Inaccuracies in Administering Liquid Medication

Although pediatricians usually take great care in accurately calculating medication for their patients, the important processes of measuring and administering the dose are often overlooked. Many of the problems encountered in the administration of tablets and capsules to small children have been overcome by the production of medications in liquid form. However, the advantage gained in the administration of liquid products is often lost because of the inaccuracy of the devices used to measure and administer them.

Liquid doses may be inaccurate for several reasons. The measuring devices commonly used today include household spoons, cups, and specific devices provided by pharmaceutical manufacturers to be used with their products. Teaspoons are particularly poor measuring and administering devices. The measured capacity of the teaspoon has been shown to be within the range of 2.5 to 7.8 ml. In addition, teaspoons are a poor delivery device because they tip easily. Furthermore, the same spoon, when used by different persons, may deliver from 3 to 7 ml. Such variations may be related to factors such as pouring the liquids from different-sized bottles, the color of the liquids, and the adequacy of available light. Perhaps the most important factor in measurement is related to the care practiced by the person doing the measuring.

Although the American Pharmaceutical Association (in 1902) and the American Medical Association (in 1903) defined the “standard teaspoonful” as 5 ml, this recommendation has not been universally adopted. The practice of some pharmaceutical manufacturers of establishing doses in 4-ml and other fractions of a “teaspoon” tends to confuse the prescribing physician when it comes to instructing patients. What terms should he use? Should he use “teaspoonful” or should he write “4 cc” on the prescription when instructing the parent on how much to give the patient?

The advent of plastic, paper, and glass measuring cups has provided no significant increase in accuracy. These cups (devices) have been designed for inexpensive, rapid production and not for uniformity and accuracy. Hence, irregular capacities are commonplace.

Some pharmaceutical manufacturers provide other devices suitable for measuring and administering their products. These devices include calibrated droppers, molded plastic cylinders, and measuring-caps. There may be limits to the accuracy of these devices because they are mass-produced. Furthermore, these devices are designed for use only with a particular product and do not guarantee delivery of the entire measured dose if another product is used. When using a device for measurement and administration of a drug, care must be taken to measure accurately and to deliver the measured dose completely.

Perhaps one of the more novel and useful innovations in the area of measurement and administration of drugs to children is the use of the oral syringe.* These syringes (both glass and plastic) are constructed in such a manner that...
they will not accept a needle, and are available in a variety of sizes to guarantee more accurate measurement. Their tips are designed to resist breaking off in the child's mouth, and the plunger assembly of the syringe allows total expression of the measured dose. A number of hospitals incorporate these syringes into their institutional distribution systems; however, their availability for home use is limited.

RECOMMENDATION

The inaccuracies in administering liquid medication have been brought to the attention of the Food and Drug Administration and the American Pharmaceutical Association.

The Committee on Drugs recommends that all physicians advise their community pharmacies to obtain and stock appropriate liquid administration devices, and insist on the use of such devices when prescribing liquid medications.

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REFERENCES
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