Maternal Practices in Administering Oral Medications for Their Young Children with Common Illnesses

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Abstract: Administration of pediatric medications encompasses a complex maternal task. Mothers are usually the primary caregiver for children throughout childhood. They are intimately involved in the delivery of medications and completing the treatment course to their children at home. In addition, they face many challenges as they seek to administer medications to their children in a safe and effective manner. A convenient sample of 200 mothers from Out-patients department of Children University Hospital at El–shatby and El Raml Children's Hospital in Alexandria who full-filled the following criteria: having children under five years who complained of one or more of the common illnesses including: cough, diarrhea, throat problems and fever as well as receiving oral medications. Moreover, mothers were responsible for administering oral medications to their children were included in the study. Data was collected through "Maternal Oral Medication Administration Structured Interview Schedule". Results of the present study revealed that the majority of mothers had poor practices regarding oral medication administration to their young children. Medication administration errors (MAEs) are evident problems among mothers. The most profound errors were in compliance with the prescribed time regimen and measuring the accurate dose. Additionally, self- medication is also one of the common maternal errors. Medication administration errors (MAEs) were also noticed in the administration of antipyretics followed by cough drugs and antibiotics. However, the higher good maternal scores were obtained in ORS administration.
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1. Introduction

A medication is any substance, solid, liquid or vapor, which may be administered to the child either externally or internally to prevent illness, relieve symptoms, control or cure health problems.[1,2] As with adults, safety and effectiveness are required when administering medications to children. However, the need for safety in children takes on greater importance due to physiologic, psychological, and cognitive differences.[3]

Physiological differences between children and adults make children more sensitive to drugs with increasing risk to adverse drug reactions. Physiological differences include anatomical and functional immaturity of various organ systems such as cardiovascular, gastrointestinal, renal, and neurological system in addition to, differences in body size and compositions with particular significance to the variations in the body fluids composition.

The oral route is the most widespread and economical method of administering medications. [4] Oral medications are available in several forms including liquids, sprinkles (powder), tablets, chewable tablets and capsules. Liquid medications encompasses syrups, elixirs, and suspensions.[1, 3, 4]

Children under five years of age are more vulnerable to illness and death. World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) are improving child health through Integrated Management of Childhood Illnesses (IMCI).[5] It focuses on management of common health problems affecting young children. These include acute respiratory infections (mostly pneumonia), diarrhea, measles and malnutrition.[5,6] IMCI refers to cough, diarrhea, throat problems and fever as main features of the common illnesses affecting under-five children. Pediatricians usually prescribe antibiotics, antipyretics, cough and cold medications and anti-diarrheal drugs including oral rehydration solutions (ORS) in the management of these symptoms. [7-9]

Oral drugs are given for a range of reasons, administered in different doses and on different time schedules. However, the way of giving most of oral drugs is similar. So, mothers should be instructed to consider the following: giving the right medication by checking its label, giving the right dose which involves choosing the appropriate measuring device and accurately measuring the prescribed dose and following the appropriate technique of using each device. Administering medication at the right time schedule and completing the prescribed course are also important issues. Other maternal responsibilities are checking the right route through which the medication should be administered and following the right approach which refers to how the mother has to talk to

her child about receiving medications and modifications that could be applied in administration techniques according to child's developmental level. [5, 1, 3)]

Medication administration errors (MAEs) may be the result of faulty maternal practices i.e. when any of the previously mentioned rights gets wrong. Potentially the most serious errors occur when giving the wrong dose which includes overdose, under dose, and missed dose or giving the wrong medication to the child. [10, 11)]Giving the medication incorrectly could also include failure to carry out the accompanying instructions (i.e., with food, on empty stomach …etc). Omission and self medication are other forms MAEs. **Omission** refers to those medications ordered by the physician but are not taken by the patient, while **self medication** includes medications that are taken by the patient but are not prescribed by the physician.[3,12)]

Medication Error Quality Initiative Report (2008) concluded that serious MAEs are classified as follows: dose omission (27.6%), overdose/multiple dose (21.7%), wrong patient (12.0%) and wrong medication (8.4%). [9] In addition, **the American Association of Poison Control Centers (2007)** reported that 7,000 children who are in the care of parents or families, seek emergency help for medication problems yearly.[10] Furthermore, the bulletin of the **World Health Organization (2010)** cited that more than 50% of antibiotics worldwide are purchased without a prescription.[13]

Teaching the family about the prescribed medications is an essential part of the therapy. [5] The pediatric nurse plays a vital role in teaching the family particularly the mother how to give oral drugs to her child. Teaching the mother about medications begins with a thorough assessment that includes a list of all medications the child is currently taking. Any history of allergies to medications should also be noted to avoid any potential drug interactions.[5,14] The mother should be informed about the importance of each prescribed drug, its dose and number of doses that should be given throughout the day in addition to the method of administering it to her child at home. IMCI emphasized that providing demonstration about oral drug dose measurement and allowing the mother to give the first dose to her child under a pediatric nurse's observation are crucial aspects of health teaching.[5] Another important role of pediatric nurse is to educate mothers regarding safe storage of medications at home where mothers should be instructed to carefully collect, count, and package each drug separately in its original container and out of children reach. The expected side effects should also be included in health education provided for mothers about medication administration. If the mother learned how to give a drug correctly, she could treat her child properly with oral drugs at home. In addition educating mothers about administration of medication to their sick children not only makes the job easier, but also gives them a sense of self-management and control. [2-5)]

Aim of the study

The aim of this study is to determine the maternal practices in administering oral medications to their young children with common illnesses.

2. Materials and method

I-Materials

Research design:

A descriptive design was used.

Settings:

This study was conducted at Out-patients department of Children University Hospital at El–shatby and El Raml Children's Hospital in Alexandria, Egypt.

Subjects:

A convenient sample of 200 mothers from the previously mentioned settings who full-filled the following criteria:

1. Having children under five years of age with common illnesses such as cough, diarrhea, throat problems, fever and receiving oral medications.
2. Responsible for administering oral medications to their children

Tool:

Maternal Oral Medication Administration Structured Interview Schedule.

This tool was developed by the researcher after thorough review of literature to assess maternal practices in administering oral medication to their young children with common illnesses.

It consisted of two parts:

Part I:

It included socio-demographic characteristics of the mother such as: maternal age, educational level, occupation, residence, family type and number of children.

Part II:

It included three aspects related to administration of oral medications, namely medication rights (right medication, dose, time and approach), care after medication administration including safe drug storage and maternal practices concerning administration of specific types of oral medications which are used in the management of children's common illnesses.

1. **Medication rights**: it includes items related to:

- ***Right medication*** such as: giving only the prescribed medication, checking that medication is right one every time before giving it to the child by reading its label and presence of history of giving the child wrong medication.
- ***Right dose:*** such as maternal practices in using different measuring devices, mother's practices

when the child vomits the required dose or spit it out, history of giving the child over dose of the drug and action taken.

