

# What's New in the Patient Safety World

September 2017

## Weight-Based Dosing in Children

One factor contributing to many pediatric medication errors is that dosages of medications often require calculations based upon the weight of the patient. The fact that a calculation must be done predisposes to both simple arithmetic errors and to decimal point errors (see, for example, our September 2011 What's New in the Patient Safety World column "[Dose Rounding in Pediatrics](#)").

A recent study looked at an intervention designed to reduce the likelihood of errors in weight-based dosing ([Larose 2017](#)). Larose and colleagues compared two strategies in a simulation exercise among residents rotating in the pediatric emergency department. One group of residents used a reference book providing weight-based precalculated doses. The other (control) group used a card providing milligram-per-kilogram doses.

They found that the clinical aid providing precalculated medication doses was not associated with a decrease in overall prescribing error rates but was **highly associated with a lower risk of 10-fold error** for bolus medications and for medications administered by continuous infusion.

Of course, the other big issue in calculating weight-based pediatric medication dosages is having an accurate weight and one that uses the appropriate units.

According to the American Academy of Pediatrics (AAP), half of all U.S. hospitals do not weigh and record in kilograms, according to an emergency readiness assessment ([Korioth 2016](#)). That simple initiative (requiring all weights be in kilograms) can prevent drug-dosing errors. There has been an updated AAP-endorsed statement from the Emergency Nurses Association (ENA) calling for use of kilograms in the ED ([ENA 2016](#), [Wyckoff 2017](#)). An error that originates in the ED can follow the patient throughout a hospital visit.

The ENA position statement recommends:

- Patient weights should be measured, recorded and displayed in a prominent place in the medical record in kilograms only.
- Multiple types of scales should be available in the emergency setting, all configured to record weights in kilograms only.

- For patients under age 18 years, clinical decision support features should be used to compare weight with expected weight (such as based on growth charts) and provide real-time alerts whether under-dose or over-dose is suspected.
- Electronic medical records (EMRs) should allow for weight entries only in kilograms.
- Institutions should consider integrating digital scales with the EMR to eliminate or reduce the need for data entry.
- The patient's actual weight is considered part of the mandatory nursing assessment, is taken at each visit, and is repeated as warranted in response to changes in the patient's condition unless life-threatening circumstances do not allow it.
- The patient's weight in kilograms should be included on all prescriptions.
- The patient's weight in kilograms should be included in all inter- and intra-disciplinary patient hand-offs.

Lastly, don't forget that one of the unintended consequences of healthcare information technology is that a single error can be propagated into multiple other errors. The classic error is inputting an incorrect patient weight into a dedicated field in an electronic medical record. That erroneous patient weight may then be used to calculate doses of those medications that use weight-based dosing. This error probably most often happens when the weight is input in pounds when the EMR is expecting the weight in kilograms. There are also instances where a patient's height and weight have been transposed in the EMR. The other time it occurs is when the weight put into that field is an estimated weight that turns out to be incorrect or when the weight field is not updated after a significant gain or loss of weight. Good EMR's do two things:

1. When a weight is input into a dedicated field the EMR will prompt for input in kilograms or it will ask whether the input weight is in pounds or kilograms and make the appropriate adjustment.
2. After a certain period of time (eg. 2-3 weeks) the EMR may prompt the user to adjust the weight if significant change has taken place.

What safety mechanisms do you have in place to ensure capture of correct weights?

