

Effectiveness of Normal Saline Flush versus Heparin Saline Flush in Maintaining the Patency of Peripheral Intravenous Cannula and on Occurrence of Intravenous Local Vascular Complications in Patients Receiving Intermittent Intravenous Medications

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Abstract

A study was conducted to assess and evaluate the effectiveness of normal saline flush versus Heparin saline flush (10 IU) in maintaining the patency of Peripheral intravenous cannula and on occurrence of intravenous local vascular complications in patients receiving intermittent intravenous (IV) medications. True experimental research approach with multiple treatments, pre-test post-test control group design was used. Purposive sampling technique was adopted; 90 patients who met the sampling criteria were assigned randomly to experimental group 1 (normal saline flush), experimental group 2 (heparin saline flush) and control group. Results showed that there was a significant association between patency of peripheral IV cannula and flushing. There was a significant association between Normal saline and Heparin saline group. There was a significant difference in mean IV local vascular complication score of all 3 groups with the highest mean score of control group. There was no significant difference between mean IV complication scores of normal saline and heparin saline group. The study revealed that flushing of IV cannula is very effective and normal saline and heparin saline flush (10 unit) are equally effective in maintaining the patency of peripheral IV cannula and preventing the occurrence of local vascular complications.

Intravenous catheterisation is the most common invasive procedure among patients admitted to hospital. Maintaining patency of a “non-infusing” peripheral intravenous (IV) cannula line is extremely important to continue IV medications and prevent cannula-related complications.

It has long been accepted that the process of flushing IV cannula line is a primary method for maintaining catheter patency. Heparin sodium used to be the traditionally used medication for flushing but it has many side effects like haemorrhage, allergic reactions, thrombocytopenia and pain at the injection site. There is a controversial aspect concerning the method of choice for maintaining the patency of peripheral intermittent IV cannula line. Maintaining the function of IV cannula is an important nursing responsibility which could possibly cut down the cost of cannula and time spent in staring IV line and more importantly the stress, pain and local vascular complications experienced by the patient having IV cannula line. So it should be carried out following

the best available scientific evidence.

Objectives

The objectives of the study were to:

1. Assess and evaluate the patency of peripheral intravenous cannula and prevention of local vascular complications with (a) intermittent saline flush, and (b) heparin saline flush in patients having IV cannula receiving intermittent medications.
2. Compare the effectiveness of intermittent normal saline flush versus heparin saline flush with the control group to maintain IV line patency and in preventing local vascular complications.

Review of the Literature

In a study of 1,000 patients (500 each in control and experimental group), Choudhary (2013) found that 2 ml intermittent normal saline flushing every two hourly will maintain the patency of peripheral intravenous cannula (PIVC) is the best method to use in clinical setting for maintaining the patency of PIVC

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to reduce the need for the frequent removal and insertion of the IV cannula, minimise the complication and improve the quality of nursing care and minimising the hazards for the patients.

Patidar et al (2014) conducted a research study on comparative efficacy of heparin saline and normal saline flush on conveniently recruited 75 patients of medical and surgical wards, equally randomly divided into 3 groups i.e. control group, normal saline group and heparin saline group. Saline flush (1 ml) using SAS technique (Saline flush, Administration of drug, followed by Saline flush) and Heparin Saline flush (10 units heparin in 1 ml of normal saline) using SASH technique (Saline flush, Administration of drug followed by Heparin saline flush) each-time following IV medication administration consecutively for 72 hours, with no intervention in control group. Results showed that there was significant difference ($p < 0.05$) in duration of patency of IV line between control group and normal saline group and between control group and heparin saline group. However, normal saline and heparin saline group had no significant difference in duration of patency of IV line ($p = 0.50$). The study concludes that normal saline is as effective as heparin saline in maintaining patency of IV lines.