- ***Right time***: Compliance in giving child's medications in the accurate time**,** maternal practices when forgot to administer the child's medication on time
- ***Right approach***: such as hand washing, child position during administration of oral medication, maternal practices when the child refuses medication, methods used in administration of tablets for children.

2. **Mothers practices after administration of oral medication** such as cleaning the measuring device and recording the child's medication name, dose and time
- **Storage of medication** such as types of oral medications stored for later use, storing medications in their original containers and place of storage.

3. **Maternal practices concerning administration of specific types of oral medications** which are used in the management of children's common illnesses such as antibiotics, antipyretics, cold and cough drugs and oral dehydration solutions.

II- Method

1. Official letters were directed to the responsible authorities of the University Children Hospital at El-Shatby and El Raml Children's Hospital in Alexandria in order to obtain their approval to collect the data and facilitate the research implementation after explaining its purpose.
2. The tool was developed by the researcher, after thorough review of related literature.
3. The tool was submitted to a jury of five experts in pediatric nursing field for content validity. Based on their comments; necessary modifications were done. The validity was 88%.
4. The reliability of the tool was done by measuring the internal consistency of its items using the Cronbach alpha coefficient. The tool was reliable as (r = 0.79)
5. Written informed consent was obtained from mothers who were involved in the study for their participation after explaining the aim of the study and confidentiality was assured.
6. A pilot study was carried out on twenty mothers from the previously mentioned setting to test the feasibility, applicability and clarity of the tool and some modifications were done. This number of mothers was excluded from the study subjects.
7. Every mother was interviewed individually by the researcher to collect the necessary data at the waiting area in the out-patient department after examination of the child and oral medications have been prescribed. The duration of each interview lasted from 15 to 20 minutes.
8. Data were collected over a four months period extending from December 2011 to April 2012.
9. A scoring system was done regarding maternal practices in administering oral medication to their young children with common illnesses as the following:

- Maternal practices in administering oral medication to their young children encompassed nine main categories: right medication (3 items), right dose (8 items), right time (2 items), right approach (5 items), post care(6 items) anti-biotic administration (8 items), fever relievers (antipyretics) (2 items), cough and cold medications (3 items), and oral dehydration solutions(6 items).
- Each item from practices scores is graded as follows; two for correct and complete response, one for correct but incomplete response and zero for incorrect or didn't know response. The mothers` practices were considered accurate according the literatures.

The total score of the maternal practices in administering oral medication to their young children was 86.

Scoring of maternal practices:

Total percent score of practices =Scores obtained from 43 items of practices X 100

43 X 2

N.B

- 43 = total items of practices.
- 2 = highest grade.

- Then the obtained total percent score of maternal practices is transformed into a qualitative manner as follows:

➢ Good = 65% and more.

➢ Fair = 50% to less than 65%.

➢ Poor = less than 50%.

Statistical Analysis:

- After the data collection, data were coded and transferred into specially designed formats so as to be suitable for computer feeding using statistical software SPSS version 16. Following data entry, checking and verification processes were carried out to avoid any errors during data entry.
- Microsoft office Excel software was used to calculate the maternal scores of knowledge and practices .It was also used to construct the needed graphs.
- The statistical analysis was done for the data after its arrangement.

The following statistical measures were used:

- **Descriptive Statistics:**

1. Number and percentage: They were used for describing and summarizing qualitative data.
2. Minimum and maximum were used for describing and summarizing quantitative data.
3. Mean ( ) was used to measure central tendency in statistical tests of significance.
4. Standard deviation (**SD**) is an average of the deviations from the mean. It was used for measuring the degree of variability in a set of scores.

- **Analytical statistics:**

1. Kruskal- Wallis Test ($\mathbf{X^2}$): It is a non parametric test that was used to compare the difference between more than two groups of abnormally distributed quantitative variable.
2. Mann-Whitney Test (**Z**): It is a non parametric test used to compare the difference between two groups of abnormally distributed quantitative variables.
3. The 0.05 level was used as the cut off value for statistical significance (e.g. significant at $P \leq 0.05$).

3. Results

Table (I) clarifies the socio-demographic characteristics of mothers. It was found that more than half of mothers (53.5%) were in the age group of 20 to less than 30 years with a mean age equal 29.1±5.8 years. Regarding mothers` educational level, it was found that illiterate mothers represent 28.5% from the total sample and the same percent represent the secondary /diploma level of education. On the other hand, only 11% of them had university education. Moreover, the highest percent of mothers (84.5%) were housewives. About two thirds of mothers (63%) were residing in urban area while the rest of them (37%) were residing in rural one. Concerning the family type, it was found that nearly half of mothers (44.5%) lived in nuclear families and more than one third of them (36.5%) were living within cluster families. Furthermore, the table illustrates that more than half of mothers (60%) were having one or two children and nearly one third of them (34%) had three or four children.

Table (II) portrays maternal practices concerning right medication. It is obvious that 70% of mothers were administering a medication that was previously prescribed for the child or his siblings. However, only 5% of them were consulting the pediatrician immediately as the child gets ill. The majority of mothers (90%) were checking that the medication is the right one every time before administering them to their children. On the other hand, 20% of mothers had previous history of giving wrong medication to their children.

Maternal practices concerning right dose are illustrated in **table (III)**, it is revealed that the highest percentage of mothers (77.5%) were using medication bottle cap in administering liquid medications to their children. In addition, teaspoons were used by two thirds of mothers (67%). On the other side, nearly two thirds of mothers (65%) were using graduated medication cup and more than half of them (55.5%) were using syringe. Regarding the techniques followed by mothers in using each measuring device, it is found that more than half of mothers who were using teaspoon (53%) reported that they placed it on the tip of child's tongue and the rest of them (47%) were placing it at the middle of child's tongue. Among mothers who were using syringes or medicine droppers it was found that 41.5% of them were placing these measuring devices in the middle of the tongue, while more than one third of them (37.5%) were placing it at the side and posterior of the mouth. Furthermore, the table shows that 61.9% of these mothers were not expelling excess air from the syringe or dropper to assure accurate dose measurement. It is clear from the same table that more than one third of mothers who reported the use of graduated medication cups (36.2%) were pouring the dose in the medicine cup nearly. In contrast, more than half of them (57.7%) were pouring the medication until it reached the ordered amount and only 6.2% of mothers reported that they were placing the cup at eye level in order to measure the dose accurately. In case of child's vomiting or spitting out the medication dose, it was shown that nearly equal percentages of mothers were either giving another dose to the child or didn't take any action (35.5%, 37.5% respectively) and those who were giving another smaller dose to the child constituted 23.5% from the total sample. Nearly half of mothers (43%) had history of giving over-dose to their children and the highest percent of these mothers (73.3 %) didn't take any action in case of such error.

