Assessment of Nursing Care through Intravenous Solution Therapy among Children

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ABSTRACT

Background and Objective: Intravenous (IV) solution is a scarce human resource and ensuring its safety and clinical effectiveness requires investment – both human and financial. IV solution therapy is an essential part of patient care. When used correctly, it saves life and improves health. The nurse has an important and effective role in implementation and monitoring of care while IV solution infusion. The present study aim is to assess the nursing care through intravenous solution therapy among children in Mosul City.

Methods and Materials: This descriptive study was carried out in internal medicine wards and emergency departments in Ibn-AL-Atheer teaching hospital, Ibn-Sina teaching hospital and AL-Khansa'a teaching hospital in Mousl city for the period from 15th October / 2012 to 10th September / 2013 to assess the nursing care throughout procedure of IV solution infusion therapy for children. The sample of the study were convenience composed of (104) nurses while performing intravenous solution infusion in the above hospitals' wards. A special observational tool was prepared utilizing available related literatures . Content Validity of the tool was done through opinions of a panel of (24) experts, while the reliability of tool was done through a pilot study that were $r_{(Pre)} = 0.77$, $r_{(Intra)} = 0.71$, $r_{(Post)} = 0.78$, and $r_{(Total)} = 0.74$.

Results: The acceptable levels of the three stages of procedure as a results of the study were as; Pre-procedure=98.4%, Intra-procedure=70.6% and Post-procedure=52.6%.

Conclusion: The study concluded negligence in some activities are dangerous and can be fatal, heedlessness in case the solution is suitable to be infused or not, and heedlessness or ignorance of sterilization and disinfection. The study recommended that the nurses working in Intravenous solution infusion must be highly qualified and efficient in regard to IV therapy. Standardized guidelines in respect to sterilization and disinfection throughout each procedure.

Key words: assessment, nursing care, intravenous solution therapy, children**.**

INTRODUCTION

Intravenous (IV) simply means “within a vein” IV therapy is a treatment that infuses fluids, medications, blood, or blood products into a vein for treatment of a patient. It permits accurate dosing and a swift effect of the substance infused. IV therapy is used to administer fluids, drugs, and nutrients when a patient cannot take these items orally. The rapid effect of fluids delivered directly into the bloodstream is necessary during emergencies or other critical-care situations in which medications are needed. However, the results can be fatal if the wrong medication or dosage is given (Dretzke et. al., 2004). Administration of IV solution to children is common practice in a hospital setting. Children receive IV solution for a variety of reasons, and with the development of accurate modern pumps, delivery rates of these solutions can be controlled and are perceived to be safe. However, serious morbidity and mortality in previously healthy children associated with the administration of IV solutions has been reported (Moritz and Ayus, 2007; Hanna et. al., 2003). So, an order for IV therapy is made by the physician. Various other health care employees are responsible for the procedures surrounding initiation, administration, and maintenance of the IV therapy that has been ordered (Dretzke et. al., 2004).

Intravenous solution therapy is a major and serious procedure in daily hospital work - that all stages of it has some risks - the nurse plays a vital role throughout that, therefore highly qualified nursing staff is needed to be aware of this procedure. The possible complications are "phlebitis, infiltration,

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infection, allergic reactions, circulatory overload and air embolism". The present study aim is to assess the nursing care through intravenous solution therapy among children in Mosul City.

MATERIALS AND METHOD

A descriptive study design has been adopted throughout the period from 15th of October 2012 to 10th of September 2013. Data were collected from three hospitals in Mosul city (Ibn -AL- Atheer, Ibn- Sina and AL-Khansa'a Teaching Hospitals). A convenience sample of (104) nurses working in pediatrics emergency departments and pediatrics wards in the three hospitals has been included.

After reviewing many previous related literatures, an observational tool was developed to measure nurses' practice throughout the intravenous infusion procedure. It composed of two parts: **Part I**; related to demographic characteristics of the nurse as Age, Gender, Educational qualifications, Tenure (years of work), Workplace inside the hospital, The hospital that the nurse working in , and Enrollment in Training Sessions. **Part II;** composed of Procedure related-items consist of three categories or stages: Pre- procedure (27) items, Intra- procedure (34) items, Post-procedure (13) items. Each item has four options: Never = 0; Sometimes = 1; Often = 2; Always = 3. Mean of score depended as an acceptable level was (≥ 1.5). Content validity of the tool was determined by presenting it to a panel of (24) experts, while the researchers selected (10) nurses randomly from Ibn- Al-Atheer teaching hospital - outside the study sample – to identify the reliability of the tool and by using Spearman-Brown method of split half technique, the reliability coefficient of the total tool and of its' categories were as; Pre-procedure (r=0.77), Intra- procedure (r=0.71), Post- procedure (r=0.78) and Total (r=0.74). Data were collected through indirect observational method depending on the procedure related – items of the study instrument while the nurse carrying out the procedure. Each nurse had observed for three times of procedure. Each activity pinpointed in respect to the options of each item, then calculated the total scores of the options. Mean and Standard Deviation were used as descriptive statistic.

