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AN EXPERIMENTAL STUDY TO EVALUATE THE EFFECTIVENESS OF INTERMITTENT SALINE FLUSHING IN MAINTAINING THE PATENCY OF PERIPHERAL VENOUS CATHETER AMONG PATIENTS IN SARVODAYA HOSPITAL, BANGALORE

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ABSTRACT

Statement of the problem: "An experimental study to evaluate the effectiveness of intermittent saline flushing in maintaining the patency of peripheral venous catheter among patients in Sarvodaya hospital, Bangalore". **Background:** Intravenous catheters represent the most common parenteral site for medication delivery. These catheters needs to be changed once in three days, or if they dislodge from the vein. Maintenance of the patency of these intravenous catheters is important for minimizing patients discomfort and the expense associated with replacement Saline flush is important for patients, as it reduces the need for the potentially painful process of placing vascular lines, and also helps control costs by reducing the number of devices used for each patient. **Objectives** : To assess the patency of peripheral venous catheter among patients in experimental and control groups, to determine patency of peripheral venous catheter after intermittent saline flushing in experimental group, to compare the patency of peripheral venous catheter between experimentaland control group, to find out association between patency of peripheral venous catheter with selected demographic variables. **Methods:** True experimental research design with experimental and control group was adopted. The study was conducted in Sarvodaya Hospital, Bangalore. Simple random sampling was used to select 60 samples based on certain predetermined criteria. Subjects were randomly divided in to experimental and control group as they were admitted. Each group consisted of 30 members. Data was collected from the subjects through observational check list after obtaining an informed consent. Pre test was conducted on the first day of admission. The IV catheter in situ was observed in both the groups for pain, return blood flow and patency after administering medications. From the second day saline flushing was administered intermittently every 2nd hourly in the experimental group and patency was observed. As per prepared tool if a particular observation was present 2 marks was given and 1 was given if absent. The data obtained were analyzed and interpreted in terms of the objectives and hypothesis of the study. **Results:** Descriptive and inferential statistics were used for data analysis. Results show that the experimental group's pre-test mean score was 12.1, with a standard deviation of 2.8, and that its post-test mean was 11.7, with a standard deviation of 2.2. The paired 't' test value was 19.6, which was significant at the level of 0.05. This shows that the intervention of 2nd hourly intermittent saline flushing is effective in the experimental group. An analysis of mean practice to compare peripheral venous catheter patency in experimental and control groups shows that, the mean score for experimental group is 29 with the standard deviation of 6 and for the control group, the mean score is 36.8 with a standard deviation of 7.3. Based on the calculated 't' test value of 13.36, this is significant at 0.05. And there was no significant association between the patency of peripheral venous catheter and selected demographic variables such as age (F=1.88), gender (F=0.71), previous hospitalization (F=1.39) and duration of hospitalization (F=2.37) in the control group, Where as in the experimental group, there was a significant association between the patency of peripheral venous catheter and duration of hospitalization (F=5.67), and no significant association between patency of peripheral venous catheter and selected demographic variables such as age (F=0.61), gender (F=0.10) and previous hospitalization (F=0.01). **Conclusion:** The study concluded that administration of 2nd hourly intermittent saline flushing among patients with peripheral venous catheter will maintain the patency of peripheral venous catheter.

KEYWORDS: Intermittent saline flushing, patency and peripheral venous catheter.

BACKGROUND OF THE STUDY

Peripheral venous catheters (PVCs) can be retained for a period of 72 –96 hours to minimize the number of venipunctures. Thus, PVCs are widely used in various medical facilitiesfor clinical interventions such as drug infusion, nutrition and blood product administration. Babadi, Ghadiriyan, & Hosseini (2015), reported that despite advances in the field of intravenous therapy, phlebitis is still a common complication of peripheral venous catheter.

Blockage of intravenous cannula (IV) is one of the major discomforts faced by the patients. Nurses not only directly administer the medication to the patients but also experience the difficulty while administering the medication through non-patent IV cannula. Maintenance of the patency of these intravenous catheters is important for minimizing patients discomfort and the expense associated with replacement.

To date, heparin saline (HS) and normal saline (NS) solutions have been mainly used in catheter sealing for clinical applications. Heparin is an anticoagulant. Therefore, HS can be used to prevent thrombosis and maintain the patency of the catheter for intermittent infusion. However, adverse reactions caused by heparin can be significant, including allergic reactions, bleeding and heparin-induced thrombocytopenia, the latter of which has an incidence of 0.5%. Another disadvantage of using HS for catheter sealing is the possibility of administering the wrong dosage of HS.

A meta-analysis was conducted to evaluate the effects of HS and NS in maintaining catheter patency, the incidence of phlebitis and catheter retention time. No significant differences were detected in the incidence of catheter blocking, phlebitis and catheter retention time. Based on this evidence, in 2011, the Infusion Nurses Society (INS) recommended the application of NS for flushing and sealing of catheters used in adult patients. So the present study was intended to evaluate the effectiveness of 2^{nd} hourly saline flushing in maintaining the patency of peripheral venous catheter.

