Medication dosing errors for infants and children

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Preparing small doses of medication from syringes may be inaccurate and can result in crucial dosing errors for infants and children, according to a study published in CMAJ (Canadian Medical Association Journal).

Because babies and young children require small doses of drugs, these are often prepared from stock of less than 0.1 mL which can result in dosing errors and possible adverse events. Medications most commonly requiring small doses include potent narcotics and sedatives such as morphine, lorazepam and fentanyl as well as immunosuppressants.

"The safe administration of medications requires formulations that permit accurate preparation and administration," writes Dr. Christopher Parshuram, Department of Paediatrics, The Hospital for Sick Children (SickKids) and Director of Paediatric Patient Safety Research, University of Toronto Centre for Patient Safety, with coauthors. "Current equipment does not permit the accurate measurement of volumes less than 0.1 mL."

The researchers conducted a theoretical study as well as a clinical study of 1531 patients admitted to the ICU in 2006. Out of 71 218 intravenous doses, 5245 (7.4%) needed preparations of less than 0.1 mL of stock solution and 12 439 (17.5%) needed preparations from less than 0.2 mL.

"Our findings indicate a substantial source of dosing error that involved potent medications and affected more than a quarter of the children studied," write the authors. "Small volumes of stock solution are

required because of the relatively low doses needed for infants and young children and the relatively high concentrations of commercially available stock solutions. The clinical sequelae of errors occurring as a result of preparing doses from small volumes will be compounded by incomplete safety data, errors in medication orders, and errors in preparation or administration."

The authors conclude that since this practice occurs in paediatric hospitals across North America, the "re-evaluation of preparation methods, regulatory requirements and manufacturing practices is warranted."

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