What's New in the Patient Safety World

November 2014

Out-of-Hospital Pediatric Medication Errors

A new study investigated out-of-hospital medication errors involving children (Smith 2014). The investigators used a database of reports from poison control centers nationwide. Between 2002 and 2012 they found 63,000 such errors annually in children under the age of 6 or one error every 8 minutes in the US. They acknowledge this is likely an underestimate since the database captures only those cases that were reported to poison control centers.

Most of the incidents (96.9%) occurred in the child's own home but some occurred in other residences or in school. Fortunately, most did not cause serious harm to children and most did not require management or monitoring in a healthcare facility. Analgesics, cough and cold preparations, antihistamines and antibiotics accounted for the vast majority of incidents. Boys accounted for a slightly higher percentage of cases and there was a seasonal pattern with higher incidence in winter (more prescriptions for offending medications occur during winter months). The percentage due to cough and cold preparations decreased considerably over the study period, largely due to efforts to reduce their inappropriate prescription.

Being inadvertently given a medication twice accounted for 27% of medication errors, followed by other incorrect dose (17.8%), confused units of measure (8.2%), and wrong medication (7.8%).

The incidence of medication errors increased in younger children, with more than 25% of cases occurring in children under the age of 1 year. Liquid medications were more often involved in younger patients.

The authors note several opportunities to reduce the occurrence of such medication errors in children. Efforts at educating parents on correct use of dosing devices and better instructions on labeling and packaging are important. Moreover, adherence to evidence-based guidelines for prescription of drugs in the analgesic, antihistamine, and antimicrobial categories should be emphasized.

Language barriers, of course, may play a role in pediatric medication errors. So may health literacy issues. For years when we have talked about health literacy we have focused on reading levels and reading comprehension. But in our June 2012 What's New in the Patient Safety World column "Parents' Math Ability Matters" we noted a study

(AAP 2012) that showed that parents' mathematics skills, independent of reading skills, may play a big role in some pediatric medication errors. The study was done by Marrese et al. and presented as an abstract at the Pediatric Academic Societies (PAS) annual meeting April 28, 2012 (Marrese 2012). It showed parents with math skills at the third grade level or below were five times more likely to measure the wrong dose of medication for their child than those with skills at the sixth grade level or higher. While about a third of the parents had low reading skills, 83% had poor "**numeracy**" skills, with 27% having skills at or below the third grade level. Parents with low numeracy may especially prone to make errors in tasks requiring dose measurement or measurement conversions.

The study highlights the need to address numeracy skills of parents when communicating medication instructions (we suspect the same is likely to apply to adult medication errors as well). They also provide as an example having providers review and give parents pictures of dosing instruments filled to the correct amount for that prescription.

And a study earlier this year showed that parent's measurement and dosing errors are common (Yin 2014). 39.4% of parents made an error in measurement of the intended dose and 41.1% made an error in the prescribed dose. Furthermore, 16.7% used a nonstandard instrument. Compared with parents who used milliliter-only, parents who used teaspoon or tablespoon units had twice the odds of making an error with the intended and prescribed dose. Associations were greater for parents with low health literacy and non–English speakers. Nonstandard instrument use partially mediated teaspoon and tablespoon–associated measurement errors. The authors conclude that their findings support a milliliter-only standard to reduce medication errors.

We also refer you to our May 7, 2013 Patient Safety Tip of the Week "Drug Errors in the Home" which had many observations and recommendations regarding pediatric patients in the home as well as adult patients.

Some of our other columns on pediatric medication errors:

November 2007	"1000-fold Overdoses by Transposing mg for micrograms"
December 2007	"1000-fold Heparin Overdoses Back in the News Again"
September 9, 2008	"Less is More and Do You Really Need that Decimal?"
July 2009	"NPSA Review of Patient Safety for Children and Young People"
June 28, 2011	"Long-Acting and Extended-Release Opioid Dangers"
September 13, 2011	"Do You Use Fentanyl Transdermal Patches Safely?"
September 2011	"Dose Rounding in Pediatrics"
April 17, 2012	"10x Dose Errors in Pediatrics"
May 2012	"Another Fentanyl Patch Warning from FDA"
June 2012	"Parents' Math Ability Matters"
Septembrer 2012	"FDA Warning on Codeine Use in Children Following Tonsillectomy"
May 7, 2013	"Drug Errors in the Home"

May 2014 "Pediatric Codeine Prescriptions in the ER"

References:

Smith MD, Spiller HA, Casavant MJ, et al. Out-of-Hospital Medication Errors Among Young Children in the United States, 2002-2012. Pediatrics 2014; 134: 867–876 published online October 20, 2014 http://pediatrics.aappublications.org/content/early/2014/10/15/peds.2014-0309.full.pdf+html

American Academy of Pediatrics (AAP). Parents' Poor Math Skills May Lead to Medication Errors. AAP press release April 28, 2012 http://www.aap.org/en-us/about-the-aap/aap-press-room/Pages/Parents-Poor-Math-Skills-May-Lead-to-Medication-Errors.aspx

Marrese C, Dreyer B, Mendelsohn A, Moreira H, Yin HS. Parent Medication Dosing Errors: Role of Health Literacy and Numeracy (abstract). Pediatric Academic Societies (PAS) annual meeting April 28, 2012 http://www.abstracts2view.com/pas/view.php?nu=PAS12L1_4021

Yin HS, Dreyer BP, Ugboaja DC, et al. Unit of Measurement Used and Parent Medication Dosing Errors. Pediatrics 2014; 134(2): e354-e361; published ahead of print July 14, 2014 http://pediatrics.aappublications.org/content/134/2/e354.abstract?sid=695180bb-684f-492b-9217-53ed71b6eb19

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