

## Evaluation of Nurses Practices Regarding Intravenous Medications Administration at Raparin Pediatric Teaching Hospital /Erbil city

تقويم الممارسات التمريضية لإعطاء الدواء عن طريق الوريد في مستشفى رابرين  
التعليمي للأطفال في مدينة أربيل

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### الخلاصة

**خلفية البحث:** إن الممارسات التمريضية الخاطئة لإعطاء الدواء عن طريق الوريد من أكثر الأخطاء شيوعاً لدى الأطفال الراقدين في المستشفى.

**الهدف:** تهدف الدراسة الى تقويم أخطاء إعطاء المضادات الحيوية عن طريق الوريد من قبل الممرضات للأطفال. **المنهجية:** تم إجراء دراسة وصفية في مستشفى رابرين التعليمي للأطفال في مدينة أربيل لأقليم كردستان العراق في الفترة من ١٧ كانون الثاني لعام ٢٠١٢ ولغاية ١٧ كانون الثاني من عام ٢٠١٣. تم اختيار عينة غرضية مكونة من ٣٥ ممرضة وممرض ممن يعملون في وجبات العمل الثلاثة لمستشفى رابرين، تم ملاحظة كل ممرضة وممرض خلال خمس ممارسات لإعطاء المضادات الحيوية عن طريق الوريد للطفل الراقدين في المستشفى. استخدمت الباحثة إستراتيجية إستراتيجية لغرض جمع المعلومات تتألف من جزأين الجزء الأول: يشمل المعلومات الديموغرافية والجزء الثاني: يشمل إستراتيجية رصد للممرضات أثناء إعطاء المضاد الحيوي عن طريق الوريد للأطفال. تم تحليل نتائج الدراسة باستخدام الوسائل الإحصائية الوصفية والإستنتاجية.

**النتائج:** أعلى نسبة من الممرضات والممرضين لديهم أخطاء في قياس الجرعة الدوائية الغير الصحية، عدم غسل اليدين، عدم تفحص المريض قبل وبعد إعطاء الدواء. وأشارت الدراسة الى وجود دلالة احصائية معنوية بين الخصائص الوظيفية للممرضة والممرض وأخطاء إعطاء المضاد الحيوي عن طريق الوريد.

**الاستنتاج:** أكدت الدراسة بان غالبية الممرضات يمارسن عملية إعطاء المضاد الحيوي عن طريق الوريد بشكل خاطئ من حيث احتساب الجرعة الصحية، التوثيق الصحيح للعملية وعدم غسل اليدين قبل وبعد عملية إعطاء المضاد الحيوي عن طريق الوريد.

**التوصيات:** أوصت الباحثة بإقامة دورات تدريبية للممرضات والممرضين العاملين في مستشفى رابرين للأطفال حول إعطاء الدواء، وكذلك إعداد دليل عملي لإعطاء الدواء. وتهيئة وتوفير غرفة خاصة لتحضير الدواء مزودة بإعلانات وإرشادات كافية لأنعاش معارف وممارسات ممرضات حول الطريقة الصحيحة لتحضير الادوية.

### ABSTRACT:

**Background:** Intravenous medication administration practices errors are the most common errors among hospitalized children.

**Objectives:** to assess intravenous antibiotic medication administration errors by nurses.

**Methodology:** An exploratory study conducted at Raparien pediatric teaching hospital in Erbil City of Iraqi Kurdistan region from December 17<sup>th</sup> 2012 to December 17<sup>th</sup> 2013. A purposive sample consists from 35 nurses working in three shifts of work, each nurse was observed during five procedures of intravenous antibiotic medication administration to hospitalized children. A questionnaire format consist from two parts the first part for socio-demographic data collection and the second part was an observational checklist concerning intravenous antibiotics medication administration procedure used for observing the nurses. The data was analyzed through using descriptive and inferential statistical analysis.