Maternal practices concerning right time are clarified in **Table (IV)** sametable. It is obvious that the majority of mothers (92%) were not compliant in giving the child's medications at the accurate time. Regarding maternal practices in case of forgetting the administration of child's medication on its time, it is illustrated that nearly half of mothers (49%) were omitting the forgotten dose and provided the next dose on its time. While, 40.5% of them were giving the forgotten dose as soon as they remember.

Table (V) portrays approaches followed by mothers in administration of medication to their young children. Regarding hand washing it was found that the highest percentage of mothers (76.5%) were not washing their hands before and after administering medication to their ill children. Concerning child's position during oral medication administration, the

table clarifies that 59.5% of mothers were positioning their children in sitting position and approximately one quarter of them (24.5%) reported the use of semi-sitting position. On the other hand, it was noticed that 16% of mothers were placing their children in lying position when administering oral medications. Regarding maternal approaches if more than one medication were prescribed to the child at the same time, the results revealed that nearly half of mothers (45.6%) were administering all liquid medications at the same time with the same device without rinsing in-between administration. Furthermore, 10% of them were mixing the medications together before administration. On the other hand, mothers who were rinsing the measuring device between administrations of each medication or administering each medication with a separate device were 24.5% and 19.9% respectively. Regarding maternal approaches in administering tablets for their children, it was observed that among the 30% of mothers who had previous experience of giving tablets for their children, nearly half of them (43.3%) were dissolving tablets in water or pleasant tasting liquid and one third of these mothers (33.3%) were crushing tablets before administration and mixing it with child's food, while 23.3% of them were mixing the crushed tablets with water or pleasant tasting liquid. The same table displays maternal approaches used in case of child's refusal of receiving the medication, it illustrated that nearly half of mothers (48%) were pinching the child's nose in order to force him to swallow medications. One third of mothers (33%) were referring to medication as a honey or candy. Restraining and forcing the child to take the medication and punishing him physically were reported by 21% and 19% respectively. However, only 10.5% of mothers were rewarding and praising their children to receive the medication.

Maternal practices concerning medication storage and care after oral medication administration are illustrated in **table (VI)**. The majority of mothers (96%) were storing residual medications for later use. Moreover, it is illustrated that storing medications in their original packages was mentioned by a small percentage of mothers (14.5%). Regarding the place of oral medications storage, it was found that more than half of mothers (57.5%) reported that they were storing oral medications within children reach. In contrast, small percentages of them were storing medications in locked cabinet, high shelf or refrigerator (7.5%, 15% and 20% respectively).Concerning types of stored medications, it is illustrated that almost all mothers (99%) were storing residual antipyretics followed by cough and cold medications (94.3%) and anti-diarrheal drugs (83.3%) for later use. However, mothers who were storing residual antibiotics constituted a small percent (8.3%) from the total sample. In respect to maternal care after medication administration, it is clarified that the majority of mothers (91%) were rinsing the measuring device with water only. While, a small percentage of them (6%) reported that they were using soap and running water and dried it. On the other hand, 3% of mothers were not washing the measuring devices between uses. The table also clarifies that approximately all mothers didn't record (document) the given medications, dose or time.

Maternal practices concerning administration of specific types of medications used in management of common children illnesses are illustrated in **table (VII).** It is clear that approximately half of mothers (45.5%) were completing the full course of antibiotic therapy. Nearly half of mothers (58.5%) were developing time schedule for antibiotic administration and only 39.2% of these mothers, who developed time schedule, were complying with the administration of the antibiotic on its scheduled time until finishing the prescribed course. Concerning antibiotic suspension preparation, it is revealed from the same table that the majority of mothers (85%) were preparing antibiotic suspensions by themselves while the remaining 15% of them were asking the pharmacist to prepare it. the table also shows that approximately three quarters of mothers (73.5%) were adding the sterile water in medication's bottle until it reaches the recommended mark. Moreover, it is shown that the majority of mothers (84%) were shaking antibiotic suspensions before administration. Regarding types of measuring devices used, it is illustrated that half of mothers (49.5%) were using syringe. Nearly two thirds of mothers (64.5%) didn't store suspended antibiotic in the refrigerator in-between use. About three-quarters of mothers (74%) were giving previously prescribed antibiotics in the management of a similar condition without consulting the pediatrician.

Concerning antipyretics administration, it is noticed that the vast majority of mothers (98%) were administering antipyretic drugs without prescription. Only one third of mothers (34.5%) were consulting the pediatrician in case of severe and persistent fever while, nearly half of mothers (44%) were trying another type of antipyretics.

As regard administration of cough and cold medications, it is clear that the majority of mothers (88%) were administering cough and cold medications without pediatrician's prescription and 54.5% of them were administering more than one type. Regarding practices followed by mothers when the child's cough wasn't relieved after the use of the current medication, it was found that more than half of mothers (52%) were discontinuing the current medication and administering another type of cough and cold medications compared to 45% of them who were seeking pediatrician's advice.

Concerning administration of oral rehydration solution (ORS),it was found that 21% of mothers reported that they were dissolving ORS packet in 200 ml water and nearly one quarter of mothers (24%) mentioned that they were using ORS special cup for measuring the accurate amount of water. On the other hand, one third of the mothers (33%) mentioned that that they were dissolving ORS packet in half a cup of water. More than half of mothers (59.5%)were boiling water to prepare ORS while, one third of them (33%) were using tap water for dissolving ORS packet. The table also illustrates that more than half of mothers (59%) were administering ORS slowly in case of child's thirst. However, 41% of them were giving it rapidly. Cup and spoon were used by 43% of mothers and syringes were used by one quarter of them (26%) in ORS administration. Furthermore, 37.5% of mothers reported that they were stopping administration of ORS in case of child's vomiting the administered ORS compared with 46.7%who were continuing its administration but at a slower rate. It was found that 41.5% of mothers were performing faulty practices in case of child's refusal of ORS. Moreover, almost half (51.8%) of these mothers were dissolving ORS packet in small amount (half cup) of water for rapid administration. While, 40.9% of them were adding sugar to ORS in order to be more palatable.

Table (VIII) and **figure (1)** clarify the distribution of mothers according to their percent score of practices concerning medication rights. It is observed that nearly three quarters of mothers (70.5%) obtained good score in administering the right medication to their children with higher mean percent score (83.2±28.2). On the other hand, it is found that the majority of mothers (92%) got poor score in keeping the right time with a low mean percent score (14.9±18.9). Likewise, nearly two thirds of mothers (63.5%) obtained poor score in relation to administering the right dose of medication. As regards approaches followed by mothers in administering medications to their young children, the table illustrates that more than half of mothers (53.5%) got fair score. While, nearly equal percentages of them obtained good and poor scores (22.5% and 24% respectively).