RESULTS

Table (1): Demographic Characteristics of the Study Sample :

Characteristics	Items	No.	%
Age groups (years)	21-30	49	47.1
	31-40	48	46.2
	41-50	4	3.8
	Above 50 years	3	2.9
	Total	104	100%
Mean (± SD) = 31.48 (± 5.95)			
Gender	Male	89	85.6
	Female	15	14.4
	Total	104	100%
Educational Qualification	Graduate of Nursing Course	5	4.8
	Vocational preparatory Nursing Graduate	54	51.9
	Graduate of the Institute of Nursing	26	25.0
	Graduate of Nursing College	19	18.3
	Total	104	100.0
Tenure	1-4	22	21.2
	5-9	59	56.7
	10-14	10	9.6
	15-19	6	5.8
	20-24	3	2.9
	25-29	4	3.9
	Total	104	100.0
Mean (± SD)= 8.4 (± 6.22)			
Work place	Emergency department	54	51.9
	Internal medicine ward	50	48.1
	Total	104	100.0

The hospital	Ibn-Al-Atheer	48	46.2
	Ibn-Sina	30	28.8
	Al-Khansa'a	26	25.0
	Total	104	100.0
Enrollment in Training Session	No	87	83.7
	Yes	17	11.5
	Total	104	100.0

Table (2): Classification of Acceptable Level of Pre- Procedure Activities of Intravenous Solution Therapy by (Mean of score + SD) .

No	ACTIVITES	Mean	SD	Level
A1	Assure the correct patient before intravenous solution administration.	2.9712	.16818	acceptable
A2	Clarify what will be done to the patient and answer questions of the patient and his\her family.	2.3269	.78136	acceptable
A3	Wash hands.	2.4808	.85877	acceptable
A4	Wear uniform.	2.9135	.50455	acceptable
A5	Check Temperature.	2.5192	.69646	acceptable
A6	Check Pulse.	.4615	.81160	unacceptable
A7	Check respiration.	.1154	.54519	unacceptable
A8	Measure the weight of the child.	2.6827	.59552	acceptable
A9	Put the patient in a comfortable position.	2.6923	.52282	acceptable
A10	Wear medical gloves.	2.3365	.86586	acceptable
A11	Prepare cannula (make sure the size of the cannula by the veins of the patient).	2.9904	.09806	acceptable
A12	Prepare cotton (Swab).	2.8558	.51044	acceptable
A13	Prepare disinfectant solution.	2.4808	.88109	acceptable
A14	Prepare tournique .	2.9327	.31972	acceptable
A15	Prepare adhesive tape (Plaster).	2.7981	.50971	acceptable
A16	Prepare the site of insertion the cannula preferring the veins of forearm and hand.	2.9615	.19324	acceptable
A17	Tie up the tournique to feel the vein.	2.9615	.30918	acceptable
A18	Sterilize the insertion site of cannula by using the disinfectant solution by circular movement from centre outside and wait to dry .	.4135	.93071	unacceptable
A19	Tighten the skin around the insertion site to make the vein obvious or tangible.	2.9038	.32737	acceptable
A20	Insert cannula in the vein.	2.2885	.69216	acceptable
A21	Ascertion from enterance of cannula in correct position by seeing blood in it.	2.9038	.32737	acceptable
A22	Remove tournique.	2.9904	.09806	acceptable
A23	Press over a vein by a finger (over the top of the cannula) to prevent bleeding.	2.7692	.56139	acceptable
A24	Remove the trocar of the tournique and throw it out.	2.0769	.66380	acceptable
A25	Fix the cannula with adhesion tape.	2.9904	.09806	acceptable
A26	Administer two cc of normal saline to check the cannula.	1.8173	.93232	acceptable
A27	Observe the insertion site of cannula.	2.8558	.42764	acceptable

Tables (3): Classification of Acceptable Level of Intra- Procedure Activities of Intravenous Solution Therapy by (Mean of score + SD) .