**Results:** The study findings had revealed that the highest percentages of nurse's errors were in the intravenous medication administration phase and most of nurses have errors of; inappropriate medication calculation, not washing hand, not monitoring patient before and after medication administration. There was significant relationship between nurse's characteristics, professional background and intravenous antibiotic medication administration errors.

**Conclusion:** Majority of nurses practice intravenous antibiotic medication administration incorrectly in regarding to right dose and right documentation. Most of nurses weren't washing their hands before and after each procedure.

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**Recommendations:** Researchers recommended establishment of training course for nursing staffs for improving their knowledge and practices that will help avoid medication errors. Having standard guidelines of intravenous medication administration in each unit .Provide medication preparation rooms with adequate guideline as posters in order to revitalize nurse's knowledge regarding appropriate medication preparation.

**Keyword:** Intravenous, administration, evaluation, practice

## **Introduction**

Medication administration practices errors are common in the medication process; ordering, transcription; dispensing; administration; and discharge summaries<sup>(1)</sup>. Medication errors are committed by different health care professionals, errors in the prescribing phase are usually done by the physician, while nurses more often make mistakes during administration<sup>(2)</sup>. An errors something incorrectly done through ignorance, inadvertence or a reported in all countries, particularly in developing countries. Medication errors present a universal problem and can cause serious consequences for patients, especially those with acute complex medical conditions. Little is known about medication errors in Middle Eastern countries<sup>(3)</sup>. Manual writing may complicate the distinction between two drugs with similar names. Many drugs have similar names or drug names may sound similar, leading to confusion, similar drug names are responsible for over one third of medication errors <sup>(4)</sup>.

Medication errors are a well-known problem in hospitals. Studies have shown that medication errors and adverse drug reactions are one of the main causes for adverse events in hospitals leading to disability and death in up to 6.5% of hospital admissions<sup>(5)</sup>. Information on medication errors in pediatrics is scarce; the extent of risk in pediatrics is not well-studied<sup>(6)</sup>.

Medication errors contribute to the morbidity and mortality of hospitalized pediatric patients. In the United States of America, Medication errors have been found to be responsible for 7,000 pediatric patient injuries per year, with a similar incidence and consequences in United Kingdom<sup>(7)</sup>. Intravenous administration medication errors were three times more likely to cause death or harm than any other medication errors <sup>(8)</sup>.

Medication errors are under-reported in all countries, particularly in developing countries. Medication errors present a universal problem and can cause serious consequences for patients, especially those with acute complex medical conditions<sup>(3)</sup>.

Although there are many studies regarding medication errors conducted in the surrounding countries but there was no any previous published study about medication errors among children in Iraq. A meta-analysis carried out in Middle East countries before 2013 and found that there is no any published study in Iraq about medication errors among children <sup>(3)</sup>. On the other hand there is only one a study conducted in Kirkuk city regarding barriers that preventing the nursing staff from reporting medication error <sup>(9)</sup>. For this reason researcher conducted current study.

## **Methodology:**

Descriptive study was conducted in Raparin Pediatric Teaching Hospital (RPTH) which were included Medical, Surgical, Neonatal intensive care and Emergency units) in Erbil city of Iraqi Kurdistan region.

A Purposive sample consists from (35 nurses) who were working in (RPTH) in three shifts of work (morning, evening, night) during administration of intravenous antibiotic

medication to inpatients of Raparin Pediatric Teaching Hospital. Each antibiotic medication administration case either repeated in a patient or involved in a newly admitted patient was consider as a single new case, each nurse was observed during five procedures of intravenous antibiotic medication administration.

A questionnaire format with (51) items structured by researcher after review of literatures used in data collection consist of two parts: part one items; related nurses and children socio-demographic introduction and part two (a checklist of 32 items testing nurse's practices during intravenous antibiotics medication administration procedure. This part consists of (5) phases: Transcription phase include 4 items; Medication dispensing phase include 5 items; Storage phase include 4 items; Administration phase include (12) items; Monitoring phase include (7) items).Content validity of the study instrument was determined by (13) experts in different fields. All the expert's responses were positive towards the study instrument.

