

When Bad Math Makes its Mark

How medication dosage miscalculations impact both patients and pharmacies

1.5 Million

preventable medication errors harm patients in the U.S. each year¹

7,000–9,000 people die as a result of medication error, costing more than²

\$40 Billion



Read on for three examples of miscalculations that can lead to negative repercussions.

1

Miscalculations Based on Weight

Prescription: Give 333 mg Amoxicillin suspension every 12 hours for 7 days.



What went wrong

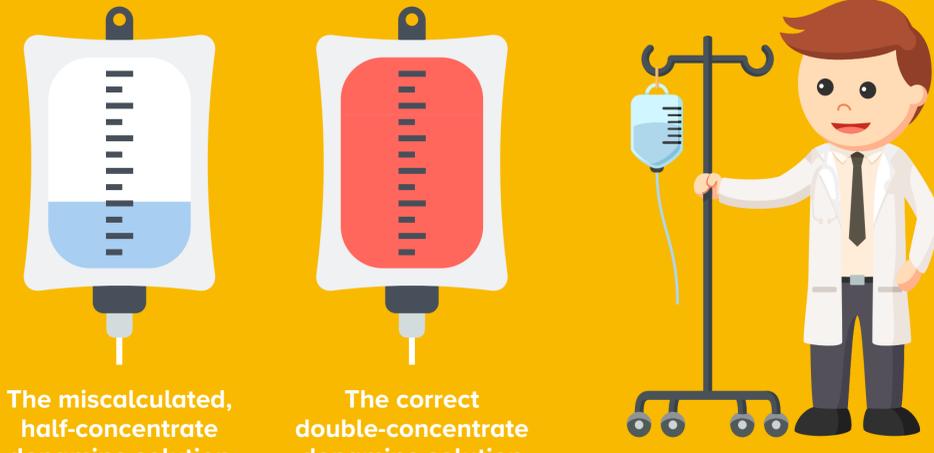
A technician calculates the dosage of Amoxicillin for a 9-month-old, 13 lbs., 5 oz., patient, but the dosage based on weight in pounds, not kilograms. Also, the dosage should be split evenly every 12 hours but was instead prescribed to receive the full amount twice daily. The incorrect calculation led to a dosage over four times higher than the intended dose.

There are several cases where incorrect dosages for pediatric patients have resulted in serious injury or death. Swapping pounds and kilograms, or even just having the wrong weight to begin with, can make a serious impact on a patient.

2

Miscalculations of IV Drugs

Prescription: Double concentrate dopamine IV



What went wrong

A hospital's pharmacy receives a request from a nurse to "double concentrate" a dopamine IV. The technician used dimensional analysis to calculate the correct amount of dopamine, but didn't track her units of measure, causing her to misplace a number, resulting in calculating a lower concentration dopamine IV than standard concentration.

Because dopamine's effects are heavily dose-dependent, small differences in concentration may mean the difference between increasing urine output or increasing cardiac output. In an emergency situation, it is critically important that the correct dose be administered to bring about the desired effect.

3

Miscalculations Impacting Revenue

Prescription: Take 1 g Sucralfate suspension q6h x14 days then take 1 g q12h to prevent ulcer recurrence

Qty: QS 30 days — Refills: 5



What went wrong

The prescription is written for a higher initial dose, intended to treat an existing duodenal ulcer, and then for lower maintenance dose thereafter to prevent the ulcer from recurring. The patient's part D plan maintained an audit and determined that the calculated volume was incorrect, and therefore they were billed incorrectly. As a result, the plan recouped the total amount paid to the pharmacy for all six fills. Over the six-month period, the pharmacy dispensed a total of 7,200 mL or roughly 15 pints.

With a listed Average Wholesale Price (AWP) of \$251 per 14 oz bottle, and a reimbursement rate of AWP – 18% + \$1.60 dispensing fee, the total revenue loss to the pharmacy is \$3,451.89.

Tools to calculate correctly

There are three different ways to accurately calculate dosages, providing technicians and those training them more tools to be successfully.

$\frac{A}{B} \times X$ <p>Desired over have</p>	$\frac{A}{B} \times \frac{Y}{X}$ <p>Dimensional analysis</p>	$\frac{A}{B} = \frac{X}{Y}$ <p>Ratio/proportion</p>
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As you consider how you train your current and future technicians to be reliably accurate, it's critical to address any anxiety that exists around math. Building confidence is key and providing multiple tools to validate knowledge and math skills will lead to improvements in performance.

PharmaSeer Math™

A digital learning resource for mastering calculations used in pharmacy practice

Learn more at <https://info.nhanow.com/pharmaseermath>

¹<https://www.nap.edu/catalog/11623/preventing-medication-errors>
²<https://www.ncbi.nlm.nih.gov/pubmed/30085607>
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