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What's New in the Patient Safety World

July 2020

Medication Dosage Miscalculations

Ah! Calculations! Talk about setting the stage for errors. Any time you have to calculate a drug dose, you are potentially vulnerable to error. You can enter wrong decimal points, use the wrong units, or simply make a mathematic mistake.

We've done several columns (listed below) on errors made in relation to patient weights. Most often that happens when a dose is calculated using a patient's weight in pounds rather than kilograms. We've also discussed many examples of errors made in calculating IV medication doses when units like milligrams and milliliters are confused.

One of our favorite slides we use in several presentations is one showing typical human error rates for a variety of industries. That shows an error rate of 0.03 for simple arithmetic errors. That number comes from Park (Park 2012) in an earlier edition that is apparently no longer available. Smith (Smith 2005) had also noted studies show error rates in "doing arithmetic wrongly" to range from 0.01 to 0.03.

A recent article (Ressler 2020) notes that medication dosage miscalculations are, unfortunately, common and often go unnoticed. Prescriptions can be filled incorrectly by simply missing one crucial piece of information, like weight, or applying a proportion calculation incorrectly.

Ressler provides several examples of how such calculation errors can happen and how one error may even be compounded by a second error.

One example included the dosage of a drug being erroneously calculated based on weight in pounds, not kilograms and then the dosage was supposed to be split evenly every 12 hours but was instead prescribed to receive the full amount twice daily. The result was the incorrect calculation led to a dosage over four times higher than the intended dose.

Another example illustrates how incorrect dopamine concentration in a calculation led to potential overdose of this drug in a critical situation.

There's even an example of how an incorrect calculation led to a pharmacy having a chargeback from Medicare Part D because of overbilling.

The article provides a link to an infographic the author suggests you hang in your pharmacy or classroom for these three scenarios that can help you illustrate the impact of a miscalculation.

Calculation of drug doses, particularly for high alert medications, is one process that may benefit from double checks. However, it is critical that those double checks be truly independent double checks.

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

March 23, 2010	"ISMP Guidelines for Standard Order Sets"
September 2010	"NPSA Alert on LMWH Dosing"
August 2, 2011	"Hazards of ePrescribing"
January 2013	"More IT Unintended Consequences"
May 2016	"ECRI Institute's Top 10 Patient Safety Concerns for 2016"
September 2017	"Weight-Based Dosing in Children"
January 2018	"Can We Improve Barcoding?"
June 2018	"Incorrect Weights in the EMR"

Some of our other columns on double checks:

January 2010	"ISMP Article on Double Checks"
October 26, 2010	"Confirming Medications During Anesthesia"
October 16, 2012	"What is the Evidence on Double Checks?"
December 9, 2014	"More Trouble with NMBA's"
April 19, 2016	"Independent Double Checks and Oral Chemotherapy"
December 11, 2018	"Another NMBA Accident"
March 5, 2019	"Infusion Pump Problems"
August 27, 2019	"Double Check on Double Checks"

References:

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https://kuliahdianmardi.files.wordpress.com/2016/03/handbook-of-human-factors-and-ergonomics-fourth-edition-2012.pdf

Smith DJ. 'Reliability, Maintainability and Risk" 7th Edition. Elsevier 2005

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Ressler K. Bad Math: The Impact of Medication Dosage Miscalculations. Pharmacy Times 2020; June 8, 2020
https://www.pharmacytimes.com/news/bad-math-the-impact-of-medication-dosage-miscalculations

infographic
https://info.nhanow.com/when-bad-math-makes-its-mark?hsCtaTracking=3e634876-e0ad-4f0d-b62e-92b3864281f7%7C51341399-e022-48bf-a337-e1aebab04df1

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