Reliability (stability) was determined and measured through computation of Pearson product moment correlation as the correlation was (0.82).Two point level scales were used for rating items of observation checklist. Data of the study were ordinal according to two level scale which scored as (1, Yes) for and (0, for No) respectively.Statistical Package for Social Sciences software (SPSS, version 19) was used for data processing and statistical analysis. Descriptive tests (Frequency and percentage, mean and standard deviation) and inferential statistical tests (Chi-square test, Pearson product moment correlation and Relative Sufficiency) were used for data analysis, P-value  $\leq 0.05$  consider as significance.

## Results:

**Table (1):Demographic characteristics of 35 nurses (n=35)**

Items		*F	**%
<b>Age</b>	20-29years	14	40
	30-39years	6	17.2
	40-49 years	14	40
	$\geq 50$ years	1	2.9
<b>*** MS and SD</b>	<b>34.40 <math>\pm</math> 8.088*</b>		
<b>Gender</b>	Male	16	45.7
	Female	19	54.3
<b>Marital Status</b>	Unmarried	9	25.7
	Married	26	74.3
<b>Type of Shift</b>	Morning shift	16	45.7
	Afternoon shift	11	31.4
	Night shift	8	22.9
<b>Level of Education</b>	Nursing school graduate	25	14.3
	Preparatory school graduate	30	17.1
	Nursing institute graduate	120	68.6
	College of nursing graduate	0	0

\*F. frequency, \*\*%percentages \*\*\* Mean  $\pm$ standard deviation\*

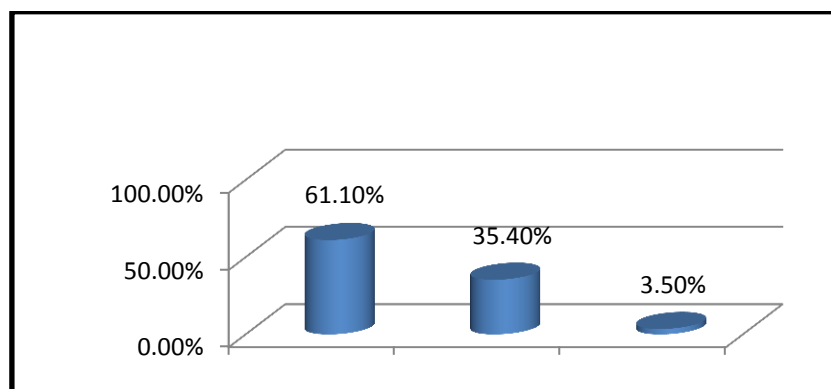
Table (1) shows that (40%) of the sample were within age groups (20-29 and 40 to 49) years. The mean of score and standard deviation (SD) of their age was  $34.40 \pm 8.088$ , more than half of nurses (54.3%) were females, and majority (74.3%) of them were married. Highest percentages (45.7%) of nurses were caring patients in morning shift; also the highest percentages (68%) of the sample were nursing institute graduates.

