Accuracy of Paediatric Oral Liquid Measuring Devices in Libya: Comparison of Dosing Cups Oral Dosing Spoons and syringe.

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Abstract

Background: Our goal was to examine the following issues relevant to the use of liquid medications: (1) which liquid medication dosing devices are commonly owned and used;
(2) the ability of potential patients to accurately measure liquids using different dosing devices; (3) their ability to correctly understand a variety of dosing instructions; and
(4) their ability to correctly understand a pediatric dosing chart.

Methods: Two hundred volunteer's women were interviewed. Participants were shown
3 types of liquid dosing devices (kitchen spoons, syringe ,dosing cup) and were asked which they had in their homes and which they had ever used. The participants were tested and scored on their ability to measure liquid medicines and interpret dosing instructions accurately.

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Results: A total of 125 subjects completed the study. Participants more commonly reported use of dosing cups (20%), and teaspoons (50 %), tablespoon (20%), and hypodermic syringe(10%), A household teaspoon was the device most frequently used for measuring liquid medication. Women and participants with more education had higher total performance scores. Common errors included misunderstanding instructions, confusing teaspoons and dessertspoon on a medicine cup, also some of them though that half of tablespoon is equal to teaspoon full, some of them though a full cup is one dose and misreading a dosage chart when weight and age were discordant.

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Conclusions: spoons were the unacceptable devices in the home for measuring liquid medications. Subjects were more likely to measure an unacceptable dose with spoons when compared with a dosing cup. However, a large proportion of study participants were unable to measure an accurate dose with either device. They should encourage the use of more accurate devices, particularly the oral dosing spoons Community pharmacists should educate caregivers on the selection and proper use of measuring devices to improve the accuracy of medication administration in the home

Key Words: Measuring devices; Medication administration; Medication errors,

Parent education; Paediatrics

Oral Liquid Measuring Devices

Abstract

Introduction

The subject of administration errors associated with measuring devices is not a new issue. In 1975, Mattar et al.[5] found that when liquid antibiotics or oral decongestants were not dispensed with a measuring device, 75% of parents used a household teaspoon or kitchen measuring spoon to administer the medication to their children. A 1992 report from the American Association of Poison Control Centres found that liquid drug dosing errors were commonly caused by teaspoon/ tablespoon confuses option that the entire dosing cup (eg, filled to capacity) was the recommended dose.[6] Furthermore, the measured capacity of a household teaspoon is highly variable, ranging from 1.5 mL to 9 mL, which may lead to inaccuracies in administering liquid medications.[5,7] Potentially more accurate measuring devices include oral syringes, medication cups, cylindrical spoons, and droppers, when used appropriately.

Few studies evaluating techniques to prevent medication errors associated with liquid measuring devices have been conducted with consumers,[12-15] and further efforts to identify effective strategies to improve the accuracy of oral liquid medication administration in the home setting are warranted.

Our study objectives were to evaluate the skill of participants with oral liquid measuring devices, compare the accuracy of an oral use of hypodermic syringe and dosing cup with kitchen spoons and determine their perceptions regarding the accuracy and ease of use of the oral liquid measuring devises .

Methods

Our study was conducted in a women's social association . were obtain subjects with a variety of socioeconomic and different educations . The interview consisted of several parts. Participants were shown the following liquid dosing devices: spoons, medicine cup,and syringes. In addition, they were shown a household teaspoon and a measuring spoons.

(fig1) ,They were asked which of the dosing devices they had in their homes and which they had ever used for dispensing liquid medications.

The participants were divided to 5 grubs each 25 member they were asked to measure a 5 mL (1 teaspoon) dose of Children's panadol (acetaminophen) suspension using the dosing cup provided by the manufacturer, the ,syringe, teaspoon , tablespoon and dessert spoon.

They tested and scored on their ability to measure liquid medicines and interpret dosing instructions accurately. The investigator observed the subjects measuring 3 doses of medicine and noted the accuracy of the measurement the recommended dose is 5ml and the accepted dose is not more than 5.5ml.and not less tan 4.5ml And record the number in .(table1)

We calculated descriptive statistics and frequency distributions for all variables as mean volumes ± SD than the accurate volume of dose 5ml using excel program.

Using kitchen silverware instead of a measuring device that comes with a medicine can result in the wrong dosing -- too much or too little of the medicine. For example, a large kitchen spoon can hold twice as much liquid as a small kitchen spoon. Use the measuring device provided with the medicine instead of kitchen silverware. If your liquid medicine doesn't come with a measuring device, ask for one at the pharmacy. Some of the most common measuring devices include:

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Participants more commonly reported previous use of dosing cups (20%), and teaspoons (50 %), tablespoon (20%), and hypodermic syringe(10%), for measuring oral