Objectives of the study

1. To assess the patency of peripheral venous catheter among patients in control and experimental groups.
2. To determine patency of peripheral venous catheter after intermittent saline flushing in experimental group.
3. To compare the patency of peripheral venous catheter between experimental and control group.
4. To find out association between patency of peripheral venous catheter with the selected demographic variables.

Hypothesis

H1: Intermittent saline flushing every 2nd hourly will maintain the patency of peripheralvenous catheter.

Sampling CriteriaInclusion criteria

1. Patients who are admitted in Sarvodaya hospital.
2. Patient who are having peripheral venous catheter.
3. Patients who admitted in general ward and special ward.

Exclusion criteria

1. Patient with hyper coagulability.
2. Patients who are taking asprin, warfarin,Ecosprin drugs

RESEARCH METHODOLOGY

To accomplish the objectives of the study "True Experimental Design with experimental and Control Group" was adopted. The study was conducted at Sarvodaya Hospital, Bangalore after obtaining formal permission from the concerned authorities. Patients admitted in the hospital with the IV catheters who fulfilled the inclusion criteria and given informed consent were included in the study. The samples were selected by using Random sampling technique. Observational Check list was found appropriate to assess the patency of Peripheral Venous Catheter. The tool was prepared by the investigator after an extensive review of literature and discussion with the experts in the field. The tool consists of 3 parts.

Section A: Demographic data

The first section of the tool was used to collect data regarding personal and baseline characteristics of the patients with peripheral venous catheter. It consisted of 4 items for obtaining information about the selected background factors such as age, gender, previous hospitalization and duration of hospitalization.

Section B: Details of IV cannulation

The details of size of cannula, brand of cannula, type of intravenous device, site of cannulation, type of fluid, rate of fluid, height of IV bottle from injection site, gap between fluid change, solution used for flushing, duration of therapy, total volume of fluid received through one line per day, reason for removal of cannula, condition of cannula during removal and intravenous block were included in this section.

Section C: Observational check list

The observational check list was prepared separately for both pre test and post test. The categories such as resistance, leaking from cannula, hardening of tissues, redness or change in character, discomfort, blanched skin, skin swollen, skin bruised, edema, skin cool to touch, pain, possible numbness, erythema at access site, palpable venous card and infiltration were monitoredand recorded in appropriate chart.

Method of data collection

Simple random sampling technique was used to select 60 samples based on certain predetermined criteria. Subjects were randomly divided in to experimental and control group as they were admitted. Each group consisted of 30 members. Data was collected from the subjects through observational check list after obtaining an informed consent. Pre test was conducted on the first day of admission. The IV catheter in situ was observed in both the groups using observational check list. The categories such as resistance, leaking from cannula, hardening of tissues, redness or change in character, discomfort, blanched skin, skin swollen, skin bruised, edema, skin cool to touch, pain, possible numbness, erythema at access site, palpable venous card and infiltration were monitored and recorded in appropriate chart after administering any medication in the experimental group in the pre test. And in the post test every 2 hourly intermittent saline flush was administered and the observation was done in the experimental group where as only the observation done to the control group. As per prepared tool if a particular observation was present 2 marks was given and 1 was given if absent. The data obtained were analyzed and interpreted in terms of the objectives and hypothesis of the study

Major Findings/ ResultsSection I

Frequency and percentage distribution of demographic variables in experimental and control groups.

Demographic Variables

The maximum number of patients 13 (43.3 per cent) and 11 (36.7 per cent) in the experimental and control groups was between 16 and 35 years old, and the least number of patients 3 (10percent) and 4 (13.3 percent) were between 76-95 years of age group in both experimental and control group respectively. Out of 60 patients most of them were males in both experimental 18 (60 percent) and control groups 17 (56.7 percent). With regard to previous hospitalization, the majority of patients in experimental group 18 (60 percent) and control group 17 (56.7 percent) were not previously hospitalized. With regard to the duration of hospitalization, the majority of the patients in experimental group 20 (66.7 percent) and control group 21 (70 percent) were admitted in the hospital for 2-3 days.