Methodology

The true experimental research approach was used in this study conducted at selected hospital of New Delhi. Research design selected was multiple treatment 'pre-test post-test control group design'. The independent variables were normal saline flush and heparin saline flush. The dependent variables were patency of cannula and occurrence of local vascular complications. Study population comprised of all the patients who are 18 years and above of age with peripheral IV cannula receiving intermittent IV medications. Selection of 90 samples was done by employing purposive sampling technique with random assignment of study subjects. First a list of eligible samples was made and then through lottery method the samples were selected randomly and assigned equally (30 each) to experimental group 1 (normal saline flush) experimental group 2 (heparin saline flush) and control group.

Development of Tool

Part 1: Structured Proforma related to sample characteristics - It consisted of 14 items for obtaining information about the selected background factors such as patient code, age, gender, ward, bed number, date of admission, diagnosis, previous hospitalisation - its cause and duration of hospitalisation, history of any coagulopathy disorder, history of any hyper sensitivity to any anticoagulant, any active bleeding.

Part 2: Structured proforma related to factors involved in the administration of IV medication - It consisted of 9 items under 3 headings, viz. (1) IV cannula-related factors: date and time of cannula insertion, cannula inserted by, size of IV cannula, duration of insertion of IV cannula, (2) patient-related factors - site of IV cannula, avoidance of previous insertion site, activity of patient, and (3) treatment-related factors: details of duration of IV therapy, type of medication administered through IV cannula.

Part 3: Observation schedule

Section I: Observation schedule to assess patency of IV Cannula with only one item. The investigator has to just tick each time whether the cannula is patent or not. Data collected for this was based on feeling resistance while pushing the distilled water through the cannula; and observation of leaking of cannula.

Section II: Observation schedule to assess intravenous local vascular complications with 3 items included with standardised tools: (a) Thrombophlebitis - Visual infusion phlebitis score, (b) Infiltration - Infiltration scale by Infusion Nurses Society, and (c) Pain - universal numeric pain rating scale.

Data Collection Method

Formal administrative approval was taken from the concerned authorities. Informed written consent was taken from the subjects and purpose of the study was explained. Patients were interviewed using questionnaire for demographical data. The information with regard to factors involved in the administration of IV medication through peripheral IV cannula was filled. After observing the IV cannula site and checking the patency, medication was administered followed by IV cannula flushing with different solutions in experimental group 1 (saline flush) and 2 (heparin saline flush), every 12 hours. Post-intervention assessment was done to record data on patency and occurrence of local vascular complications. Control group patients were administered IV medication only and assessment for patency and occurrence of local vascular complications was done without any intervention. Patients were followed up for 60 hours (3 days) two times a day (8 AM and 8 PM), at 0 hr, 12 hr, 24 hr, 36 hr, 48 hr and 60 hr with same intervention and assessment. Data was recorded and analysed using descriptive and inferential statistics.

Results and Discussion

(Tables 1 & 2; Figs 1-3)

The present study showed that there was a significant association between normal saline flushing of IV cannula and patency of peripheral IV cannula. This finding is consistent with the findings of Choudhary (2013), Vinoli (2007) and Kaur et al (2006). They reported that

Table 1: Association between the post-intervention patency of IV cannula of experimental groups and control group on day 1, day 2 and day 3 (N= 90)

Day and Time	Experimental Group 1 (Saline Flush) n=30		Experimental Group 2 (Heparin Saline Flush) n=30	Control Group n=30			Df	Chi Square Value (Table)	Chi Square Value Obtained
	Patent	Non Patent	Patent	Non Patent	Patent	Non Patent			
Day 1 (At 12 hrs)	30	0	30	0	30	0	2	5.99	0 NS
Day 2 (At 36 hrs)	30	0	29	1	27	3			3.66 NS
Day 3 (At 60 hrs)	26	4	25	5	16	14			10.63*

*Significant at 0.05 level ; NS-Non significant

Table 2: Association between the post-intervention patency of IV cannula of Experimental group 1 and Experimental group 2 on day 1, day 2 and day 3 (N= 90)

Day and Time	Experimental Group 1 (Saline Flush) n=30		Experimental Group 2 (Heparin Saline Flush) n=30		Df	Chi Square Value (Table)	Chi Square Value Obtained
	Patent	Non Patent	Patent	Non Patent			
Day 1 (At 12 hrs)	30	0	30	0	1	3.84	0 NS
Day 2 (At 36 hrs)	30	0	29	1			0.52 NS
Day 3 (At 60 hrs)	26	4	25	5			0.13 NS

*Significant at 0.05 level ; NS-Non significant

intermittent saline flushing is highly effective and best method to be used in clinical setting for maintaining the patency of peripheral IV cannula.

