Remediation required for drug-dose calculation skills in medical students

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To the Editor: We are pleased that Simpson and colleagues brought the important matter of drug-dose calculation skills among Australian hospital doctors to the attention of the wider medical community.[1] Data similar to theirs, suggesting inadequate calculation skills, have been reported from the United Kingdom and Germany.[2-4] As teachers in the MB BS course of the University of Adelaide, we have been concerned with deficiencies in the clinical numeracy skills of our students for some time. Such deficiencies among medical students have been reported from North Carolina,[5] but to our knowledge no information has been available about Australian medical students.

In 2008, we included three questions on drug-dose calculations in the 90-item multiple choice question (MCQ) section of the final examination for Years 1, 2 and 3 of our course. For each question (Box), students were required to select one correct answer from five options. Although Question 1 required the knowledge that one standard drink contains 10 g of ethanol, as well as calculation skills, Questions 2 and 3 solely examined numeracy skills.

The exam was completed by 177 students in Year 1, 155 in Year 2, and 119 in Year 3.

Distribution of medical student responses to examination questions requiring numeracy skills*

Question 1 (Year 1 and Year 3)

A 21-year-old woman recalls drinking 5 glasses of champagne at her birthday party. Her glass holds 200 mL and the champagne has an alcohol content of 12.5%. How many standard drinks did she consume during her party?

Options	% of respondents Year 1 ($n = 177$)	Year 3 ($n = 119$)
A. 12.5 standard drinks*	50%	49%
B. 5 standard drinks	6%	7%
C. 18 standard drinks	1%	2%
D. 6.25 standard drinks	20%	15%
E. 10 standard drinks	23%	27%

Question 2 (Year 2 and Year 3)

You are treating a 60 kg patient for a laceration, which you will need to suture under local anaesthetic. Given that the maximum safe dose of lignocaine is 3 mg/kg, what is the maximum volume of a lignocaine 1% weight per volume (w/v) solution that can be administered safely?

Options		% of respondents
Year 2		($n = 155$)
A.	1.8 mL	46%
B.	6 mL	2%
C.	**18 mL***	**35%**
D.	20 mL	14%
E.	60 mL	1%
Year 3		($n = 119$)
A.	60 mL	1%
B.	6 mL	0
C.	180 mL	41%
D.	**18 mL***	**38%**
E.	180 µL	19%

Question 3 (Year 3)

A 10 kg infant has viral meningitis and a high temperature. You want to treat her fever symptomatically with oral paracetamol. The preparation is paracetamol 50 mg/mL and the recommended dose is 15 mg/kg. How many mL of paracetamol syrup is the equivalent of one dose?

Options		% of respondents ($n = 119$)
A.	1.5 mL	0
B.	**3 mL***	**96%**
C.	6 mL	1%
D.	12 mL	2%
E.	15 mL	1%

* The correct options are shown in bold. ◆

The distribution of their responses is shown in the Box (with correct responses in bold).

The percentage of correct responses to these questions was significantly lower than the overall score for the MCQ paper, with the exception of Question 3, which may have been too easy (as it did not discriminate between students).

We believe these data support our hitherto anecdotal concerns that many students in the MB BS program have inadequate calculation skills. Although tertiary students' numeracy problems have been attributed, at least in part, to the level of mathematics teaching in secondary schools,[6] we consider they must be addressed at university level. We plan to make available an online calculation learning tool that begins with real-life non-medical examples. We are currently developing this tool with the University of Adelaide's Mathematics Learning Centre and plan to publish our experience, including evaluation, with a view to making the tool widely available.

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