**Some of our other columns on errors related to patient weights:**

March 23, 2010	<a href="#">“ISMP Guidelines for Standard Order Sets”</a>
September 2010	<a href="#">“NPSA Alert on LMWH Dosing”</a>
August 2, 2011	<a href="#">“Hazards of ePrescribing”</a>
January 2013	<a href="#">“More IT Unintended Consequences”</a>
December 8, 2015	<a href="#">“Danger of Inaccurate Weights in Stroke Care”</a>
May 2016	<a href="#">“ECRI Institute’s Top 10 Patient Safety Concerns for 2016”</a>

**Some of our other columns on pediatric medication errors:**

November 2007	<a href="#">“1000-fold Overdoses by Transposing mg for micrograms”</a>
December 2007	<a href="#">“1000-fold Heparin Overdoses Back in the News Again”</a>
September 9, 2008	<a href="#">“Less is More and Do You Really Need that Decimal?”</a>
July 2009	<a href="#">“NPSA Review of Patient Safety for Children and Young People”</a>
June 28, 2011	<a href="#">“Long-Acting and Extended-Release Opioid Dangers”</a>
September 13, 2011	<a href="#">“Do You Use Fentanyl Transdermal Patches Safely?”</a>
September 2011	<a href="#">“Dose Rounding in Pediatrics”</a>
April 17, 2012	<a href="#">“10x Dose Errors in Pediatrics”</a>
May 2012	<a href="#">“Another Fentanyl Patch Warning from FDA”</a>
June 2012	<a href="#">“Parents’ Math Ability Matters”</a>
September 2012	<a href="#">“FDA Warning on Codeine Use in Children Following Tonsillectomy”</a>
May 7, 2013	<a href="#">“Drug Errors in the Home”</a>
May 2014	<a href="#">“Pediatric Codeine Prescriptions in the ER”</a>
November 2014	<a href="#">“Out-of-Hospital Pediatric Medication Errors”</a>
January 13, 2015	<a href="#">“More on Numeracy”</a>
April 2015	<a href="#">“Pediatric Dosing Unit Recommendations”</a>
September 2015	<a href="#">“Alert: Use Only Medication Dosing Cups with mL Measurements”</a>
November 2015	<a href="#">“FDA Safety Communication on Tramadol in Children”</a>
October 2016	<a href="#">“Another Codeine Warning for Children”</a>
January 31, 2017	<a href="#">“More Issues in Pediatric Safety”</a>
May 2017	<a href="#">“FDA Finally Restricts Codeine in Kids; Tramadol, Too”</a>
August 2017	<a href="#">“Medication Errors Outside of Healthcare Facilities”</a>
August 2017	<a href="#">“More on Pediatric Dosing Errors”</a>

## References:

Larose G, Levy A, Bailey B, Cummins-McManus B, et al. Decreasing Prescribing Errors During Pediatric Emergencies: A Randomized Simulation Trial. *Pediatrics* 2017; 139(3): e20163200

[http://pediatrics.aappublications.org/content/139/3/e20163200?sso=1&sso\\_redirect\\_count=1&nfstatus=401&nftoken=00000000-0000-0000-0000-000000000000&nfstatusdescription=ERROR%3a+No+local+token](http://pediatrics.aappublications.org/content/139/3/e20163200?sso=1&sso_redirect_count=1&nfstatus=401&nftoken=00000000-0000-0000-0000-000000000000&nfstatusdescription=ERROR%3a+No+local+token)

ENA (Emergency Nurses Association). Weighing All Patients in Kilograms. Position Statement; September 2016

[https://www.ena.org/docs/default-source/resource-library/practice-resources/position-statements/weighingallpatientsinkilograms.pdf?sfvrsn=9c0709e\\_6](https://www.ena.org/docs/default-source/resource-library/practice-resources/position-statements/weighingallpatientsinkilograms.pdf?sfvrsn=9c0709e_6)

Korioth T. FYI: Weigh in kilograms to cut dosing errors. AAP News 2016; August 19, 2016

<http://www.aappublications.org/news/2016/08/19/FYIKG081916>

Wyckoff AS. To reduce errors, ED staff should weigh patients in kilograms AAP News 2017; August 29, 2017

<http://www.aappublications.org/news/2017/08/29/Kilograms082917>



Healthcare Consulting

[www.patientsafetysolutions.com](http://www.patientsafetysolutions.com)

<http://www.patientsafetysolutions.com/>

[Home](#)

[Tip of the Week Archive](#)

[What's New in the Patient Safety World Archive](#)