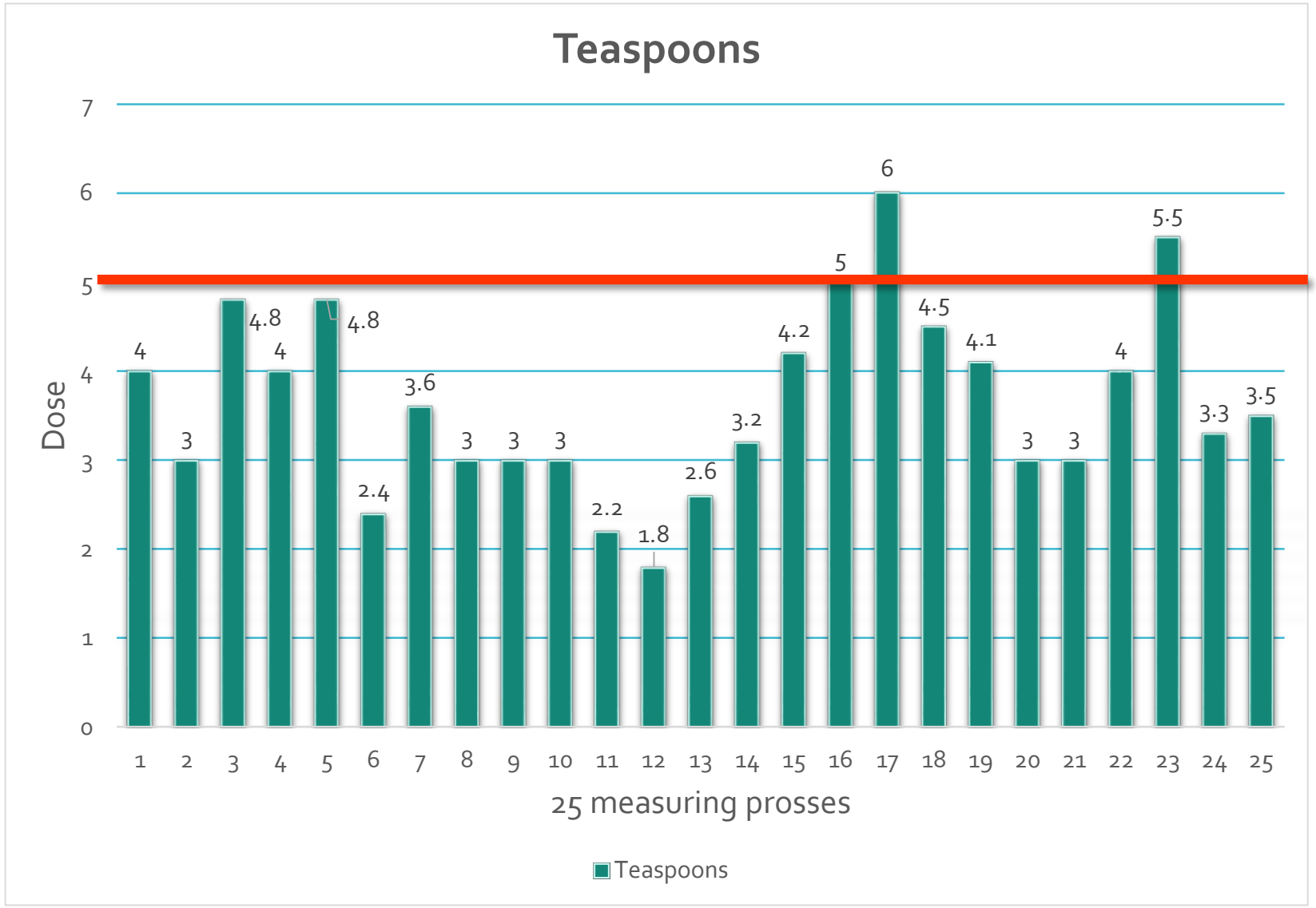
liquids. Before the measurement demonstration exercise, half of participants believed that the household teaspoon would be easier to use when compared with the dosing cup, and half of the subjects believed that the syringe would be easier for use and produce the most accurate results. Our result shown there are significant errors of dose in each of the five devises as shown in the 5diagrams and the mean volumes ± SD measured with the devises was high on the recommended dose 5ml .as shown in the percentage of error diagrams .

Results

Oral Liquid Measuring Devices	Teaspoons 5ml	Dessert spoons 8ml	Tablespoons 15ml	Hypodermic syringe	measuring cup
1	4.0	3.6	8.2	4.5	5
2	3.0	5.4	10	5	5
3	4.8	6.6	14	4.6	4.5
4	4.0	3.6	8	4.5	4.5
5	4.8	5.4	12	5	4.5
6	2.4	5.3	7	4.5	5
7	3.6	4.5	8.7	4.5	5
8	3.0	6.6	6.8	4.4	4
9	3.0	5.0	8.4	5	5
10	3.0	3.6	6.2	4.5	4.5
11	2.2	4.0	13	5	4.5
12	1.8	5.0	14	4.5	4.5
13	2.6	6.0	10	4.5	5
14	3.2	4.5	6.8	4.4	4.5
15	4.2	8.0	9	4.5	5
16	5.0	4.5	13	5	6
17	6.0	4.0	8	5	6.5
18	4.5	6	15	5	5
19	4.1	6	8.6	5	6
20	3.0	4.3	9.5	4.8	5
21	3.0	4.6	8.6	4.5	5
22	4.0	5.6	15	5	5.4
23	5.5	5.3	10	5	5
24	3.3	4.5	8.4	5	5
25	3.5	4.5	9.5	5	6