Table (IX) and **figure (2)** clarify the distribution of mothers according to their percent score of practices in administration of specific types of medications used in management of young children with common illnesses. It is observed that more than half of mothers (56.5%) obtained poor score concerning antibiotics administration to their young children. While, only 9.5% of them obtained good score. Regarding maternal score in administration of antipyretics, it is illustrated that the highest percentage of mothers (72.5%) got poor score with lower mean percent score (28.7±20.9) and only 9.5% of them got good score. Similarly, nearly two thirds of mothers (61%) got poor score in administration of cough and cold medications. On the other hand, it is clarified that most of good score was obtained by mothers in the administration of oral rehydration solution, where approximately two thirds of them (65.5%) got good score with higher mean percent score (63.5±16.8)

Maternal total percent score of practices concerning medication administration to their children with common illnesses is clarified in **table (X)** and **figure (3).**It is found that more than two thirds of mothers (68.5%) obtained poor total score of practices and more than one quarter of them (27.5%) obtained fair score, while only a very small percent of mothers (4%) obtained good score.

Table (I): Socio-demographic characteristics of mothers.

Socio-demographic characteristics of mothers	**Mothers (n=200)**	
	No.	**%**
Age (years)		
• Less than 20	5	2.5
• 20-	107	53.5
• 30-	78	39.0
• 40-<50	10	5.0
Min-Max	18-46	
Mean±SD	29.1±5.8	
Level of education		
• Illiterate	57	28.5
• Read and write	11	5.5
• Primary School	17	8.5
• Preparatory School	36	18.0
• Secondary School	57	28.5
• University education	22	11.0
Occupation		
• Housewife	169	84.5
• Working	31	15.5
Residence		
• Rural	74	37.0
• Urban	126	63.0
Family type		
• Nuclear family	89	44.5
• Extended family	38	19.0
• Cluster family	73	36.5
Number of children in family		
• 1-	120	60.0
• 3-	68	34.0
• 5-6	12	6.0
Min-Max	1-5	
Mean±SD	2.4±1.0	

Table (II): Maternal practices concerning right medication

Practices concerning right medication	Mothers (n=200)	
	No.	%
Maternal initial response regarding child's illness (Maternal self medication practices)		
• Try using herbs , warm fluids or any of traditional methods	22	11
• Administer previously prescribed medication	140	70
• Ask the pharmacist advice	28	14
• Consult the pediatrician immediately as the child gets ill	10	5
Checking medication name every time before administration		
• Yes	180	90
• No	20	10
Having history of giving wrong medication to the child		
• Yes	40	20
• No	160	80

Table (III): Maternal practices concerning right dose

Practices concerning right dose	Mothers (n=200)	
	No.	%
# Devices used in measuring and administering medication		
• Medication bottle cap	155	77.5
• Teaspoon	134	67.0
• Graduated medication cup	130	65.0
• Syringe	111	55.5
• Medicine dropper	7	3.5
Technique of using tea spoon [n=134]		
• Place it on tip of the tongue	71	53.0
• Place it at middle of the tongue	63	47.0
Technique of using syringe/medicine dropper [n=118]		
• Place it on tip of the tongue	25	21.2
• Place it at middle of the tongue	49	41.5
• Place it in the side and posterior of the mouth	44	37.3
Expelling excess air when using a syringe or medicine dropper[n=118]		
• Yes	45	38.1
• No	73	61.9
Method of measuring the medication using a graduated cup[n=130]		
• Pour dose nearly	47	36.2
• Pour medication until it reaches the ordered amount	75	57.7
• Measure prescribed dose at eye level	8	6.2
Maternal practices in case of child's vomiting or spitting out the administered dose		
• Give another dose to the child	71	35.5
• Give another smaller dose to the child	47	23.5
• Consult pediatrician or pharmacist	1	0.5
• Increase amount of next dose	6	3.0
• Didn't take any action	75	37.5
Previously administering an over-dose to the child		
• Yes	86	43.0
• No	114	57.0
Actions taken in case of over-dose administration[n= 86]		
• Observe the child for any abnormal manifestation and then take an action	5	5.8
• Omit the following dose	9	10.5
• Consult pharmacist	5	5.8
• Consult pediatrician	4	4.6
• Didn't take any action	63	73.3

[#] **Categories are not mutually exclusive**

Table (IV): Maternal practices concerning right time.

Practices concerning right time	Mothers (n=200)	
	No.	%
Compliant in giving the child's medications at accurate time		
• Yes	16	8.0
• No	184	92.0
Maternal practices in case of forgetting administration of child's medication on time		
• Give medication as soon as they remember	81	40.5
• Provide next dose before its time	14	7.0
• Give forgotten dose with next dose (double-dose/ over-dose)	6	3.0
• Omit forgotten dose and provide next dose on its time	98	49.0
• Consult pediatrician or pharmacist	1	0.5

Table (V): Maternal practices concerning right approach.

Practices concerning right approach	Mothers (n=200)	
	No.	%
Hand washing		
• Yes	47	23.5
• No	153	76.5
Child's position		
• Sitting position	119	59.5
• Lying position	32	16.0
• Semi-sitting	49	24.5
Method of giving the child more than one medication at same time(n=151)		
• Administer all medications with the same device without rinsing	69	45.6
• Mix medications together	15	10.0
• Rinse the device between administration of each medication	37	24.5
• Administer each medication with a separate device	30	19.9
#Methods of administering tablets to the child [n=60]		
• Crush tablet and mix it with water or pleasant tasting liquid.	14	23.3
• Dissolve tablets in water or pleasant tasting liquid.	26	43.3
• Crush tablets and mix it with child's food.	20	33.3
# Maternal practices in case of child's refusal to receive medications administration		
• Refer to medication as a honey or candy	66	33.0
• Pinch child's nose to force the child to swallow medications.	96	48.0
• Restraint and force the child to take medication	42	21.0
• Punish the child physically	38	19.0
• Ask a loved person to administer medications to the child	16	8.0
• Reward and praise the child to take the medication	21	10.5
• Threaten the child if he refuses the medication.	3	1.5

[#] **Categories are not mutually exclusive**

Table (VI): Maternal practices concerning care after medication administration

Practices concerning care after medication administration	Mothers (n=200)	
	No.	%
A. Medication storage:		
Storing the residual medication for later use		
• Yes	192	96

• No	8	4
Store medications in their original packages		
• Yes	29	14.5
• No	171	85.5
Place of storage of child's oral medications		
• In locked cabinet	15	7.5
• On table (Within children reach)	115	57.5
• On high shelf	30	15.0
• In refrigerator	40	20.0
#Types of residual medications that can be stored [n=192]		
• Cough and cold medications	181	94.3
• Antipyretics	190	99.0
• Anti-diarrheal drugs	160	83.3
• Antibiotics	16	8.3
B. Care after oral medication administration:		
Method of cleaning medication device after administration		
• Rinsing it with water only	182	91.0
• Wash it with soap and warm water and allow it to dry	12	6.0
• Didn't wash it	6	3.0
Recording child's medication name, dose and time		
• Yes	1	0.5
• No	199	99.5