**Table(2):Assessment of nurse's intravenous antibiotic medication errors**

Items	175 Observations							
	YES		NO		*MS	**SD	***R S	****E v.
	F	%	F	%				
<b>Transcription errors</b>								
Rechecking patient's drug six rights	24	13.7	151	86.3	0.14	0.345	14	Def.
Using notebook for documenting prescribed drug	101	57.7	74	42.3	0.58	0.495	58	Suff
<b>Dispensing error</b>								
Have guideline for doing procedure	0	0	175	100	0	0	0	Def.
Correct calculation of medication	4	2.3	171	97.7	0.02	0.150	2	Def.
Rechecking calculation of medication	6	3.4	169	96.6	0.03	0.182	3	Def.
Two nurses checking the preparation medication	42	24.0	133	76.0	0.24	0.428	24	Def.
<b>Storage errors</b>								
Inspect the vial for any change(discoloration, particulate matter)	32	18.3	143	81.7	0.18	0.388	18	Def.
Ensure medication integrity by a check of the expiration date	0	0	175	100	0	0	0	Def.
Have special counter or refrigerator for storage drug	0	0	175	100	0	0	0	Def.
<b>Monitoring errors</b>								
Evaluate the success of the medication administration	35	20	140	80.0	20	0.40	2.00	Def.
Monitoring vital signs	0	0	175	100	0	0	0	Def.
Development of medication allergy	0	0	175	100	0	0	0	Def.
Adverse reaction of medication	0	0	175	100	0	0	0	Def.
Monitoring the site for phlebitis	0	0	175	100	0	0	0	Def.
Provide the patient with correct information regarding their medication	0	0	175	100	0	0	0	Def.
<b>General errors</b>								
Hand washing before and after each medication administration procedure	15	8.5	160	91.4	0.9	0.28	9	Def.
Educating the family about potential adverse reactions	4	2.3	171	97.7	0.2	0.15	20	Def.
Monitoring the patient for allergy	1	0.6	174	99.4	0.01	0.76	1	Def.
Monitor patient's vital signs	0	0	175	100	0	0	0	Def.
Participation of two nurse's in preparation medication administration	25	14.3	150	85.7	0.14	0.35	14	Def.

\*MS=Mean\*\*SD=standard deviation\*\*\*RS=Relative sufficiency \*\*\*\* Evaluation

Table (2) indicates that all the nurses have deficits in all the items of medication administration practices except in using notebook for documenting prescribed drug.



**Figure(1) Methods of intravenous antibiotic medication administration used by nurses.**

**Table (3): Associations between nurse's professional background and intravenous medication administration errors**

Items	Number of nursing experience years as a nurse in general			Number of experience years in caring for children		
	$\chi^2$ *	**P-value	***Ev.	$\chi^2$ *	**P-value	Ev.
Correct calculation of medication	67.5	0.000	HS	43.6	0.000	HS
Nurses interruption during medication dispensing	33.4	0.010	HS	30.3	0.007	HS
Hand washing before and after procedure	27.6	0.05	S	27.6	0.05	S
Use only sterile needles or other devices to access the vial	20.2	0.26	NS	27.1	0.01	HS
Remove the needle and add a new needle or plastic bung	37.9	0.003	HS	35.1	0.001	HS

\* $\chi^2$  = chi-square\*\* p-value < 0.05 significant while 0.01 is high significant

Table (3) Show high significant association between nurse's professional background and (correct calculation of medication, nurse's interruption during medication dispensing, remove the needle and add a new needle or plastic bung, use only sterile needles to access the vial). Significant association between nurse's professional background and hand washing before and after procedure.

### Discussion:

Analysis of demographic characteristics revealed that most of nurses were from age groups (20-29) and (40-49) years. Similar results were reported previous studies<sup>(10,11)</sup>. The majority of nurses who participated in the study were female this is consistent to what mentioned by Toruner and Uysal which conducted a descriptive study at pediatric inpatient ward in Turkey and found that majority of participant were

female nurses <sup>(2)</sup>. Concerning the marital status majority of nurses were married, this finding is supported by Bahadori, *et al* <sup>(12)</sup>.

Regarding the type of shift, the highest percentage of nurses who participated in the study were working in morning shift as the load of the work is in morning shift and needs more human resources for caring. This is similar to what found in other studies <sup>(13, 14)</sup>.