Teaspoons

Results



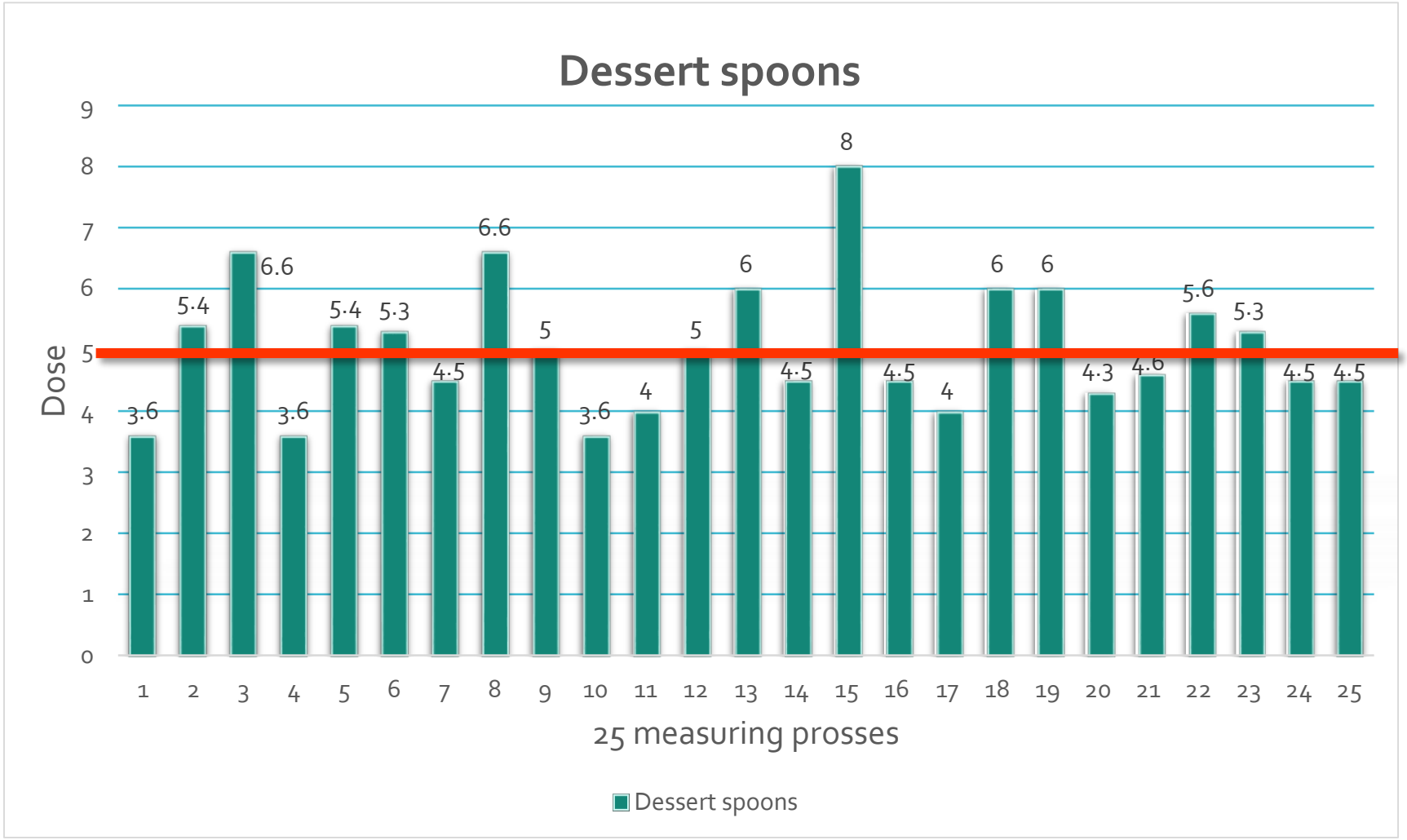
20% Acceptable dose

4% High dose

76% low dose

Dessert spoons 2

Results



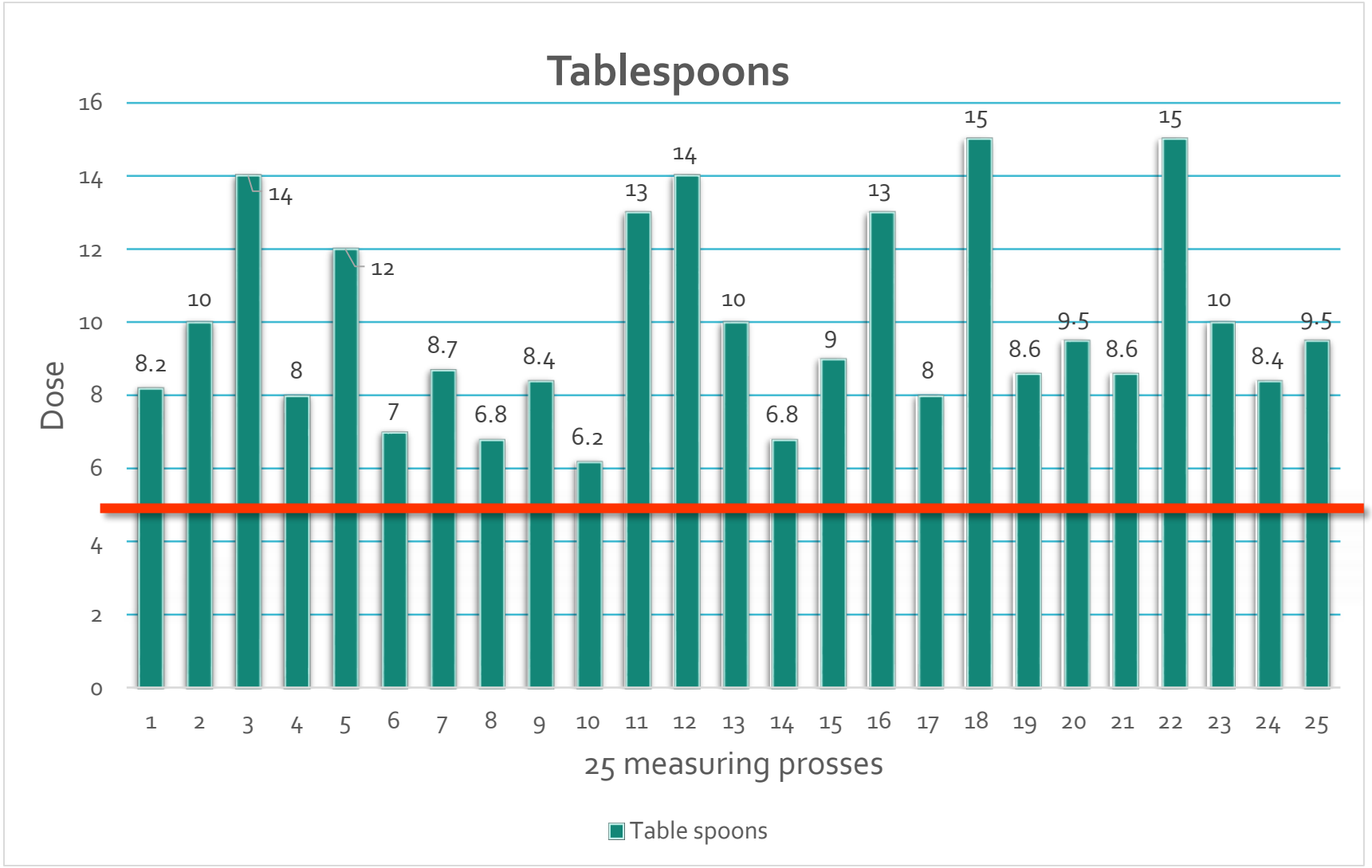
48% Acceptable dose

28% High dose

24% low dose

Tablespoon 3

Results

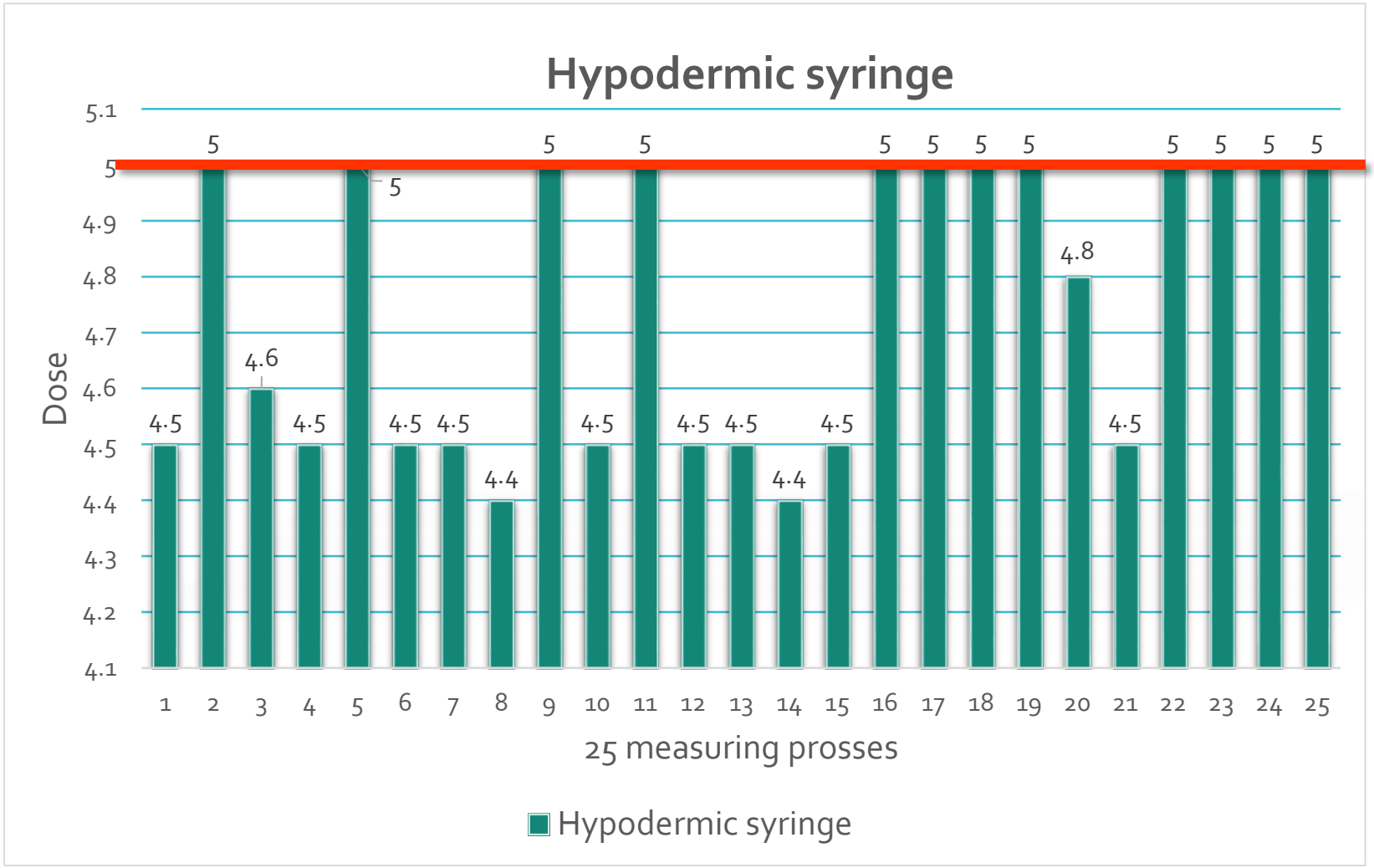


0% Acceptable dose

100% High dose

0% low dose

Results

