

A Medical Error Averted

The article appearing in this month's *International Pediatrics*, "Reducing Medical Errors with PDAs" by Dr. Mark Rosenbloom, reminded me of just how vulnerable little children in particular are to medical errors, and how easy pediatric prescription or administration errors can be. Consider the following story:

Canada's two largest cities, Toronto and Montreal, are separated by about 600km, and connected by a large superhighway that hugs Lake Ontario. A number of beautiful towns lie in between, each with its own distinctive character. In summer, the lakeside towns bustle with tourists. The hotels and motels are fully booked. The cafés and restaurants are crowded. The emergency rooms of the small community hospitals are full of "weekenders" with sprained ankles, sunburns, bee stings and fishhooks snagged accidentally in fingers. During autumn the towns are quiet and the air is chilly. The children are back in school. The tourists are gone, leaving the rugged and friendly folk who make their home there year round.

In one lakeside town, primary care physicians with offices in the community staff the local hospital emergency room. Each takes his or her turn with an ER shift once a week, such that the town always has emergency care. The hospital is small and the ER is tiny, with only four beds and a separate "ambulance" room equipped with a cardiac monitor and crash cart. The nurses' station doubles as a reception desk, adjacent to a small waiting area. In one corner is a desk at which the doctor on duty writes his notes. Above the desk is a shelf with just four books: *The Compendium of Pharmaceutical Specialties* (a large Canadian drug reference book); *the Ontario Schedule of Benefits* (a billing guide for physicians in the province of Ontario); an outdated copy of *Nelson's Pediatrics*; and a copy of *The Washington Manual of Therapeutics*.

One midmorning Saturday, a slow but steady stream of patients came in. The ER was always slow early in the fall mornings. The physician on duty, Dr. Rudy Salloy, had time to finish a hot cup of coffee and the Saturday edition of *The Globe and Mail*. A young woman clutching a toddler came hurriedly to the reception desk. Just a

minute later, June, the young nurse on duty, told Dr. Salloy, "This little girl seems pretty sick. You'd better get over here."

Dr. Salloy wasted no time. The little girl, Amanda, was actually one of his patients, and her mother was delighted to see him. "Dr. Salloy. I'm so glad it's you. She's been like this all night. Roy gave her some cough syrup last night without any luck."

Dr. Salloy had seen Amanda just 2 weeks ago for a checkup visit at which she was perfectly well. That Saturday, however, she looked pale and listless. Her breathing was noisy and interrupted every few seconds with a classic "barking" cough. Stridor was audible throughout her lung fields.

"Cathy, your daughter's got croup. It's bad enough that I believe we should treat her with a medicine called epinephrine."

"Whatever you think is best doctor."

Dr. Salloy enjoyed a reputation as an outstanding physician and an integral part of the community. On occasion, Dr. Salloy's eldest daughter was Amanda's baby-sitter.

"June, we've got racemic epi for the nebulizer, right?"

"Sure do Dr. Salloy. How much would you like to give? She weighs 10.3kg."

"Geez...it's been awhile.. Let me think."

Dr. Salloy took a moment to perform a quick calculation in his head.

"Let's give her 5 ml of the solution."

As June rushed to get the requested amount of racemic epinephrine, Dr. Salloy began doubting his calculation. Did he actually have the right dose? Was his calculation correct?

Fortunately, Dr. Salloy had on hand a personal digital assistant (PDA), equipped with the latest in medical software. Dr. Salloy used the PDA to consult a drug reference program on his handheld computer and confirmed that the dose of racemic epinephrine he had in mind, 0.05mL/kg body weight of 2.25% solution, was indeed correct. He realized his mistake in an accompanying calculator program designed for calculating pediatric dosages based on weight. Amanda,

based on her weight, should have received 0.5mL of racemic epinephrine, not 5mL.

“June. I was wrong. Draw up 0.5mL, not 5.”

This story is pure fiction but it illustrates a few key points. First a serious medical error was almost certainly averted. The proficiency of physicians in calculating dosages is variable. Large errors in the dosing of medication for children of a ten-fold or greater magnitude are common and epinephrine is among the medications most often incorrectly dosed.¹ Large doses of racemic epinephrine to children can have very serious consequences including myocardial infarction.²

On duty emergency room physicians must typically make do with limited information resources. The available selection of hardcopy reference texts is often small, awkward to use and outdated. While larger hospitals and health systems have access to resources which have been shown to reduce medical errors³ such as electronic reference information and computerized physician order entry (CPOE), most physicians are not so lucky.

Handheld computers are portable, easy-to-use and can store enough useful information and tools to make practicing medicine a lot easier. The number of applications for handheld computers continues to grow. Unlike other information technology applications, becoming proficient with handheld computers is a realistic goal for all physicians.⁴

While many have called for a systems-based approach to preventing medical errors and the use of technologies such as CPOE, adoption of these technologies has been slow. In 2001, fewer than 5% of US hospitals were using CPOE.⁵ An inexpensive handheld computer is a useful alternative. Physicians who use drug reference programs

on handheld computers are confident that they help reduce their own prescribing errors.⁶

All physicians have a responsibility to reduce their own medical errors. All of us also have the means to purchase, carry and use a handheld computer. Doing so would be a wise choice for us and our patients.

References

1. Kozer E, Scolnik D, Keays T, Shi K, Luk T, Koren G. Large errors in the dosing of medications for children. *N Engl J Med.* 2002;346(15):1175-6.
2. Butte MJ, Nguyen BX, Hutchison TJ, Wiggins JW, Ziegler JW. Pediatric myocardial infarction after racemic epinephrine administration. *Pediatrics.* 1999;104(1):e9.
3. Bates DW, Teich J, Lee J, et al. The impact of computerized physician order entry on medication error prevention. *J Am Med Inform Assoc.* 1999;6:313-21.
4. Rao G. Introduction of handheld computing to a family practice residency program. *J Am Board Fam Pract.* 2002;15(2):118-22.
5. Kaushal R, Barker KN, Bates DW. How can information technology improve patient safety and reduce medication errors in children's health care? *Arch Pediatr Adolesc Med.* 2001;155:1002-7.
6. Rothschild JM, Lee TH, Bae T, Bates DW. Clinician use of a palmtop drug reference guide. *J Am Med Inform Assoc.* 2002;9(3):223-9.

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