Although most of nurses have special notebook for documenting prescribed drug, but majority of nurses don't recheck patient's six rights of medication within transcription. This finding is related to nurses being over load in work for these reasons they are have no time to recheck patient's six rights. Majority of nurses' had deficits in correct medication calculation. Moreover they don't recheck the medication calculation, Fahimi, *et al*, who found nurses were repeated 4040 medication calculation errors <sup>(15)</sup>. The finding of the present study reveals that most of nurses who give intravenous antibiotic medication to children in RPTH have errors in storage, as most of nurses did not inspect the vial for any change. Moreover all participant nurses did not ensure medication integrity by checking the expiration date and they have no special counter or refrigerator for storage drugs. In addition the nurses have deficient in ensuring medication integrity by checking of the expiration date. This result is supported by Giorgi, *et al* (2010) who stated that errors related to drug storage (protection from light, temperature control of drugs, expiry date) were 38 errors in their study <sup>(16)</sup>.

However majority of nurses used clear labeled antibiotic vials. Cousin *et al* in UK found that the product was either not labeled or incorrectly labeled in 43%, 99%, and 20% of doses administered in the UK, German and French hospitals, respectively <sup>(17)</sup>. Present study shows that the majority of nurses (62.9%) were used intravenous bolus injection, which is similar to what found by other researcher <sup>(18)</sup>.

Most of participants were monitoring the site of insertion for any change (infiltration, swollen, pain and phlebitis). This result is in contrast to a study conducted in Brazil <sup>(19)</sup>.

Nearly all of nurses were not monitoring the patient for allergy. Current study found that the majority of participant did not educating the family about potential adverse reactions nor instruct them to watch the reactions. Hughes and Edgerton mentioned that the nurses should encourage families to seek out information on their child's care, read package labels carefully, adverse reactions and ask questions about their medications <sup>(20)</sup>.

Majority of participant nurses kept the dilute medication prior to administration, some drug after dilution should be administered immediately because they will be expired or became unstable after some time of dilution prior to administration. This is compatible with the study done in Malaysia and concluded <sup>(21)</sup>.

Majority of participant nurses used sterile needles to access the vial, present study is found in the Netherlands. Regarding the item remove the tamper-evident seal from the vial and wipe the rubber septum with an alcohol wipe then allow drying for at least 30 seconds nurses have deficits skill in the action. This result was supported in 2013 by Ong and Subasyini <sup>(21)</sup>.

Present study finding indicates that more than two third of participants were not disposing the needle in sharp counter, Perry and Potter reported that the dispose of sold supplies and place broken ampule and /or used vials and used needle in puncture-proof container <sup>(22)</sup>.



Current study shows that the intravenous infusion injections by the nurses were sufficient. This result was supported by Tromp *et al*, who found the nurses, inspects the solution for clarity and regulates the controller according to the described rate significant<sup>(23)</sup>.

Most of the nurse do not monitoring the patient during and after intravenous medication administration, for this reason there was more error take place in monitoring process. This finding is supported by Vazin and Delfani who indicate that inappropriate monitoring of medications were most common error type<sup>(24)</sup>.

Current study revealed that there was high significant association between (nurse's professional backgrounds) and (correct calculation of medication, nurse's interruption during medication dispensing, remove the needle and add a new needle or plastic bung). Significant association between nurse's professional background and hand washing before and after procedure. These findings in present study was done in Australia who found that as nurses gained experience up to 6 years, their rates and severity of errors declined significantly, in addition mentioned that there was few studies have examined the association between nurse experience and intravenous medication errors<sup>(25)</sup>.

### **Conclusions:**

Majority of nurses practice medication administration errors have incorrect ways regarding right dose and right documentation. Most of nurses were not washing their hands before and after each procedure. Not educating the family about potential adverse medication reactions; following improper technique of cleaning the rubber septum with an alcohol wipe.

### **Recommendations:**

Researchers recommended:

1. Establishment of training course for nursing staffs for improving their knowledge and practices that will help avoid medication errors.
2. Providing the nurses in each unit with standard guidelines for intravenous medication administration.
3. Provide medication preparation rooms with adequate guideline as posters in order to revitalize nurse's knowledge and practices regarding appropriate medication preparation.

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