

The Effect of Drug Concentration Expression on Epinephrine Dosing Errors

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The full report is titled “The Effect of Drug Concentration Expression on Epinephrine Dosing Errors. A Randomized Trial.” It is in the 1 January 2008 issue of *Annals of Internal Medicine* (volume 148, pages 11-14). The authors are D.W. Wheeler, J.J. Carter, L.J. Murray, B.A. Degnan, C.P. Dunling, R. Salvador, D.K. Menon, and A.K. Gupta.

What is the problem and what is known about it so far?

Epinephrine (adrenaline) is sometimes the best treatment for life-threatening allergies. The drug is stored in salt water in glass ampules, which are broken open when the drug is needed. The amount of epinephrine contained in the ampule label is usually expressed as both a dose (1 mg of the drug per 1 mL of salt water) and a ratio (1 part drug for every 1000 parts of salt water). Doctors understand doses much better than ratios. A ratio requires doing arithmetic to figure out how much drug to give. Dose errors with epinephrine are common. Having to do arithmetic to figure out how much epinephrine to give a person in an emergency might lead to those errors and to delays in giving the drug.

Why did the researchers do this particular study?

To see whether expressing the amount of epinephrine as a ratio on ampule labels leads to mistakes and delays in giving the drug.

Who was studied?

28 doctors.

How was the study done?

The researchers programmed a medical mannequin to look like it was having a life-threatening allergic reaction. They gave the doctors ampules of epinephrine and told them to treat the emergency. One half of the doctors was randomly assigned to ampules with labels that had the epinephrine dose. The other half was randomly assigned to ampules with labels that had the amount of epinephrine expressed as a ratio. The researchers then measured the amount of drug the doctors gave and how long it took them to give it.

What did the researchers find?

All but 2 doctors whose ampules with labels that expressed the amount of epinephrine as a ratio overdosed their patients. Because they had to figure out how much drug to give, the doctors using ampules labeled with a ratio also took about 1.5 minutes longer to give it.

What were the limitations of the study?

The researchers simulated an emergency. The findings might be different if the doctors had to treat a real person. In reality, ampule labels have both doses and ratios, not one or the other.

What are the implications of the study?

The use of ratios to express epinephrine concentration may be a source of drug error. Patient safety might be improved by expressing drug concentrations exclusively as doses.

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