

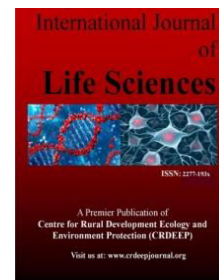
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## Full Length Research Paper

## Effectiveness Of Intermittent Normal Saline Flush To Maintain The Patency Of Peripheral Intravenous Catheter Among Patients In Vijaya hospitals and Joseph hospital at Kanyakumari district, Tamil Nadu

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## ABSTRACT

*This study is focused on the effectiveness of intermittent normal saline flush to maintain the patency of peripheral intravenous catheter among patients in Vijaya hospitals and Joseph hospital at Kanyakumari district, Tamil Nadu. The investigator formulated a hypothesis, which stated that the normal saline flush before and after administration of drugs will help to maintain the peripheral intravenous patency than those patient who did not receive the normal saline flush. Flushing procedures are necessary before and after the administration of intermittent medications through a capped catheter lumen; before and after blood sampling or the infusion of blood products; before and after the administration of incompatible medications; and when converting a catheter from a continuous to an intermittent infusion. A pilot study was conducted for about one week in the month of October to assess the feasibility of the tool. The main study was conducted for four weeks from November 1, 2013 to November 30, 2013) The investigator used convenience sampling technique and selected a sample of 60 patients in which 30 experimental and 30 control group where taken. A written consent was obtained from the patient. The data were collected by using patency scale with ten items. The investigator had applied descriptive and inferential statistic to analyze the data regarding demographic variables and effectiveness of normal saline flush. Results: The findings revealed that in the experimental group, after the intervention of normal saline flushing, 24(80.%) patients had patent intravenous cannula for 72 hours. There was a significant difference in the patency status of intravenous cannula between the experimental and the control group ( $t(60) = 3.39$  at 0.05 level of significance). The study result revealed that the experimental group has got 24(80%) no blockage in contradict the control group has 3(10%) blockage, The mild blockage is around 6(20%) among experimental group whereas the control group got 10(33.3%) mild blockage. Among control group the moderate blockage was 8(26.6%) and the severe blockage is 9(30%) in contrast the experimental group has no severe and moderate blockage.*

## Introduction

Peripheral venous catheters (PVC) are the most frequently used invasive devices in the hospital, in order to administer the drugs, fluids and parenteral nutrition Zingg & Pittet (2009), . Hence it is fundamentally important to maintain the patency of Peripheral Intravenous Catheter to facilitate the flow of fluid. Study reported the effectiveness of normal saline over heparin in catheter patency and its associated complications (Tuten & Gueldner , 1991).

A variety of complications associated with the insertion and utilization of venous access devices generally can be considered either local or systemic in nature. The non-patency of IV cannula results in local and systemic complications i.e. thrombosis, thrombophlebitis, extravasation, infiltration,

pulmonary embolism and bloodstream infections. Diverse practices are followed for maintaining the patency and also to evaluate the patency of intravenous cannula with Normal Saline Lock.

In the study conducted by Kaur, Thakur, Kaur, & Bhalla, (2011), normal saline lock was found to be highly effective for maintaining patency of intra venous cannula. Saline flush is important for patients, as it reduces the need for the potentially painful process of placing vascular lines, and also helps to control costs by reducing the number of devices used for each patient. Flushing procedures are necessary before and after the administration of intermittent medications through a capped catheter lumen; before and after blood sampling or the infusion of blood products; before and after the administration of incompatible medications; and when

converting a catheter from a continuous to an intermittent infusion.

#### *Problem identification and its significance*

Intravenous drug administration is common in hospitalised patients. If the daily volume of infusion is less, and needed intermittently, during the gap time the intravenous catheter may occlude with blood clot which may lead to thromboemboli, severe pain in the subsequent infusion as the clot forcefully dislodges from the lumen and even blockage of the catheter which leads to the selection of new site. To prevent these all complications maintaining the patency is very important.

To maintain the patency of Intra Venous Catheter even heparinised saline can also be used but considering to its side effects like prolonging bleeding and clotting time, heparin induced thrombocytopenia which may worsen the situation in patients hence saline flush is the safest method to maintain the patency of Intra Venous Catheter in patient (R. Clinton Webb, Edward W. Inscho).