[#] **Categories are not mutually exclusive**

Table: (VII) Maternal practices regarding administration of specific types of medications used in management of common children illnesses

Maternal practices	**Mothers (n=200)**	
	No.	**%**
Practices concerning antibiotic administration		
Completing full course of antibiotic regardless child's improvements		
• yes	89	45.5
• No	111	55.5
Developing time schedule for antibiotic administration		
• Yes	117	58.5
• No	83	41.5
Compliance with scheduled time until finishing the prescribed course. [n=117]		
• Yes	46	39.2
• No	71	60.8
Prepare liquid antibiotics suspension		
• Yes	170	85
• ^No	30	15
Method used by the mother in suspension preparation [n=170]		
• Add all the packet of sterile water to the medication particles regardless of the recommended amount	32	18.8
• Add the sterile water until it reaches the recommended amount	125	73.5
• Add tape water to the medication particles	7	4.2
• Add previously boiled water to the medication particles	6	3.5
Shaking the antibiotic bottle each time before administration		
• Yes	168	84
• No	32	16

#Measuring devices used to measure antibiotic doses		
• Syringe	99	49.5
• Graduated medication cup	42	21.0
• Medication bottle cap	48	24.0
• Tea spoon	49	24.5
• Medicine dropper	4	2.0
• Dosing spoon	2	1.0
Storing suspended antibiotics in refrigerator in-between uses.		
• yes	71	35.5
• No	129	64.5
Giving previously prescribed antibiotics used in a similar illness without prescription		
• Yes	148	74
No	52	26
Practices concerning antipyretics administration		
Giving feverish child antipyretics without prescription		
• Yes	196	98.0
• No	4	2.0
#Maternal practices in case of severe and persistent fever		
• Try another type antipyretic	88	44.0
• Increase the dose of the same antipyretic	35	17.5
• Increase the frequency of the same antipyretic	41	20.5
• Consult the pediatrician	69	34.5
• Administer antipyretic injection	8	4.0
Practices concerning cough and cold medications administration		
Giving the child cough and cold medications without prescription		
• Yes	176	88
• No	24	12
Administering more than one type of cough and cold medications (without prescription) (n=176)		
• Yes	96	54.5
• No	80	45.5
# Maternal practices in case of severe and persistent cough		
• Seek pediatrician advice.	90	45.0
• Discontinue the current medication and try another one	104	52.0
• Didn't take any action	6	3.0
Practices concerning ORS administration		
Amount of water used for dissolving ORS packet		
• 200 ml of water	43	21.5
• ORS special cup	48	24.0
• Half cup of water	66	33.0
• Large size cup	9	4.5
• Didn't know	34	17.0
#Type of water used for dissolving ORS packet		
• Previously boiled water	119	59.5
• Mineral water	15	7.5
• Tap water	66	33.0
Speed of administering ORS in case of child's thirst(drinking eagerly)		
• Slowly	118	59.0
• Rapidly	82	41.0
#Methods of ORS administration		
• From the cup directly	42	21.0
	52	26.0

• Using syringe	86	43.0
• Cup and spoon	14	7.0
• Infant's bottle	6	3.0
• Using medicine dropper		
Maternal practices in case of child's vomiting the administered ORS (n=184)		
• Stop administration of ORS	69	37.5
• Continue administration of ORS but at a slower rate	86	46.7
• Continue with the same rate	29	15.8
Perform faulty maternal practices in case of child's refusal of ORS		
• Yes	83	41.5
• No	117	58.5
#Faulty maternal practices in case of child's refusal of ORS (n=83)		
• Dissolve it in an amount of water less than the recommended	43	51.8
• Add sugar	34	40.9
• Stop ORS an didn't any fluids replacement	6	7.3

^ The person who usually prepares suspended liquid antibiotics for mothers was the pharmacist # Categories are not mutually exclusive

Table (VIII): Distribution of mothers according to their percent score of practices concerning medication rights

Practice parameters	Maternal percent score of practices (n=200)				
	Score	No.	%	Min-Max	Mean±SD
Right medication	Good	141	70.5	0.0-100	83.2±28.2
	Fair	4	2.0		
	Poor	55	27.5		
Right time	Good	7	3.5	0.0-100	14.9±18.9
	Fair	9	4.5		
	Poor	184	92.0		
Right dose	Good	16	8.0	7.1-78.6	44.0±15.3
	Fair	57	28.5		
	Poor	127	63.5		
Right approach	Good	45	22.5	20-90	54.8±13.8
	Fair	107	53.5		
	Poor	48	24.0		

Good≥ 65%; Fair≥ 50 %< 65%; Poor<50%

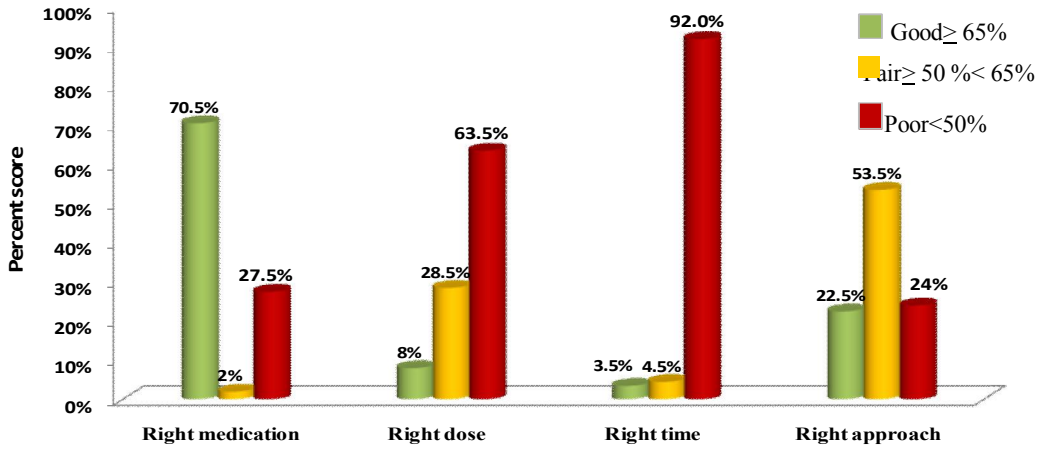

Figure (1): Distribution of mothers according to their percent score of practices concerning medication rights

Table (IX): Distribution of mothers according to their scores of practices concerning administration of specific types of medications used in management of their children's common illnesses.