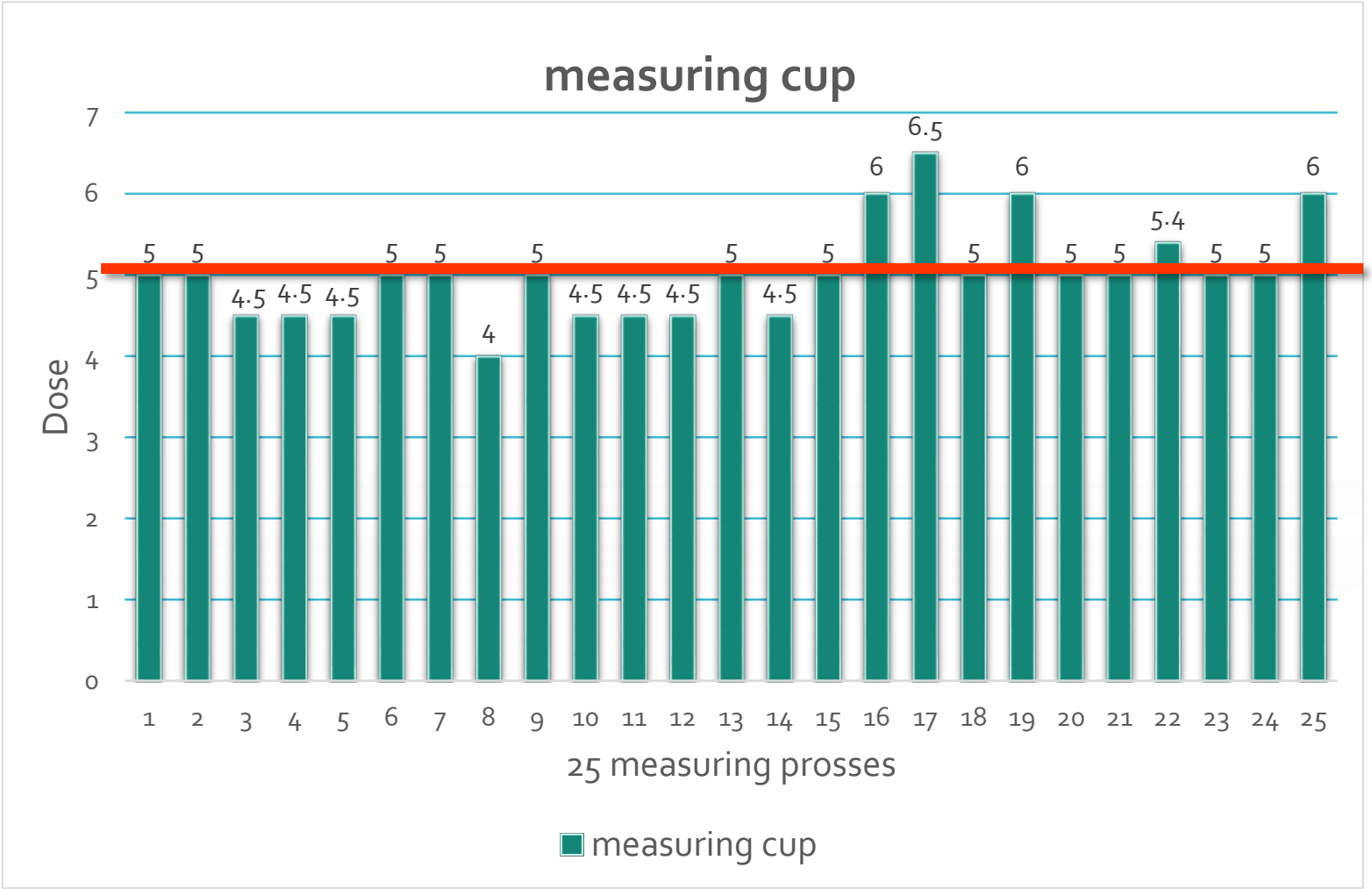


92% Acceptable dose

0% High dose

8% low dose

Results



80% Acceptable dose

16% High dose

4% low dose

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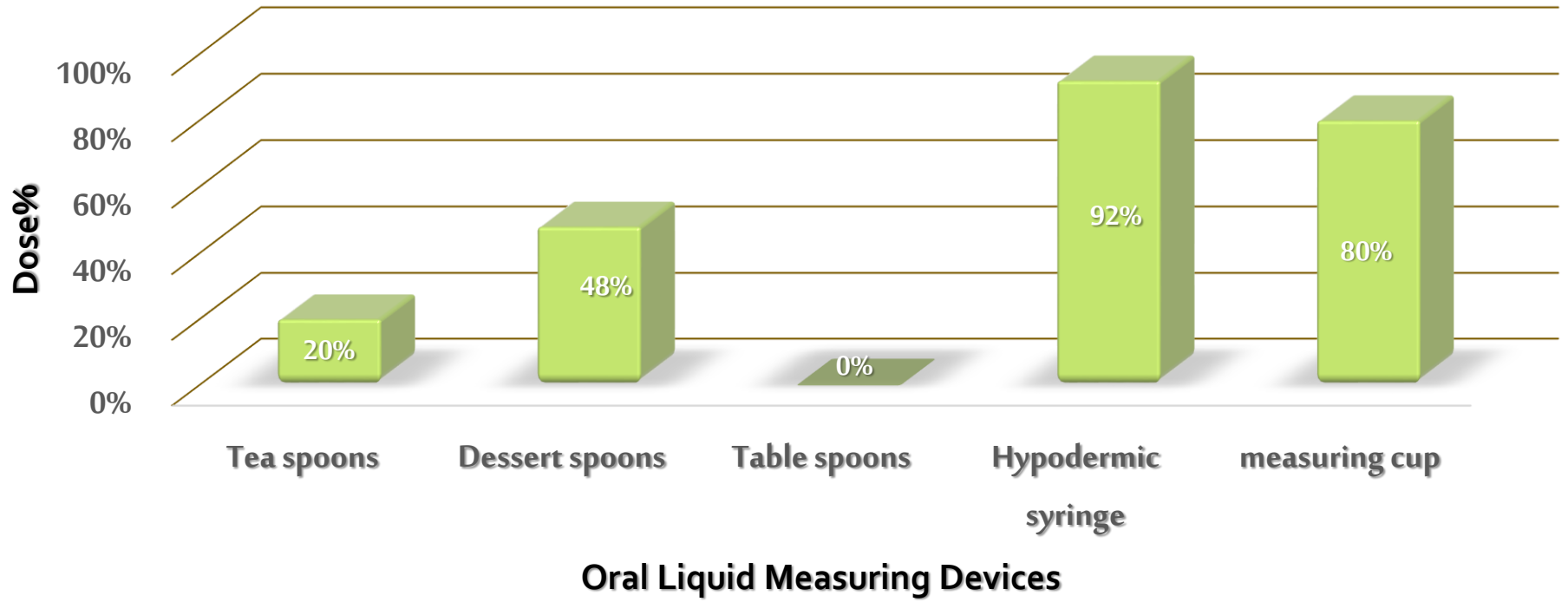
The investigators fined that parents more commonly use dosing cups, and teaspoons when

administering liquid medication to children. The use of more accurate measuring devices might increase the chance that children are given a correct dose. the actual use of the devices, with a majority of subjects during the test revealed that some of the women cannot scored the correct recommended dose (5ml of medicine) the percentages of acceptable dose that measured with each device(fig 1-3) were

(92% hypodermic syringe), (80% measuring cup), (48% dessert spoon),(20% teaspoon) (0% tablespoon) . Although more subjects believed that the teaspoon was easier to use than the syringe, an acceptable dose with the syringe was the higher versus the other dosing devices . There are limited reports evaluating the accuracy of oral liquid measuring devices