In this study, there was similarity between normal saline flush and heparin saline flush (10 unit) in maintaining the patency of peripheral intravenous line on day 1, day 2 and day 3, which is consistent with the findings of Kathryn et al (2003) and Harahan

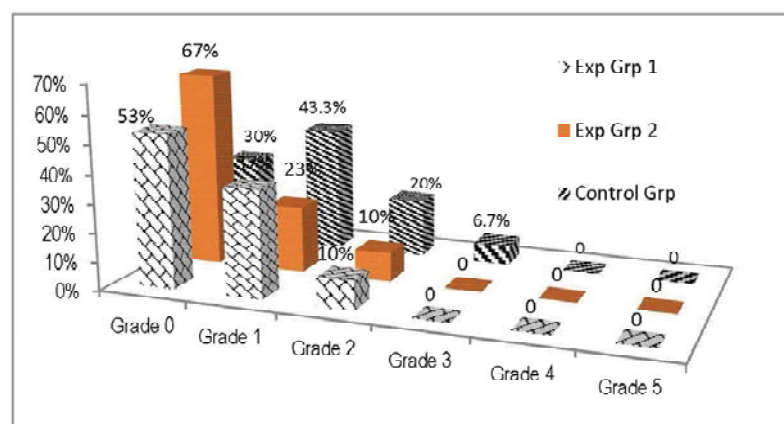


Figure 1: Percentage distribution of thrombophlebitis grade in experimental groups and control group patients on Day 3 (at 60 hrs).

& Berends (2000) where both normal saline flush and heparin flush (10 unit) were found equally effective in the maintaining the patency of peripheral IV cannula.

There was a significant difference between post-intervention IV local vascular complications mean score of experimental group 1, experimental group 2 and

control group whereas there was no significant difference found between IV local vascular complication mean score of experimental group 1 (saline flush) and experimental group 2 (heparin saline group). This finding is consistent with research conducted by Mok et al (2007) & Shoaf et al (1992), who reported that 0.9 percent normal saline was as effective as 10 units per ml of heparin in normal saline solution in maintaining catheter longevity and preventing IV complications. Further, there was no association between the patency of IV cannula and

development of local IV vascular complication with duration of IV cannula. This finding is consistent with that of Schrappe et al (2004) who reported that findings of their research study do not support CDC recommendations for an elective PIVC change after 72 hours, provided daily monitoring of the insertion site occurs. Another research study by Lai (1998) reported that comparison between the rates of phlebitis of peripheral intravenous lines left in place for 72 hours versus rates of those left in place 96 hours showed similar result and if intravenous cannula lines are prolonged to 96 hours, a potential cost saving of \$61,200 per year could be realised.

A significant association between mean local vascular complications score of peripheral intravenous cannula line in experimental groups with site of cannula. The site where maximum cannula developed the complications was wrist and forearm. This finding is consistent with the findings of Saini et al (2011) and Esin & Samiye (2008) where they found that one of the possible factors associated with the development of IV complications like phlebitis and infiltration

