

Medication errors during simulated paediatric resuscitations: a prospective, observational human reliability analysis

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Introduction: Medication errors during paediatric resuscitation are thought to be common. However, there is little evidence about the individual process steps that contribute to such medication errors in this context.

Objectives: To describe the incidence, nature and severity of medication errors in simulated paediatric resuscitations, and to employ human reliability analysis to understand the contributory role of individual process step discrepancies to these errors.

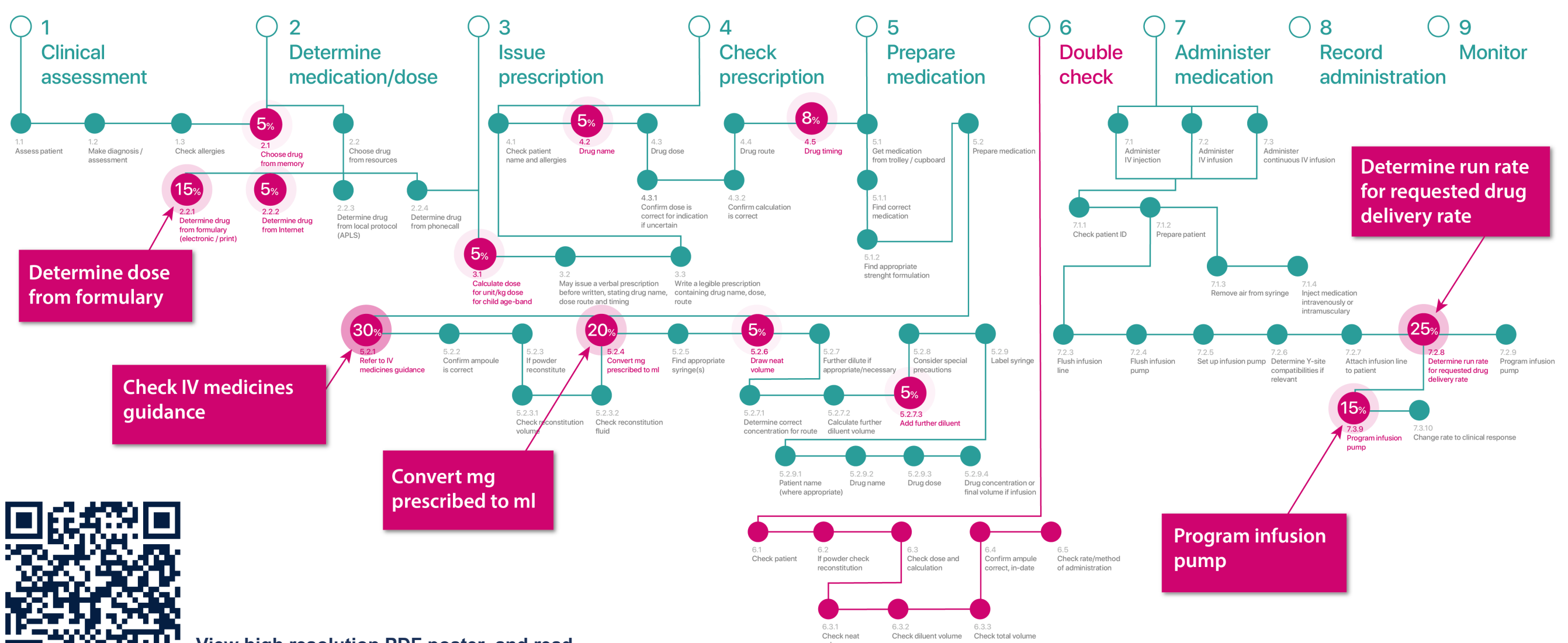
Methods: We conducted a prospective observational study of simulated resuscitations subject to video micro-analysis, identification of medication errors, severity assessment and human reliability analysis in a large English teaching hospital. Fifteen resuscitation teams of two doctors and two nurses each conducted one of two simulated paediatric resuscitation scenarios.

Results: At least one medication error was observed in every simulated case, and a large magnitude or clinically significant error in 11 of 15 cases. Medication errors were observed in 29% of 180 simulated medication administrations, 40% of which considered to be moderate or severe. These errors were the result of 884 observed discrepancies at a number of steps in the drug ordering, preparation and administration stages of medication use.

Error prone steps leading to large magnitude or clinically significant errors

Detail	Comment
Determine dose from formulary	Incorrect dose for indication selected from resource during prescription phase. Often nurses able to intervene and ask for appropriate dose, however on some occasions this did not happen.
Check IV medicines guidance	Obtaining the incorrect information for dose/indication or taking an excessively long time to identify the correct information within the guidance.
Convert milligrams to millilitres	There were 7 discrepancies when converting milligrams to millilitres of neat drug, 5 of which made major contributors to errors, and which were directly implicated in 16.6% of large magnitude errors and 20% of all clinically significant errors.
Determine run rate	Infusions in particular were prone to administration errors when calculating run rates, especially for continuous infusions requiring rates in mcg/kg/min
Program pump	Even at seemingly simple steps there were errors in the programming of the pump run rate.
Double checking	88% of all medications were double checked by both nurses together before administration. Of all medication errors already inbound to the patient at the point of double checking, we identified 14 errors (28% of all errors) that were potentially 'interceptable' by a more effective double-checking process.

Conclusions: Medication errors were common with a considerable proportion likely to result in patient harm. There is an urgent need to optimise existing systems and to commission research into new approaches to increase the reliability of human interactions during administration of medication in the paediatric emergency setting.



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