A novel tool to aid usability of age-based weight estimation formulae

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ABSTRACT
Age-based weight estimation methods are used in the resuscitation of children deemed too sick to weigh. Some methods involve multiple formulae, which can be difficult to recall and use. This paper presents a conceptually simple finger-counting method that can be used to rapidly estimate weight based on existing age-based formulae.

INTRODUCTION
Age-based weight estimation formulae are used in paediatric patients deemed too sick to weigh. Since 2011, the Advanced Paediatric Life Support (APLS) course has suggested three formulae for weight estimation: (age×0.5)+4 for children aged 1–12 months, (2×age)+8 for children aged 1–5 years and (3×age)+7 for children aged 6–12 years.1 There is evidence to suggest multiple formulae are time consuming2 as well as being difficult to recall; a survey of a group of paediatric trainees found that 92% were unable to recall the latest APLS formulae.3

To address these issues, this paper presents a conceptually simple finger-counting technique that can be used with common age-based weight estimation formulae. Its application to APLS formulae is demonstrated.

METHOD
Place your hands in front of you, palms up: counting from left to right, digits 1–5 on the left hand represent 1–5 years, and digits 6–10 on the right hand represent 6–10 years.

The following two estimated weights are memorised: 10 kg for a 1-year-old child and 25 kg for a 6-year-old child (figure 1). To estimate weight for children aged 1–5 years, start with the memorised weight for 1 year (10 kg) and count the fingers on the left hand up to the desired age, adding 2 kg for each finger. To estimate weight for a child aged 6–10 years, start with the memorised weight for a child of 6 years (25 kg) and count the fingers on the right hand up to the desired age, adding 3 kg for each finger.

To estimate weight for infants aged 1–10 months (figure 2), from left to right the operator’s digits represent the ages 1–10 months. The estimated weight for a child of 1 month is memorised (4.5 kg). Weight for age is estimated by counting fingers up to the desired age from left to right, adding ½ kg for each finger.

An accompanying video tutorial for finger counting with APLS4 is available https://vimeo.com/89796060.

DISCUSSION
Although a validated finger counting technique already exists with an aim to aid usability of age-based paediatric weight estimation,5 it does not map to any existing weight estimation formulae used in current practice. This method can be applied to any linear age-based weight estimation method formula—which will be of use for researchers who wish to develop new age-based formulae, validated for the population in which they work. Further tutorial videos have been produced to illustrate its use in this regard.6

It is important for clinicians to note that any age-based weight estimation formulae will have limited precision,7 and the latest APLS weight estimation formulae are no exception.8 Readers may be also struck by a marked 7 kg jump in estimated weight from 5 to 6 years as a result of using two different formulae (figure 1). This is a result of a decision by the APLS working group to split two formulae between the ages 1–12 years, based on comparison of accuracy of an...
earlier APLS formula and the newer Luscombe et al equation against UK-WHO 50th centile growth chart data (personal communication via Jane Mooney, APLS working group, August 2013).

I suggest this technique may act as a complementary resuscitation aid to help reduce the cognitive load associated with paediatric emergencies—especially in situations where age-based formulae, computerised methods or precalculated tables of estimated weight are not immediately at hand.

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REFERENCES

Figure 1 Advanced Paediatric Life Support (APLS) finger counting method for children aged 1–10 years (background image courtesy of Evan Amos, freely licensed via Creative Commons).

Figure 2 Advanced Paediatric Life Support (APLS) finger counting method for children aged 1–10 months (background image courtesy of Evan Amos, freely licensed via Creative Commons).

Figure 1: Advanced Paediatric Life Support (APLS) finger counting method for children aged 1–10 years (background image courtesy of Evan Amos, freely licensed via Creative Commons).

Figure 2: Advanced Paediatric Life Support (APLS) finger counting method for children aged 1–10 months (background image courtesy of Evan Amos, freely licensed via Creative Commons).


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