Practice parameters	Score (%) of mothers (n=200)				
	Score	No.	%	Min-Max	Mean±SD
Administration of antibiotics	Good	19	9.5	7.7-76.9	45.8±15.1
	Fair	68	34.0		
	Poor	113	56.5		
Administration of antipyretics	Good	19	9.5	16.7-83.3	28.7±20.9
	Fair	36	18.0		
	Poor	145	72.5		
Administration of cough medications	Good	33	16.5	0.0-100	31.0±28
	Fair	45	22.5		
	Poor	122	61.0		
Administration of ORS	Good	131	65.5	16.7-100	63.5±16.8
	Fair	36	18.0		
	Poor	33	16.5		

Good≥ 65%; Fair≥ 50 %< 65%; Poor<50%

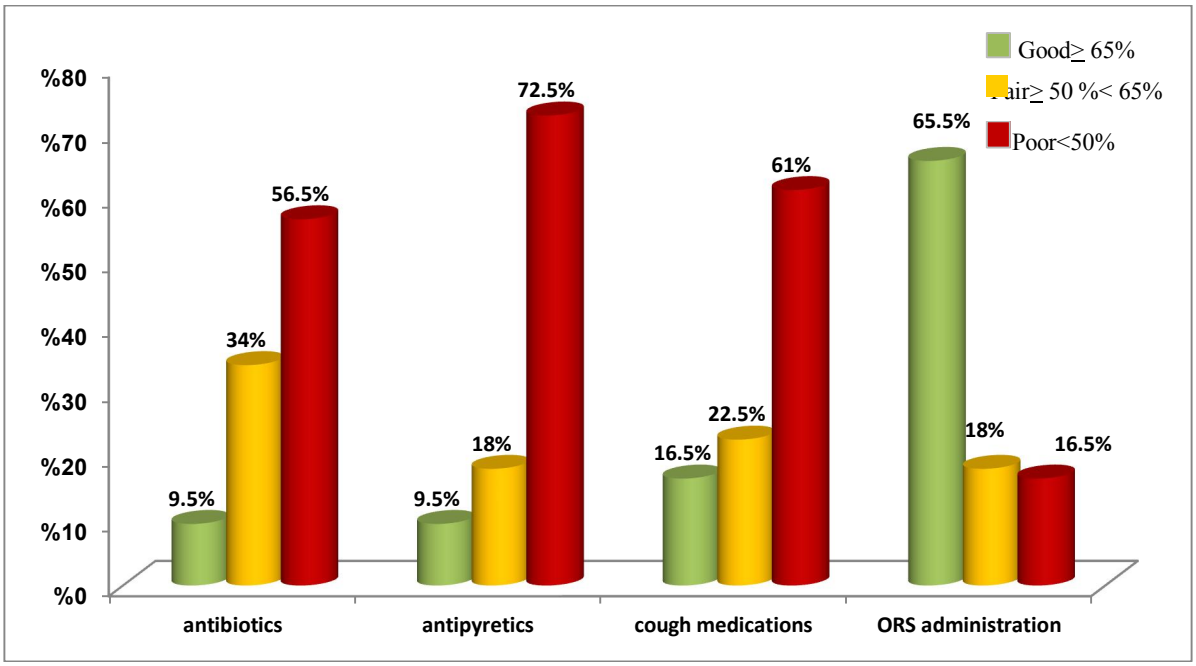

Figure (2): Distribution of mothers according to their scores of practices concerning administration of specific types of medications used in management of their children common illnesses.

Table (X): Maternal total percent score of practices concerning medication administration to their young children with common illnesses.

Practices parameters	Score (%) of mothers (n=200)				
	Score	No.	%	Min-Max	Mean±SD
Total practices score	Good	8	4.0	22.0-72.0	46.6±9.2
	Fair	55	27.5		
	Poor	137	68.5		

Poor<50%; Fair≥ 50 %< 65%; Good≥ 65%

Figure (3): Maternal total percent score of practices concerning medication administration to their young children with common illnesses.

Table (XI): Relationship between total percent score of practices and personal characteristics of mothers

Variables	N	%	Percent score of practices (Mean ±SD)	Significance
Educational level				
• Less than basic level	68	34.0	43.2±9.4	
• Basic education	53	26.5	46.4±7.8	$^{KW}X^2$=12.898
• Secondary education or higher	79	39.5	49.7±8.8	P=0.002*
Occupation				
• Housewife	169	84.5	45.9±8.7	Z=1.39
• Working mother	31	15.5	50.1±10.9	P=0.164
Residence				
• Rural	74	37.0	45.2±9.5	Z=1.327
• Urban	126	63.0	47.4±8.9	P=0.184
Family type				
• Nuclear family	89	44.5	48.8±8.6	
• Extended family	38	19.0	47.4±8.2	$^{KW}X^2$=16.213
• Cluster family	73	36.5	43.4±9.6	P<0.0001*

$^{KW}X^2$=: Kruskal Wallis test; Z: Mann Whitney test; *significant at P≤0.05

Table (XI) illustrates the relationship between maternal total percent score of practices in medication administration and their personal characteristics. A statistically significant difference was observed between mothers' total percent score of practices in medication administration and their educational level (P=0.002), where the highest mean percent score of practices (49.7±8.8) was found among mothers who had secondary or higher education, followed by those who had basic level of education (46.4±7.8), and the least mean score (43.2±9.4) was found among mothers who were illiterate or had lower than basic educational level. As regards family type, the table reflects an obvious significant statistical differences in relation to maternal score of practices in medication administration and their family types (p<0.0001). Mothers who lived in nuclear families had the highest mean percent score (48.8±8.6), followed by mothers who lived in extended families (47.4±8.2), and the least mean score of practices (43.4±9.6) was found among mothers who lived within cluster families.

4. Discussion

Following medication rights is crucial to safely administer medications to young children. Thus, the mother has to make sure that her child will receive the right medication which is prescribed only by the pediatrician and read all instructions and warnings. [15]

It is positive that, more than two thirds of mothers in the current study obtained good score in administering the right medication (Table VIII). Moreover, the minority of them had history of giving

wrong medication to their children. (Table II). This could be attributed to maternal reading abilities where more than two thirds of mothers were able to read the medications name (Table I). In addition to the ability of any mother even illiterate ones to identify medication bottles correctly due to differences in their shapes and label colors.

On the other hand, self-medication is found to be the most apparent error in respect to giving the right medication as illustrated in the present study. The findings of the current study revealed that the majority of mothers were administering previously prescribed medication for the child or his siblings without consulting a pediatrician (Table II). Furthermore, it was found that the highest percentages of *mothers reported administering antipyretics, cough drugs, anti*-diarrheal drugs or antibiotics without prescription (TableVII). Maternal self- medication practices could be explained by four reasons: The first one could be inability of some mothers to visit the pediatrician as soon as their children get ill, this could be due to either financial cause or lack of time. The second reason is maternal experiences with their children's common illnesses and repeated prescription of the same types of drugs in their treatment which made many mothers belief that they are able to use the same medication without pediatrician's prescription. The third reason could be storage and availability of residual medications which were previously used in the management of similar illnesses at home. Lack of regulations regarding medication sale at pharmacies and easy accessibility of medications could be considered the fourth reason for maternal self- medication practices.