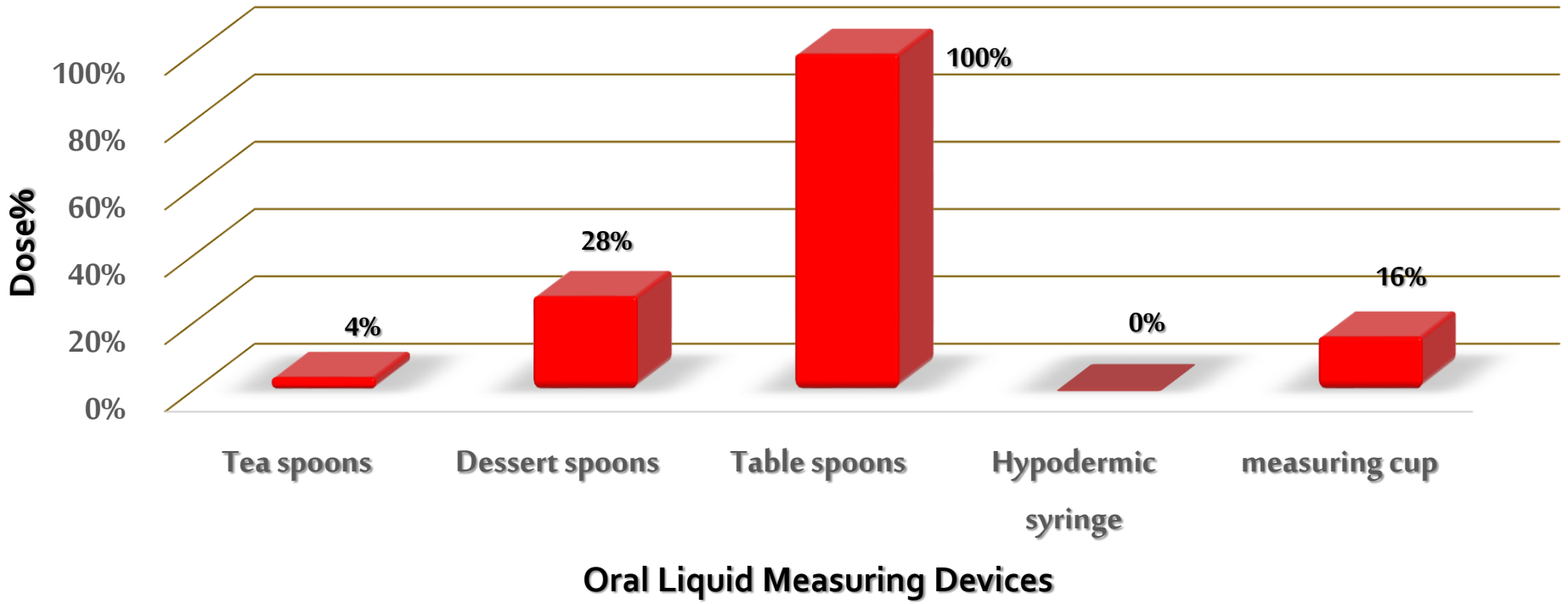
Acceptable dose 1

Oral Liquid Measuring Devices	Teaspoon 5ml	Dessert spoons 8ml	Tablespoons 15ml	Hypodermic syringe	Measuring cup
Acceptable dose	20%	48%	0%	92%	80%



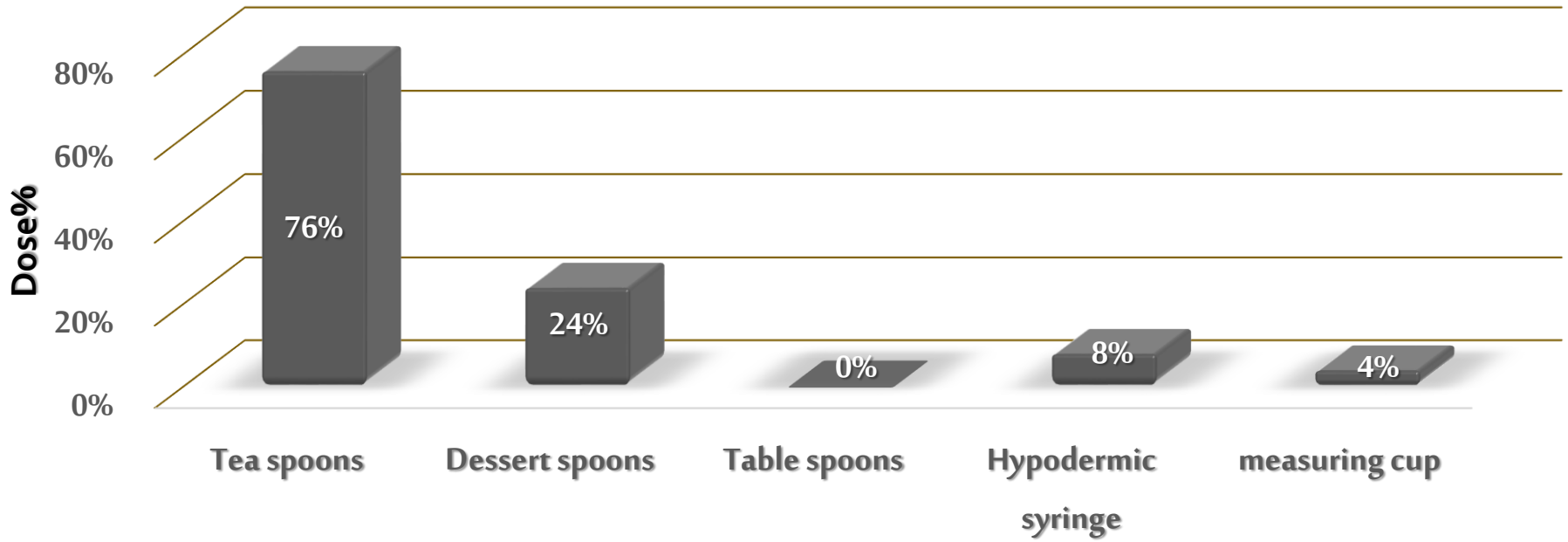
Discussion

Oral Liquid Measuring Devices	Teaspoon 5ml	Dessert spoon 8ml	Tablespoon 15ml	Hypodermic syringe	Measuring cup
High dose	4%	28%	100%	0%	16%



Discussion

Oral Liquid Measuring Devices	Teaspoon 5ml	Dessert spoon 8ml	Tablespoon 15ml	Hypodermic syringe	Measuring cup
Low dose	76%	24%	0%	8%	4%