Details of IV cannulation

- All 30 (100 percent) patients in the experimental and control group were cannulated by staff nurse after avoiding previous puncture mark, joints and by selecting most distal portion vein for cannulation.
- In that most of them 11 (36.7 percent) were cannulated in right forearm in the experimental group and in the control group most of them 9 (30 percent) were cannulatedin right dorsum of hand.
- And most of the patients 28 (93.3 percent) were used 20G cannula for cannulation.
- All 30 (100 percent) patients were received IV fluids, the rate of fluid flow is mostly between 40-60 drops/minute
- Most of them 13 (43.3 percent) were received 1001-2000ml/day in experimental and in control group 16 (53.3 percent)were received 1001-2000ml/day.
- The duration of therapy is equal in all three categories such as 2days, 3 days and above 3days.
- All the patient's (30) peripheral venous catheters in the experimental group were flushed with normal saline and all the patient's (30) peripheral venous catheters in the control group were not flushed with any solution.
- Out of 30 patients in the experimental group, the majority of 25 (83.4percent) patient's gap between fluid change was more than one hour. In the control group, 11 (36.7percent) samples fluids were changed for every half an hour, and also 11 (36.7percent) sample's gap between fluid change was more than one hour.
- It also shows out of 30 patients, the majority 26 (86.7percent) and 14 (46.8percent) of patient's cannula was removed because they no longer needed in both experimental group and control group respectively.
- In the experimental group, 27 (90percent) patient's cannula was straight during removal, where as in the control group the majority 18 (30percent) of patient's cannula was blocked with blood clot.

Section II

Data on aspect wise response on patency of peripheral venous catheter in experimental and control groups.

In aspect wise mean and standard deviation the statistical significance found in 12 aspects resistance rate (16.02), leaking from cannula (2.68), hardening of tissues (9.09), redness or change in colour (10.53), discomfort (22.97), bruised skin (2.17), skin swollen (8.09), edema (11.07), erythema at access site (10.89), palpable venous card (3.44) and infiltration (9.35) as compared to control group non-significance noticed in only three aspects blanched skin (1.59), skin cool to touch (0.89) and possible numbness (1.77) which is significant at 0.05 level. So, in comparison with control group, the experimental group maintained the patency of peripheral venous catheter more as a result of intermittent saline flushing.

Section III

Data on comparing the patency of peripheral venous catheter in the experimental groupbefore and after saline flush.

Mean Practice to compare the patency of peripheral venous catheter in theExperimental group before and after saline flush. n=30

Experimental Group	Sample	Response		Paired t- value
		Mean	SD	
Pre test	30	12.14	2.8	19.6*
Post test	30	11.7	2.2	

*** Significant at 0.05 level. • As the mean increases, patency of PVC decreases.**

The above table reveals that, in the pre test, mean score was 12.14 with the standard deviation of 2.8 and in the post test the mean score was 11.7 with the standard deviation of 2.2. The calculated paired‘t’ value was 19.6, with (df, 29) which is found to be significant at 0.05 level. Thus the findings showed that the intervention of the 2nd hourly intermittent saline flushing is found to be effective in the experimental group and hence the research hypothesis is accepted.

Section IV

Data on comparing the patency of peripheral venous catheter between experimental andcontrol group.

Mean Practice to compare the Patency of Peripheral Venous Catheter in the Experimental and Control Groups n=30

Study Group	Sample	Score	Response		Unpaired t- value
			Mean	SD	
Control	30	36.8	68.9	4.5	13.36*
Experimental	30	29	53.2	4.6	

*** Significant at 0.05 level. • As the mean increases, patency of PVC decreases.**

Above table shows that, the overall mean score for experimental group is 29 and standard deviation is 6. The overall mean score for control group is 36.8 and standard deviation is 7.3. The calculated ‘t’ test value for this was 13.36, which is found to be significant at 0.05 level.

Thus the findings showed that there was a significant difference in the patency of peripheral venous catheter between the experimental and control groups.

Section V

Data on association between selected demographic variables and the patency of peripheral venous catheter in the experimental and control groups.

The findings shows that, in the experimental group there was no significant association between patency of peripheral venous catheter and selected demographic variables such as age (F=0.61), gender (F=0.10) and previous hospitalization (F=0.01), as these obtained score are less than the table value (P<0.05). There is a significant association between the patency of peripheral venous catheter and duration of hospitalization (F=5.67) in the experimental group, as this obtained score is more than the table value (P>0.05).

And in the control group, there was no significant association between the patency of peripheral venous catheter and selected demographic variables such as age (F=1.88), gender (F=0.71), 72 previous hospitalization (F=1.39) and duration of hospitalization (F=2.37) as these obtained score are less than the table value (P< 0.05)

CONCLUSION

Peripheral Venous catheters (PVC) are the most frequently used invasive devices in the hospital and up to 70 percent of patients require a peripheral venous line during their hospital stay. Blockage of intravenous cannula (IV) is one of the major discomforts faced by the patients. It is one of the major roles of a nurse to maintain the patency of IV Cannula by just following a flushing technique. The findings of the present study revealed that the patency of peripheral venous catheter was maintained after 2nd hourly intermittent saline flushing in the experimental group in comparison with control group. Hence, intermittent saline flushing can be used as a protocol in the hospitals to maintain the patency of peripheral venous catheters.

Limitations

1. There were drop outs during the course of study.
2. Intervention of every 2nd hourly posed a difficulty.
3. It was difficult to obtain consent from the subjects.

Recommendations

1. A similar study can be undertaken on a larger scale for better generalization.
2. A comparative study can be done with heparin and

normal saline flush.

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