

3.4 Percentage of paediatric medication orders that include the correct dose per kilogram (or body surface area) and a safe total dose.

Purpose

This indicator addresses the effectiveness of processes that encourage safe medication ordering for paediatric patients.

Background and evidence

Incorrect dosing is the most common medication error reported in paediatric patients.^{1,2} Some reasons why paediatric patients are particularly predisposed to risk of medication error and subsequently of morbidity and mortality from medication error include:³

- The different and changing pharmacokinetic parameters of paediatric patients
- The need for calculation of individualised doses based on a weight or body surface area (BSA)
- Lack of published information regarding safety and efficacy of medications in paediatric patients.

Therefore, the intended dose per kilogram (or dose per BSA) and the total calculated dose should appear on all orders for paediatric patients.³

Key Definitions

Paediatric refers to all patients aged up to 18 years.

Medication orders refers to all medications that require weight based or BSA based dose calculations. Creams, drops and other medications that do not require such dosing are not included. In older paediatric patients, weight based dosing may not be needed (see below).

The correct dose per kilogram (or body surface area) is the intended dose, usually expressed as mg/kg or mg/m², and should be determined with reference to the paediatric pharmacopoeia endorsed for local use by the Drug and Therapeutics Committee (DTC). It should be recorded in the dedicated area of the Paediatric National Inpatient Medication Chart (PNIMC) or other chart approved for paediatric use by the DTC.

A safe total dose means within the safe dose range based on patient age and weight (or BSA) as recommended by the paediatric pharmacopoeia endorsed for local use by the DTC. It should be recorded in the main order box of the PNIMC or other chart approved for use by DTC.

Note:

- In obese children, use of ideal weight may be more appropriate for some medicines (check paediatric pharmacopoeia for specific guidance)
- In older paediatric patients (or those over 40-50 kg) care should be taken to ensure that the upper dose limit for adults is not exceeded.

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Data collection for local monitoring

Recommended sample selection: A random sample of current paediatric inpatients over a one month period. Random means each patient has an equal chance of being included in the audit.

Recommended sample size: The following sample sizes are recommended based on number of paediatric beds in the hospital:

Number of paediatric beds in hospital	Sample size
150 or more	20% of current paediatric inpatients
30 - 149	30 current paediatric inpatients
Less than 30	All current paediatric inpatients

Collecting a larger sample where possible will increase the sensitivity of the data

Recommended methodology: Review of medication charts. All medication orders on all current medication charts should be included in the review.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

References

1. Committee on Drugs and Committee on Hospital Care. Prevention of medication errors in the pediatric inpatient setting. *Pediatrics* 2003; 112:431-36.
2. Kozer E, Scolnik D, Macpherson A, et al. Variables associated with medication errors in pediatric emergency medicine. *Pediatrics* 2002; 110:737-42.
3. Levine S, Cohen M, Blanchard N, et al. Guidelines for preventing medication errors in pediatrics. *The Journal of Pediatric Pharmacology and Therapeutics* 2001; 6:427-43.
4. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices (Adapted for Australian use by the NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of paediatric medication orders that include the correct dose per kilogram (or body surface area) and a safe total dose

Denominator = Number of medication orders in sample

Limitations and interpretation

Calculating doses based on weight or BSA can be problematic in overweight or older paediatric patients with resultant doses exceeding the safe adult dose range. Caution needs to be applied in these situations.

Further information

The *Medication Safety Self Assessment for Australian Hospitals⁴ (MSSA)* can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medications. The MSSA is available at www.cec.health.nsw.gov.au