What's New in the Patient Safety World

August 2017

Medication Errors Outside of Healthcare Facilities

Much of what we know about medication errors is derived from inpatient studies and, to a lesser degree, long-term care studies. Medication errors that occur in the home or other non-healthcare settings are less well studied.

One method of identifying potential medication errors in those latter facilities is analyzing data from our multiple poison control centers. Such recent analysis of National Poison Database System (NPDS) data from 2000 through 2012 showed a significant increase in errors that result in serious medical outcomes (Hodges 2017). Those researchers found 67,603 exposures related to unintentional therapeutic pharmaceutical errors that occurred outside of health care facilities that resulted in serious medical outcomes (overall average rate 1.73 per 100,000 population). Most notably, there was a 100% rate increase over that 13-year study period. Increases were seen for all age groups except children younger than 6 years of age.

Common types of medication errors included:

- incorrect dose
- wrong medication
- inadvertently taking the medication twice.

The medication categories most frequently associated with serious outcomes were:

- cardiovascular drugs (20.6%)
- analgesics (12.0%)
- hormones/hormone antagonists (especially diabetes drugs like insulin and sulfonylurea) (11.0%)
- sedative/hypnotics/antipsychotics (9.6%)
- antidepressants (8.6%)

The analgesic errors were dominated by three classes:

- opioids (34%)
- acetaminophen combination drugs (23.9%)
- acetaminophen alone (20.5%)

Interestingly, serious medication errors were more frequent among females in all age categories. Two-thirds of the errors involved solid medications but 20% involved liquid medications, primarily in children.

Cough and cold medications were frequent offenders in children under the age of 6 but a suspected reason for the lack of an increase in overall errors in children under the age of 6 over the course of the study was a reduction in the number due to cough and cold medications, attributable to warnings from the FDA and numerous specialty societies.

And for children younger than 6 years, 10.9% of the errors were classified as "ten-fold dosing error", a problem we've often noted for pediatric patients (see list of columns on pediatric medication errors below). But for children 6–12 years old, the percentage of medication errors attributed to inadvertently taking/giving someone else's medication was nearly double that of any other age group. The authors speculate that some children in this age group may be administering their own medication, and due to their age, may be more likely to take another family member's medication by mistake.

Medical outcome was most commonly reported as moderate effect (93.5%), followed by major effect (5.8%) and death (0.6%). A third of exposures resulted in hospital admission. Not surprisingly, categories of medications resulting in the highest proportion of admissions to a critical or non-critical care unit were anticoagulants, analgesics, antineoplastics, anticonvulsants, and cardiovascular medications.

The authors stress that most non-health care facility medication errors are preventable, particularly those due to dosing errors, taking or administering the wrong medication, and inadvertently taking or administering the same medication twice. They also stress the growing body of literature regarding use of proper dosing devices in children (see the list of our prior columns below and another of this month's What's New in the Patient Safety World columns "More on Pediatric Dosing Errors").

But they also note that in young children the second most common type of medication error was "health professional iatrogenic error" (related to mistakes made by physicians, nurses, pharmacists, or other health care professionals, and cases in which a contraindicated medication was given).

The authors offer many potential improvements that could reduce the frequency of these medication errors, including:

- better product packaging, labeling, and dosing instructions
- special consideration given for patients with limited health literacy and numeracy
- prescription drug monitoring (to identify contraindicated medications)
- physician and patient/parent/caregiver education
- use of child-resistant weekly pill organizers
- use of written records by parents of young children to prevent another caregiver from unintentionally administering the medication a second time

Some of our prior columns on medication errors in other ambulatory settings:

June 12, 2007 "Medication-Related Issues in Ambulatory Surgery"
August 14, 2007 "More Medication-Related Issues in Ambulatory Surgery"
March 24, 2009 "Medication Errors in the OR"
October 16, 2007 "Radiology as a Site at High-Risk for Medication Errors"
January 15, 2008 "Managing Dangerous Medications in the Elderly"
April 2010 "Medication Incidents Related to Cancer Chemotherapy"
September 2010 "Beers List and CPOE"
October 19, 2010 "Optimizing Medications in the Elderly"
April 12, 2011 "Medication Issues in the Ambulatory Setting"
June 2012 "Parents' Math Ability Matters"
May 7, 2013 "Drug Errors in the Home"
May 5, 2015 "Errors with Oral Oncology Drugs"
September 15, 2015 "Another Possible Good Use of a Checklist"
February 2016 "Avoiding Methotrexate Errors"
April 19, 2016 "Independent Double Checks and Oral Chemotherapy"
June 21, 2016 "Methotrexate Errors in Australia"

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"
September 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"
November 2014 "Out-of-Hospital Pediatric Medication Errors"
January 13, 2015 "More on Numeracy"
April 2015 "Pediatric Dosing Unit Recommendations"
September 2015 "Alert: Use Only Medication Dosing Cups with mL Measurements"
November 2015 "FDA Safety Communication on Tramadol in Children"
October 2016 "Another Codeine Warning for Children"
January 31, 2017 "More Issues in Pediatric Safety"
May 2017 "FDA Finally Restricts Codeine in Kids; Tramadol, Too"
August 2017 "More on Pediatric Dosing Errors"

References:

Hodges NL, Spiller HA, Casavant MJ, et al. Non-health care facility medication errors resulting in serious medical outcomes. Journal of Clinical Toxicology 2017; Published online: 10 Jul 2017
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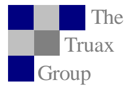

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