian Medicines Handbook Pty Ltd; 2022 [cited 2023 Feb 03]. Available from: <https://amhonline-amh-net-au/>
2. Paediatric injectable medicines handbook [internet]. Westmead (AU): The Children’s Hospital at Westmead; 2022 [cited 2023 Feb 03]. Available from: <https://pimh.schn.health.nsw.gov.au.acs.hcn.com.au/>

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