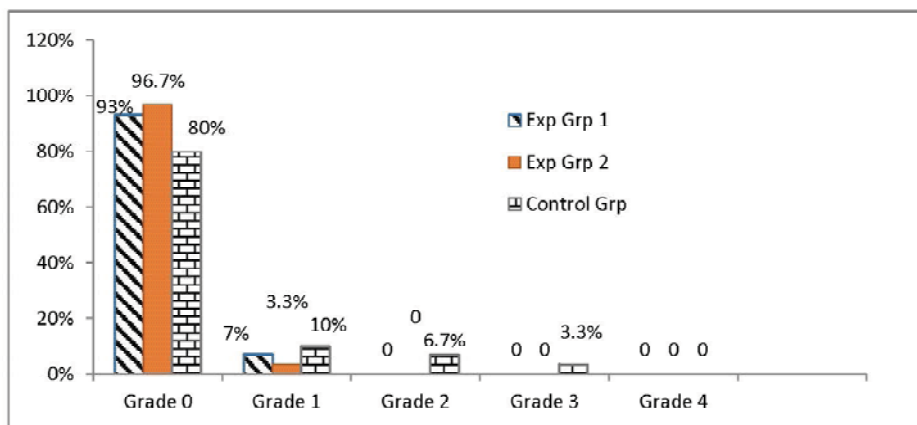


Figure 2: Percentage distribution of infiltration grade in experimental groups and control group patients on Day 3 (at 60 hrs)

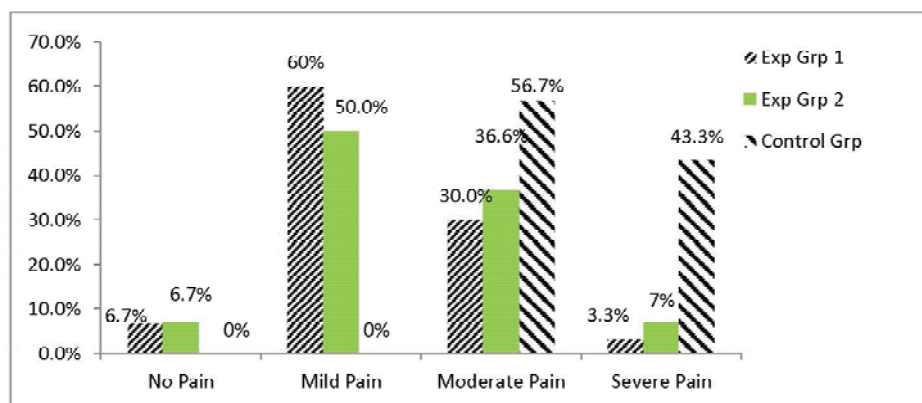


Figure 3: Percentage distribution of severity of pain in experimental groups and control group patients on Day 3 (at 60 hrs)

was use of forearm and elbow joint as the site of insertion of IV cannula.

Implications

Nursing Practice: The study emphasises the need to follow a standard protocol for flushing peripheral IV cannula. The practice of using heparin flush can be changed to normal saline flush which is the safest and best method for the patient

Nursing Education: If the students are aware of the importance of right practices, they will develop a sense of responsibility towards the profession. In service nursing personnel should be provided with the evidence-based updated knowledge and skill in order to provide best patient care.

Nursing Administration: To ensure quality care, administrators should utilise and rely upon evidence-based nursing practice this study will guide them in making clinical protocols related to IV cannula flushing.

Nursing Research: Findings of the research might encourage nursing personnel to follow the practices of peripheral IV cannula flushing with saline flush, which is a very safe practice and will be helpful in preventing intravenous complications.

Recommendations

A similar study can be undertaken on a larger sample thereby findings can be generalised for a larger population. A similar study can be done on patient receiving chemotherapy to see the effect of saline flushing versus heparin flush on the severity of occurrence of chemotherapy induced Phlebitis.

Conclusion

Flushing of IV cannula is very important. Saline flush and heparin saline flush are equally effective in maintaining the patency and preventing intravenous local vascular complications.

Saline flush and heparin saline flush give similar result in maintaining the patency of cannula and preventing IV local vascular complications, so the practice of using heparin as a flushing agent can be changed to normal saline flush which is safer and cheaper as compared to heparin saline flush.

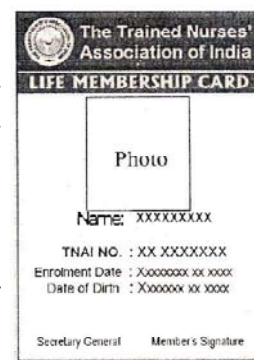
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