#### *This study is undertaken to:*

To determine the patency of Peripheral Intravenous Catheter after intermittent normal saline flushing in experimental group with control group; To evaluate the effectiveness of intermittent normal saline flushing by comparing the level of patency in Peripheral Intravenous Catheter between experimental and control group and To find out the association between the level of patency in Peripheral Intravenous Catheter and selected socio demographic variables

### **Materials and methods**

#### *Study area*

The setting was chosen on the basis of availability of samples and the co-operation extended by the management and the health team. This study was conducted at Joseph and Vijaya Hospitals, Kanyakumari district, Tamil Nadu. Both are multi specialty hospitals with bed strength of 100

#### *Population*

The population under study constituted patients on Peripheral Intravenous Catheter

#### *Sample design*

The research design adopted for the present study was the pre-experimental non equivalent control group post test only design.

#### *Sample population*

Sampling Criteria involves selecting cases that meet some predetermined criteria of importance. The criteria for sample selection are mainly depicted under two heading, which includes the inclusion and exclusion criteria.

#### *Inclusion criteria:*

- Hospitalized patients with more than 18 years of age.
- Patients with peripheral intravenous catheter.
- Patients who are receiving Inj. Ampicillin, Inj. Ceftriaxone, Inj. Pipracillin, Inj. Cefotaxime.
- Patients who are willing to participate.

- Patients who are able to understand and speak Tamil / English / Malayalam.

#### *Exclusion criteria:*

- Patient with blood coagulation disorders.
- Non co-operative patients.
- Patients with blood transfusion.
- Patients with chemotherapy.
- Patients with Isolated fluid replacement therapy.
- Patients with anticoagulant therapy.
- Patients with history of Hypertension / Renal disease.

#### *Study population*

The sample size was 60 patients with Peripheral Intravenous Catheter at Joseph and Vijaya Hospital who fulfilled the inclusion criteria. 30 patients were allocated in Experimental group and 30 patients were allocated in Control group.

#### *Data collection methods*

The data collection procedure was done for a period of 4 weeks during the month of November at Joseph and Vijaya Hospital, after receiving initial permission from the institution and formal permission from the Director of Joseph and Vijaya Hospital. At first, a rapport was established with the patients and the purpose of the study was explained to them. It was assured to them that all data would be kept strictly confidential and used only for study purpose. After obtaining the verbal and written consent from the patients to participate in the study, demographic data was collected by the investigator.

The intervention was carried out by the investigator in the experimental group. The investigator administered 2 ml Normal Saline every six hours for three consecutive days. The post test level of patency was evaluated every day for experimental and control group by using patency scale.

#### *Data analysis*

Data collected was analyzed using both descriptive and inferential statistics such as mean, standard deviation, chi square and unpaired' test.

#### *Descriptive statistics*

- Frequency and percentage distribution was used to analyze the demographic variables.
- Frequency and percentage distribution was used to assess the level of patency.
- Mean and standard deviation were used to evaluate the effectiveness of intermittent normal saline flush to maintain the patency of peripheral intravenous catheter.

#### *Inferential statistics*

- Unpaired t-test was used to compare the post test level of patency between experimental group and control group.
- Chi-square test was used to find out the association between the post test level of patency with their selected socio demographic variables such as age, gender, religion, occupation, monthly income, place of residence, food pattern, bad habits, site, size of the cannula, and weight of the patients (in kg).

**Table 1:** Frequency and Percentage distribution of patients according to their demographic variables in experimental and control groups.

(N=60)

Sl. No	Demographic variables	Experimental Group (n=30)		Control Group (n=30)	
		f	%	f	%
1.	<b>Age (in years)</b>				
	a. 21-35	6	20	7	23.3
	b. 36-50	6	20	9	30
	c. 51-65	11	36.6	9	30
	d. Above 65	7	23.3	5	16.6
2.	<b>Gender</b>				
	a. Male	14	46.6	12	40
	b. Female	16	53.3	18	60
3.	<b>Occupation</b>				
	a. Unemployed	12	40	12	40
	b. Self employed	6	20	3	10
	c. Government employee	5	16.6	5	16.6
	d. Private employee	7	23.3	10	33.3
4.	<b>Monthly income (Rs)</b>				
	a. Up to 5000				
	b. 5001 – 10,000	12	40	12	40
	c. 10,001 – 15,000	7	23.3	4	13.3
	d. Above 15001	4	13.3	6	20
		7	23.3	8	26.6
5.	<b>Place of Residence</b>				
	a. Urban	9	30	10	33.3
	b. Rural	21	70	20	66.6

**Table 2:** Frequency and percentage distribution of patients according to their level of patency in Peripheral Intravenous Catheter in experimental group and control group.