These findings are supported by **IMCI Survey on out-patient care in Egypt, WHO (2003)** which displayed that self-medication practices and extensive drugs overuse are the most evident problems of home medication administration to young children in Egypt. [16] Similarly, **Pfaffenbachet al. (2010)**, and **Pereira et al. (2007)** who conducted two studies in Brazil about self-medication in children, and reported high prevalence of self-medication among children. [17, 18] Moreover, **Bolle (2008)** found that younger people showed a significantly higher intention of self-medication and maternal self-initiated treatment. [19, 20] Furthermore, the findings of **Yousif (2002)** and **Jassim (2010)** were in harmony with the results of the current study as they reported high rate of self-medication in Sudan and Iraq. [21, 22]

Measuring the accurate dose is considered a key component in oral medication administration. [23] Measuring oral medications requires the use of measuring devices that ensure that the correct dose is drawn up for administration. [2,23] In this context, the current study highlighted that about two thirds of mothers got poor score in measuring the right dose as clarified in table (VIII). These findings could be related to the highest percentages of mothers were using non-standardized administration devices like medication bottle caps and teaspoons which don't accurately measure the prescribed dose (Table III). The use of mothers for such devices could be attributed to two main causes: the first one is considering these devices as quick and easy methods of administration. The second reason is the unavailability of the appropriate measuring devices with each oral liquid medication. Improper administration techniques in the use of standardized measuring devices (For example: mothers who didn't read the level of medication in a measuring cup at eye level) could be another contributing factor for these findings. This could be explained by lack of health education provided for mothers regarding the use of different measuring devices. These findings were congruent with of **Wolf et al. (2010)** who cited that 50% of parents or more make errors when dosing liquid medications.[24] In addition, the findings of the present study are consistent with **Diane et al. (2000)** who reported that household teaspoon was the device that most frequently used for measuring liquid medication. Moreover; they reported that dosing errors were due to misinterpreting instructions, confusing teaspoons and tablespoons and misreading a dosage. [25, 26]

Giving a wrong dose is considered one of the most serious medication errors in children. [27] **Mendelsohn et al, (2010)** found that approximately most dosing errors were involving overdosing. [28] Additionally, several studies reported that parent's accidental giving children an overdose of medications is the most frequent error observed. [29-33] These results were in harmony with the current study as it is illustrated that a sizable proportion of mothers (43%) reported giving over-dose to their children (Table III). These could be attributed to maternal belief that increasing the drug dose or increasing frequency of administration will speed the rate of child's improvement/ recovery.

Dosing liquid medications correctly can be especially confusing, as mothers may need to understand numerical concepts such as how to convert between different units of measurement. Mothers also must accurately use dosing cups, droppers and syringes, many of which vary in their measurement markings and the volume they hold. **Yin (2012)** concluded that parents with lower math skills are more likely to measure wrong amount.[34] In addition, **Dreyer et al. (2007)** found that parents with a lower reading comprehension had lack of knowledge regarding dosing. [35]These results were found to be in agreement with the findings of the current study as it clarifies that education has positive effect on mothers` practices where mothers with higher educational level

had higher mean percent scores of practices regarding medication administration (Table XI). In contrast, **Moon et al. (1998)** concluded that parental literacy level was not associated with parental ability to understand or follow medical instructions.[36]

Regarding maternal compliance with time regimen, the current study showed that the vast majority of mothers were not compliant in giving child's medications in the accurate time (Table IV). This could be attributed to many factors such as: mothers' underestimation of the importance of giving child's medications at their scheduled time, forgetting to give medication, child`s refusal to receive medication because unpleasant taste, discontinuing a medication due to symptoms improvement, lack of understanding the effect of medication or lack of understanding the given instructions .These results are supported by **Magoon (2002).**[37]

Psycho-social developmental theoryclarified that young children always display negativism in the form of resistance, opposition and refusal to cooperate with requests[5] Therefore, children should be approached in a manner appropriate to their age and experience.

The current study findings revealed that some mothers were following inappropriate approaches when administering medications to their children such as pinching child's nose to force him to swallow medication or restraining the child and punishing him physically or referring to medication as a honey or candy (Table V) These findings could be justified by maternal lack of awareness regarding the way in which mother has to talk to the child about receiving the medication and the adjustments that could be applied in administration techniques and the appropriate explanation method that is suitable to child's developmental level.

Following inappropriate approaches could also be attributed to lack of mother's understating of the consequences and risks of such wrong approaches as aspiration and psychological trauma (i.e. association between taking medication and bad experience). [5,27]

The present study revealed that the majority of mothers were storing the residual medications for later use. (Table VI). This could be attributed to lack of maternal awareness and unavailability of health education regarding safe storage of children's medications. Financial factor could also be another factor for these findings. Similar findings were found in Sudan, Iraq and Tanzania. Additionally, many studies conducted in Spain and European countries also reported high prevalence rates of stored drugs but at lower extents. [38-40]

The present study also reflected that almost all mothers were storing residual antipyretics, cough and cold medications and anti-diarrheal drugs while, small proportion of them were storing residual antibiotics for later use (Table VI). These results are in agreement with **Bolleet al (2008)**. [41] On the other hand, the results of the present study contradicted with **Jassim (2010)** and **Justin et al (2002)** who reportedhigh percentage of leftover antibiotics that were kept for further use. [22,38]

The results of present study also showed that more than half of mothers weren't concerned with storing medication out of their children reach (Table VI). This could be explained by lack of maternal awareness regarding the hazards of inappropriate drug storage (e.g. poisoning). Similar findings were reported by **Yousif (2002) Justin et al (2002)** and **Jassim (2010)**. [21, 38,22,)

The findings of the present study revealed that storing of children's medications in their original packages were mentioned by a minority of mothers (Table VI). These results were contradicted with **Bolleet al (2008)** who reported concern of large proportional of parents on storing children's medication in their original container. [41]

Adherence to the prescribed regimen in antibiotic administration is crucial. This means giving the accurate dose - no more, no less - at the scheduled time for as long as the pediatrician prescribes.[4]The contrary was observed in the present study, where more than half of mothers obtained poor score in antibiotic administration (Table VII). These findings could be attributed to maternal failure to follow the given instructions. In addition to faulty attitudes and beliefs concerning antibiotic administration (e.g. stopping giving antibiotics in case of child's improvement). Similar results were reported by **Parimi et al. (2004)** and **Bagshaw et al. (2001)**. [42, 43]

The findings of current study revealed that only half of mothers were developing time schedule for antibiotic administration and less than half of these motherswere complying with the administration of the antibiotic on its scheduled time until finishing the prescribed course. (Table VII) These findings are in the same line with the findings of **IMCI Survey on out patient care in Egypt (2003) and Winnick et al. (2005)**. [16, 44] On the other hand, the results of the present study are contradicting the findings of **Salazar et al. (2012)** who reported that the majority of parents stated that they completed the course of antibiotics. [45] This discrepancy may be attributed to cultural differences.

