



## Out with teaspoons, in with metric units

### Pediatricians urged to prescribe liquid medications in mLs only

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Pediatricians are encouraged to help prevent unintentional medication overdoses by eliminating the practice of prescribing medications with volumes in teaspoons and tablespoons. Instead, metric-based dosing using milliliters (mLs) for all liquid medicine prescriptions is preferred.

This is one recommendation from the Prevention of Overdoses & Treatment Errors in Children Taskforce (PROTECT) Initiative ([www.cdc.gov/MedicationSafety/protect/protect\\_Initiative.html](http://www.cdc.gov/MedicationSafety/protect/protect_Initiative.html)), a collaboration of public health agencies, private sector companies, professional organizations, consumer/patient advocates and academic experts. The PROTECT Initiative was launched in 2008 by the Centers for Disease Control and Prevention to develop strategies to prevent unintentional medication overdoses, which send more than 70,000 children to emergency departments each year (Schillie SF, et al. *Am J Prev Med.* 2009;37:181-187).

Several strategies from the PROTECT Initiative already are moving forward, including industry-led efforts to improve child-resistant packaging and the Up and Away and Out of Sight educational program to promote safe storage of medication ([www.upandaway.org/](http://www.upandaway.org/)). These two interventions are designed primarily to prevent unsupervised pediatric ingestions.

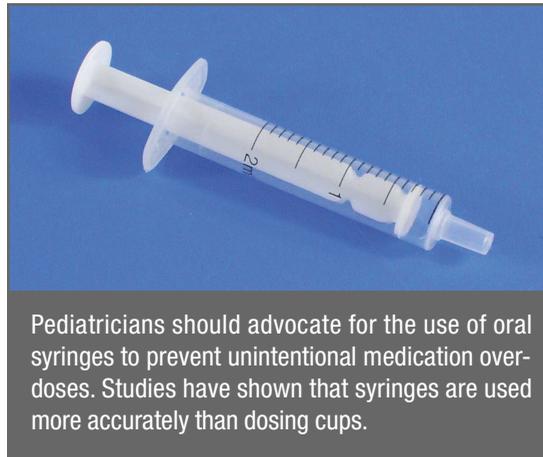
Unintentional medication overdoses also occur when caregivers mistakenly administer the wrong dose of a drug or administer it too frequently. Thus, a third goal of the PROTECT Initiative is to clarify dosing measures on medication packaging and labeling, particularly liquid medications, to reduce administration errors by caregivers.

Until recently, there was no standard guidance for labels, packaging and dosing devices for orally administered, liquid medications. In May 2011, the Food and Drug Administration (FDA) finalized voluntary guidance to industry to address this issue.

A recent study showed that prior to the guidance release, commonly used over-the-counter pediatric liquid medications contained highly variable and inconsistent dosing directions and measuring devices (Yin HS, et al. *JAMA.* 2010;304:2595-2602). Discrepancies between volumetric dosing on labels and dosing devices (e.g., metric dosing in mL on one and alternative terms such as teaspoon on the other) were cited as a source of confusion. Abbreviations for these units of measure also were inconsistent (e.g., mL, ml, ML, cc for milliliter).

While the FDA and industry continue to address problems related to medication labeling and packaging, pediatric health care providers have an important role to play by adopting mL-based dosing when prescribing liquid medications.

In testimony presented during the May 2011 joint meeting of the



Pediatricians should advocate for the use of oral syringes to prevent unintentional medication overdoses. Studies have shown that syringes are used more accurately than dosing cups.

FDA Nonprescription Drugs Advisory Committee and Pediatric Advisory Committee, the Academy acknowledged that “Dosages should be in metric units and should not use teaspoon or tablespoon measures.” Notably, the Institute for Safe Medication Practices, U.S. Pharmacopeia, The Joint Commission and the American Society of Health-System Pharmacists have issued statements in support of metric dosing, a practice some electronic prescribing systems also

are encouraging. Fostered by the PROTECT Initiative, organizations such as the American Association of Poison Control Centers, Academic Pediatric Association, American Academy of Family Physicians and Consumer Healthcare Products Association have followed suit.

While some practitioners may fear that mL-only dosing practices will increase confusion and errors by caregivers, experience from abroad suggests that minimal education of the public is needed to ensure safety (McQueen MJ. *JAMA.* 1986;256:3001-3002). Furthermore, it is probable that most pediatric providers have some experience dosing in milliliters, in particular for small volumes of concentrated infant medications (e.g., ranitidine syrup, 15 mg/mL).

The Academy’s testimony before the FDA echoed a policy statement by the AAP Committee on Drugs from a generation ago. In the 1975 statement titled *Inaccuracies in Administering Liquid Medication*, the committee detailed that inconsistent volumes are administered when medications are dosed using teaspoons, particularly when household spoons are the dose delivery device (Yaffe SJ, et al. *Pediatrics.* 1975;56:327-328). Astutely, the policy statement suggested that oral syringes be used to deliver more precise volumes; recent studies have demonstrated that syringes are used more accurately than dosing cups (Sobhani P, et al. *Ann Pharmacother.* 2008;42:46-52).

Unfortunately, household spoons are still commonly used to administer liquid medications. Therefore, pediatricians should cease prescribing liquid medications to children using teaspoon or tablespoon volumes and advocate for the use of oral syringes.



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