No	ACTIVITES	Mean	SD	Level
B1	Assure the type of intravenous solution before administering.	2.4808	.69646	acceptable
B2	Ascertain from the expire date of solution and that the bottle is locked well.	.0962	.49304	unacceptable
B3	Be sure that there are no bubbles and precipitates in the bottle, also from it's temperature before administrating.	.6731	1.08335	unacceptable
B4	Clean the rubber piece at the os of the bottle before inserting the tube.	.3750	.90508	unacceptable
B5	Hang the bottle at height of one meter over the heart level.	2.9423	.41400	acceptable
B6	Be sure that there is no air bubble in the tube before connecting with cannula.	3.0000	.00000	acceptable
B7	Calculate flow rate.	1.0096	1.22669	unacceptable
B8	Instruct the accompanying person about the dangers of re-organize the flow rate.	2.1635	.69827	acceptable
B9	Document time of administration.	.0673	.42414	unacceptable
B10	Reassure the patient while administration.	2.7212	.63025	acceptable
B11	Observe site of cannula insertion.	2.7596	.59927	acceptable
B12	Don't puncture the bottle or pressure on it to faster administration.	.7692	1.09926	unacceptable
B13	Observe the solution level inside the bottle continuously.	2.8173	.51698	acceptable
B14	Don't leave the administration tube open while lifting it from the patient.	.3462	.79768	unacceptable
B15	Hand washing.	2.6538	.65016	acceptable
B16	Change cannula in case of pain or edema in it's site.	2.9808	.19612	acceptable
B17	Don't lift the patient to a level that his/her heart is over the solution level.	2.2308	.79110	acceptable
B18	Check temperature continuously during administration.	1.9519	.75530	acceptable
B19	Check pulse continuously during administration.	.3173	.72760	unacceptable
B20	Check respiration continuously during administration.	.1058	.48106	unacceptable
B21	Stop administration in case of occurrence of any complication.	2.9135	.50455	acceptable
B22	Inform physician in case of elevated patient's temperature.	2.7788	.52058	acceptable
B23	Inform physician in case of pain sensation in cannula site.	3.0000	.00000	acceptable
B24	Inform physician in case of inflammation of vein.	3.0000	.00000	acceptable
B25	Inform physician in case of thrombus.	2.9135	.39685	acceptable
B26	Inform physician in case of cyanosis.	2.5673	.66485	acceptable
B27	Inform physician in case of tachycardia.	1.5673	1.16389	acceptable
B28	Inform physician in case of allergy.	2.9519	.35197	acceptable
B29	Observe the level of conscious of the patient through administration.	1.9135	.81384	acceptable
B30	Cannula must be changed if it is blocked, be out of the vein, also it must be changed after three days regardless if it is blocked or well.	3.0000	.00000	acceptable
B31	Administration line tube must be changed with each bottle used.	.1250	.51554	unacceptable
B32	Block administration line tube before the solution administration is terminated completely.	2.2500	.79745	acceptable
B33	After completing administration withdraw the administration line tube and close cannula for it can be used later.	3.0000	.00000	acceptable
B34	Check cannula continuously in case of using for more than one time and take care of it.	2.6731	.58197	acceptable

Table (4): Classification of Acceptable Level of Post- Procedure Items of Intravenous Solution Therapy by (Mean of score + SD) .

No	ACTIVITES	Mean	SD	Level
C1	Ensure that the patient received sufficient quantity of solution prescribed by the doctor according to time.	2.9904	.09806	acceptable
C2	Document date, period of time the procedure lasted.	.0481	.29162	unacceptable
C3	Document type of infusion administratered.	2.9519	.35197	acceptable
C4	Document size and insertion site of cannula.	.0385	.30918	unacceptable
C5	Document any problem happened during administration.	.4904	.83602	unacceptable
C6	Check temperature after complete administration.	1.4038	.79463	unacceptable
C7	Check Pulse after complete administration.	.1635	.44308	unacceptable
C8	Check respiration after complete administration.	.0000	.00000	unacceptable
C9	Don't leave any syringe or used instrument at side of the patient unit after completing the procedure.	2.4519	.65181	acceptable
C10	Throw out the emptied bottle and other equipments used in a suitable place after completing the procedure.	2.9519	.21496	acceptable
C11	Observe the patient continuously after the procedure for (30) minutes later.	2.1635	.81384	acceptable
C12	Remove cannula and disinfect it's site and provide slight pressure till the blood ceased.	2.9904	.09806	acceptable
C13	Ascertain of absence of accumulation of fluid or redness in the insertion site.	2.9423	.23429	acceptable

DISCUSSION

The "practice of nursing" means the performance of services for compensation in the provision of diagnosis and treatment of human responses to health and illness. Professional nursing practice encompass the full scope of nursing practice and includes all its specialties and consists of application of nursing theory to the development, implementation, and evaluation plans of nursing care for individuals, families, and communities. Professional nursing practice requires substantial knowledge of nursing theory and related scientific, behavioral, and humanistic disciplines (Guido, 2001).