It is estimated that more than 50% of antibiotics worldwide are purchased privately without prescription. [13] Several studies reported a considerable parental use of antibiotics without consulting pediatricians, particularly for colds, upper respiratory tract symptoms and sore-throat. [50, 42, 46-48] These findings are parallel to the results of the current study where the majority of mothers were administering the

same antibiotics which were used in a previous similar illness without prescription. (Table VII) Pediatrician's over-prescription of antibiotics for certain illnesses such as sore-throat and diarrhea makes mothers convinced that antibiotics are the drugs of choice that should be used to relieve such illnesses. Moreover, parental fears and worries of serious illness (e.g. rheumatic fever) may also increase the overuse and self- medication of antibiotics. In addition, lack of awareness regarding the usual duration of illness especially viral diseases which requires only simple measures coupled with maternal lack of awareness regarding risks from antibiotic overuse may also considered as other reasons for maternal self medication. The availability of antibiotics products due to inadequate regulations of the distribution and sale of medications could also increases the rate of self medication with antibiotics.

Fever, particularly in children, is associated with parental fear from the presumed harmful effects, irritability, stress and high level of anxiety. [48]For these reasons, antipyretics are misused as caregiver may administer higher than recommended doses or repeated doses at more frequent intervals for reaching normal temperature. These facts were confirmed in the results of the current study where approximately all mothers were self medicating their feverish children with antipyretics. Moreover, nearly half of them were administering more than one type of antipyretics and many mothers were either increasing the dose or frequency of the same antipyretic in case of severe fever. (Table VII). These findings are in accordance with **Crocetti et al (2001)** and**Bilenko et al (2006)**.[50, 51)

Cough and cold medications are considered the most frequent drugs used during early childhood. The results of the current study revealed that the majority of mothers were administering cough and cold medications without pediatrician's prescription and more than half of them were administering more than one type (Table VII). Frequent coughing especially during child's sleepis irritant to the child and upsetting for the mother. Mother's ympathy make her give any type of the available cough medications in order to relieve her child's suffering.These findings are supported by **Ryan et al**. (**2008)**.[52]

Acute diarrhea is a major worldwide problem and it is one of the common illnesses that frequently affect young children. IMCI in collaboration with World Health organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) emphasized that ORS packet which is used in the management of diarrhea in children should be mixed in 200 ml water and given slowly.[53] Fortunately, the present study findings showed that approximately two thirds of mothers obtained good score regarding ORS administration (Table XI) . The study results also reflected awareness of large percentage of mothers with the appropriate amount of water for preparing ORS packet (200 ml or ORS special cup) suitable type of water for dissolving ORS (previously boiled water) and the appropriate speed of administering ORS (slowly) and the appropriate method of its administration (cup & spoon and syringe) (table VII). These results could reflect proper health instructions that were given to mothers by health professionals regarding ORS administration. Maternal adherence to boil water before ORS preparation could be attributed to mothers' belief that drinking water is contaminated (i.e. it might be the source of child's infection). [54]

IMCI instructing mothers, who are rehydrating their children using ORS, to wait about 10 minutes then resume giving ORS but more slowly in case of child's vomiting.[53] This is consistent with the results of the current study where nearly half of mothers reported continuing administration of ORS at a slower rate in case of child vomiting (Table VII).

Rehydration project (2011) highlighted that mothers who are rehydrating their children should add the correct amount of water (i.e. too little water could make the diarrhea worse), add water only and avoid adding ORS to milk, soup, juice or soft drinks or adding sugar.[55]In this regard, the present study revealed faulty maternal practices in case of child's refusal of ORS (adding sugar or dissolving ORS packet in little amount of water for rapid administration). This could be related to lack of mothers' awareness about the risks of such practices (e.g. hypernatremia or severe dehydration). These results are in harmony with **Rasania et al (2005)**.[56]

Unfortunately, the results of the current study clearly reflect poor maternal practices in administration of child's medications(Table X). Poor maternal practices and several errors in administration of child's medications in the present study may be related to lack of knowledge. Lacking of maternal knowledge might be due to illiteracy and lower educational level (Table I). Another contributing factor for maternal poor practices is unavailability of health education provided by pediatric nurses regarding medication rights, techniques, different measuring devices and developmental consideration in medication administration. On the other hand, some mothers might not be concerned with reading the medication leaflet to know the instructions recommended for the prescribed medication. Lack of health educational programs in mass media about medication administration may be another reason. These findings were supported by **IMCI Survey on out patient care in Egypt, WHO (2003) and Walsh et al (2008)** who supported that knowledge gaps and misconceptions contributed to parents' medication errors. [16, 57]

Family type was also found as a significant factor that affects maternal practices in medication administration. The present study revealed that mothers who are living in nuclear families obtained higher scores of practices than those who were living in extended and cluster families (Table XI). These findings could be explained by the facts that mothers who are living in extended and cluster families might gain incorrect knowledge and may be affected by faulty beliefs and attitudes concerning their children's medications. Furthermore, they are usually overloaded with many responsibilities which make them not concerned with the adequacy of the process of medication administration. The presence of many caregivers and large number of children in the same household coupled with low socioeconomic status and limited resources may increase the rate of self-medication and make all children in the family to be shared in the same medications, which are used in managing common illnesses.

On the other hand, mothers who were living in nuclear families always depending on themselves in administering medications to their children where, they are the only responsible person for their children care. So, medication administration errors are minimized. Furthermore, they are usually educated and tended to get knowledge regarding administration of the prescribed medications from health professionals or through reading the medication pamphlets.

The current study aimed to shedding some light on the reality of practices followed by mothers when administering oral medications to their young children and the necessity of improving these practices.

Conclusion

Based on the findings of the present study, it is concluded that the majority of mothers poor practices regarding oral medication administration to their young children.

Medication administration errors (MAEs) are evident problems among mothers. The most profound errors were in compliance with the prescribed time regimen and measuring the accurate dose. Additionally, self- medication is also one of the common maternal errors.

Medication administration errors (MAEs) were also noticed in the administration of antipyretics followed by cough drugs and antibiotics. However, the higher good maternal scores were obtained in ORS administration. Mothers' level of education and family type were the most significant factors which affected their practices.

The main recommendations of this study are:

1. Educational sessions should be provided for the mothers in pediatric hospitals where pediatric nurses should play a vital role in educating mothers regarding medication administration to their children. Such educational sessions should emphasize the following:
   - The purpose, route, dose, frequency, and duration of the prescribed medication.
   - Techniques of using standardized measuring devices such as droppers, oral dosing syringes, dosing spoons and measuring cups.
   - The importance of following medication rights and completing full course of the prescribed medication
   - Hazards of self- medication
   - Safe and appropriate drug storage.
2. Pediatric hospitals should provide mothers with handouts, brochures, pamphlets, or video tapes about medication administration.
3. The Ministry of Health should set regulations to restrict non- prescribed drugs sales from pharmacies especially antibiotics in order to limit self-medication practices.
4. Mass media should raise the awareness of mothers and the entire general public regarding medication administration.

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