

Wrong dose of heart meds too frequent in children

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Infants and young children treated with heart drugs get the wrong dose or end up on the wrong end of medication errors more often than older children, according to research led by the Johns Hopkins Children's Center to be published July 6 in *Pediatrics*.

While the researchers found the highest number of errors among infants under the age of 1, they say [children](#) of all ages are vulnerable to such mistakes because health-care providers can manually miscalculate weight-sensitive doses and can misinterpret safe age ranges of adult drugs used off-label in children.

"We found that cardiac [medication errors](#) happen in children, and they can happen every step of the way, from prescribing to delivering the medication, but dosing and administration errors were ominously common," says lead investigator Marlene Miller, M.D., M.Sc., vice chair for quality and patient safety at Hopkins Children's.

The researchers emphasize that the vast majority of errors analyzed in their study — 96 percent — were benign and caused no detectable harm to patients or never reached the patients, but in 4 percent (31) of the cases there was harm, although no deaths.

The report and the warnings were drawn from a study analyzing 821 medication errors submitted to a national voluntary error-reporting database.

As Miller noted, errors occurred every step of the multiple-step process of calculating dosages, prescribing, dispensing and giving drugs, with the most common causes of dosing errors attributed to misinterpretation of the patient's weight, mathematical errors of computation, misinterpretation of orders, giving extra doses or missing doses. In one instance, the patient's weight in pounds was mistaken for weight in kilograms, resulting in a gross overdose of three different heart drugs, which sent the patient into [cardiac arrest](#).

Half of the errors occurred in children younger than 1 year, and 90 percent involved children under the age of 6 months. [Newborns](#) and infants with [congenital heart disease](#) — which occurs in four out of 1,000 U.S. babies — are at high risk for such errors since heart medications are most commonly prescribed for them, researchers say. The other half of dosing errors occurred in patients between the ages of 1 year and 6 years.

The investigators say certain medication errors in children can be reduced or prevented by computerizing drug orders with built-in double- and triple-checking mechanisms that reduce the likelihood for miscalculation or misinterpretation, something Hopkins Children's is already doing. In 2006, Hopkins researchers demonstrated that Web-based ordering systems make it less likely to order and give a child a wrong dose. However, because computerized orders can prevent only certain types of errors, it is critical to find new ways and design new systems that reduce other types of errors as well, such as dispensing and administration errors, while at the same time recognizing the human factor.

"While it is essential to examine or modify system fail-safes, given the human factor in patient care, we also stress vigilance among hospital staff in all aspects of medication administration, from weight assessment to medication delivery," says lead investigator Diana Alexander, M.D.,

who conducted the study while at Hopkins and is now at St. Luke Regional Medical Center in Boise, Idaho.

Most of the harmful errors involved diuretics, used to treat heart failure and lower blood pressure by ridding the body of excess water, and antihypertensive (blood-pressure lowering) drugs, both of which are now widely used in infants with congenital heart disease and increasingly in older children and teens with high blood pressure.

Source: Johns Hopkins Medical Institutions

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