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In our survey, women more commonly reported use of teaspoon and dosing cups to measure oral liquid medications in the home. Study subjects were more likely to measure an acceptable dose with the syringe compared with the Panadol dosing cup. However, a large proportion of the participants were unable to measure an acceptable dose with either device. In general, participants measured more than the recommended dose when using the dosing

cup and the tablespoon and less than the recommended dose with the teaspoon

The educated women can understand the dosing chart, community

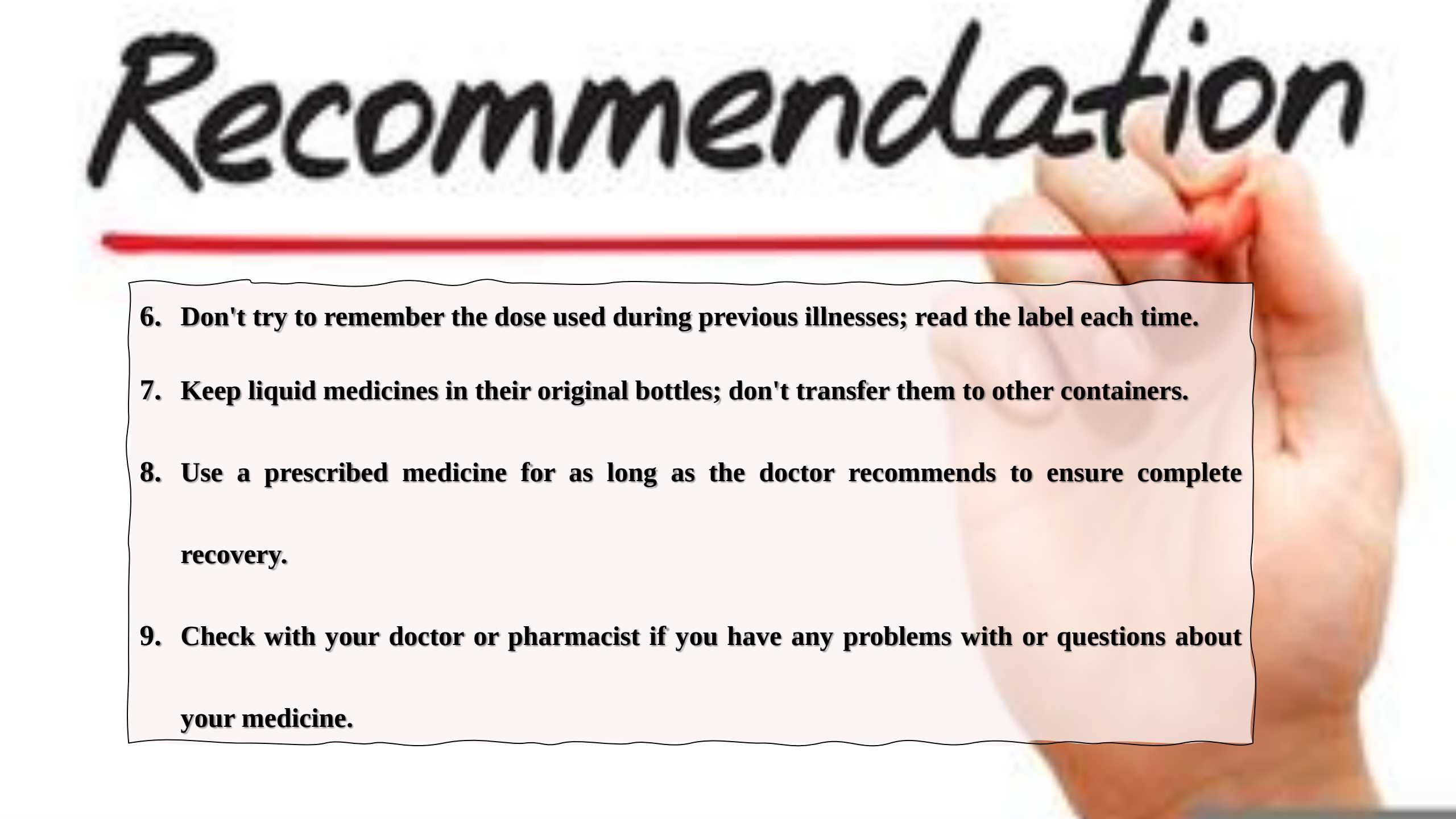
pharmacists should educate parents on the proper use of good

measuring devices .

Recommendation

1. **Use child-resistant caps, and do not leave medicine uncapped.**
2. **Store medicine as directed and in a safe place out of reach of children.**
3. **Don't give medicine to children unless it is recommended for them on the label or by a doctor.**
4. **Don't take drugs prescribed for someone else or give yours to someone else.**
5. **Don't use medicine for purposes not mentioned on the container or in package directions, unless so directed by a doctor.**

Recommendation



6. **Don't try to remember the dose used during previous illnesses; read the label each time.**
7. **Keep liquid medicines in their original bottles; don't transfer them to other containers.**
8. **Use a prescribed medicine for as long as the doctor recommends to ensure complete recovery.**
9. **Check with your doctor or pharmacist if you have any problems with or questions about your medicine.**


Thank you


THANK YOU