Almost the study sample were less than (40) years of age. This is due to two reasons; firstly, the previous economic blockade (1990-2003) the country suffered from compelled large number of employees to leave job, so the nursing vocational schools shard in solving the huge shortage in nursing staff, therefore, all the graduate persons from those schools were around this age group. Secondly, medical specialties inclusively nursing suffered from personnel shortage, so, the government obligates to employee them, therefore, many bachelor students try to attend these professions, hence their ages were youth to early middle ages. Middle east countries especially Arabian communities submit to special values, traditions and beliefs which impose females to be far away as possible as from nursing, so, males constitutes the highest percentage among our sample. As mentioned previously, the vocational nursing schools shared in solving nursing shortage problem, while large percentage of those graduates followed up their education in nursing institute, hence, if adding the percentages of those two groups, it was found that it was more than three-quarters of the sample. Their tenure (years of experience) in nursing field were appropriately in congruity with their ages. Almost the sample due their work overload did not share in any training sessions.

In order to achieve the study objective the researchers tended to assess the nurses' practices during the whole procedure on three stages; pre, intra, and post procedure (Tables; 1-3). The acceptable levels (over than 50%) of the three stages were; pre= 98.4%, intra= 70.6%, and post= 52.6%. The most important items that were unaccepted (less than 50%) in performance can be categorized into four aspects;

Firstly, checking and monitoring some of the vital signs (pulse and respiration) accompanied with calculating of flow rate while

fluid administration, this can be fatal, for if speed of flow rate was as rapid as the child need, this logically manifested by tachycardia and dyspnea due to sharp increase in fluids in the body (which must be calculated appropriately) and if it not treat as emergency case as fast as possible, it can affect severely on many vital organs as heart, kidney and so on.

Secondly, ascertain from expire date of fluid administered and any bubbles or precipitates in the bottle in addition to check it's temperature. The early signs of expire date of the fluid are presence of bubbles in fluid while shaking or presence of precipitates in it. If these or one of them is present, the fluid is unsafe to be administered to the human, for, anyone can't predict or be certain from the chemical alterations of fluid or the chemical interactions that can be happened inside the body after administration.

Thirdly, disinfection and sterilization techniques followed during this procedure, as disinfect the insertion site of cannula, disinfect the bottle os, puncture the bottle highest than fluid, and changing the administration line at each bottle administered, all these were unacceptable practices among the study sample which can led to contamination of the fluid. There is growing concern over hospital acquired infection, bacteria and viruses can be carried from person to person on the surface of any medical equipment unless it is decontaminated between use. Sterilization and disinfection reduce the risks of cross infection (the process by which microbes are passed from one infected person to cause infection in another) (Centers for Disease Control and Prevention, 2008). Disinfection and 'cold-sterilization' solutions destroy many microorganisms (bacteria, viruses, fungi) but do not destroy bacterial spores. Disinfection does not replace autoclave sterilization. Disinfectants should be used on hard surfaces (trays, countertop…) and reusable, non-autoclave able tools, such as, plastic calipers, before and after each procedure. Product usage instruments vary and some may not be suitable for all surfaces or applications (Association of Professional Pierces, 2005). Sterilization is the process of killing all microorganisms including bacteria, bacterial spores, fungi and viruses. Improper sterilization can result in the spread of infectious bacteria and blood borne viruses such as Hepatitis and Human Immunodeficiency Virus (Centers for Disease Control and Prevention, 2008).

Fourthly, documentation of time the procedure lasted, size of cannula used, site of insertion and any problem happened during administration. Nursing documentation is defined as anything written or printed used to furnish evidence or information that is legal or official. Effective documentation reflects the quality of care and provides evidence of each health care team members accountability in the delivery of the care. Nursing documentation comprises all written and/or computerized recording of relevant data made by nurses to document care given or to communicate information relevant to the care of the particular client/patient (Potter and Perry's, 2005). Nurses have always faced the challenge of recording documentation with quality patient care, some would argue that paperwork interferes with time spent caring for patients. However, with proper documentation on the patient's chart, the nurse should have the information needed to ensure quality care and to defend that care in court, and should be necessary. Effective documentation provides a record demonstration and giving proof of individualized nursing care and the patient's response to that care or outcome (Henderson, 2009). Nurses may consider documentation as a useful aid although it consumes time where it gives direction and ensures quality in patient care. The time and effort the nurse devotes to the patient's record allows the documentation to be pertinent, up-to-date, correct and complete. In today's litigious culture, effective and complete documentation is a matter of professional survival.

CONCLUSIONS

The study concludes that negligence in some activities that are dangerous and can be fatal. Heedlessness in case the solution is suitable to be infused or not. Heedlessness or ignorance of sterilization and disinfection. Ignorance of documentation.

RECOMMENDATIONS

The present study recommends that nurse must be highly qualified and efficient in regard to IV therapy. Standardized guidelines in respect to sterilization and disinfection throughout each procedure. Finally, pay more attention to documentation.

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