N=60

Grade	Experimental group (n= 30)		Control group (n=30)	
	f	%	F	%
No blockage	24	80	3	10
Mild blockage	6	20	10	33.3
Moderate blockage	0	0	8	26.6
Severe blockage	0	0	9	30

To evaluate the effectiveness of intermittent normal saline flush the following hypothesis was formulated;  
H<sub>1</sub>: There will be a significant difference the patency of

Peripheral Intravenous Catheter between experimental and control group.

**Table 3:** Mean, Standard Deviation, Mean Difference and ‘t’ value on Post test Level of patency among experimental and control group.

(N=60)

Sl.No	Group	Mean	SD	MD	t-value	P-value
1	Experimental	1.80	3.67			
2	Control	4.93	3.48	3.13	3.39	2.00

Significant at 0.05% (df=58)

**Table 4:** Aspects wise Mean practice to compare the patency of Peripheral Intravenous Catheter between Experimental and Control group

(N=60)

Sl. No	Observation	Experimental Group (n=30)		Control Group (n=30)		‘t’ Value
		Mean	SD	Mean	SD	
1	I.V site appears unhealthy	0.20	0.40	0.36	0.490	1.43 NS
2	Presence of tenderness	0.20	0.40	0.50	0.50	2.52 S
3	Discoloration around the I.V site	0.20	0.40	0.46	0.50	2.25

Sl. No	Observation	None	Mild	Moderate	Severe	P value	Significance
4	Skin cool to touch	0.20	0.40	0.36	0.49	1.43	S
5	Swelling around the I.V site	0.20	0.40	0.62	0.49	3.58	NS
6	Presence of pain near the I.V Site	0.20	0.40	0.66	0.47	4.06	S
7	Presence of Erythema	0.10	0.30	0.13	0.34	0.396	S
8	Presence of Palpable venous cord	0.20	0.40	0.60	0.49	3.41	NS
9	Skin tight and leaking	0.10	0.30	0.33	0.47	2.25	S
10	Resistance in flow of fluid	0.20	0.40	0.90	0.30	7.54	S

(S-Significance, NS- Non Significance)

**H<sub>2</sub>:** There will be significant association between the level of patency in Peripheral Intravenous Catheter and selected socio demographic variables in experimental group

**Table 5:** Data on association between the level of patency in Peripheral Intravenous Catheter and selected socio demographic variables in experimental group.

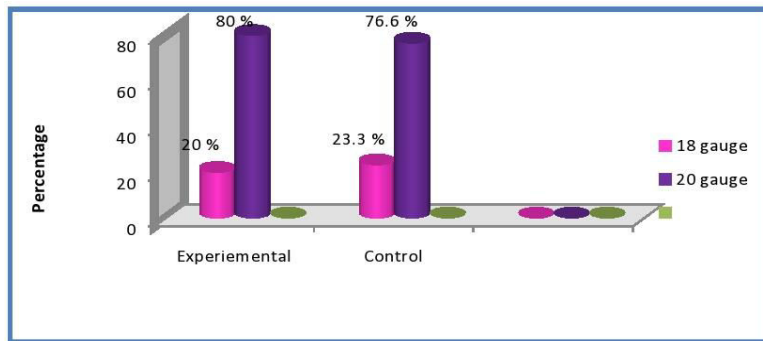
Sl. No	Score	None		Mild		Moderate		Severe		'P' value	$\chi^2$ value
1	Observation	f	%	f	%	f	%	F	%		
1	<b>Age (in years)</b>										
	a.21-35	3	10	-	-	-	-	3	10	16.92	3.94
	b.36-50	6	20	-	-	-	-	-	-		
	c.51-65	8	26.6	-	-	-	-	2	6.6	df 9	NS
	d. Above 66	7	23.3	-	-	-	-	1	3.3		
2	<b>Gender</b>										
	a. Male	10	33.3	-	-	-	-	4	13.3	7.82	3.19
	b.Female	14	46.6	-	-	-	-	2	6.6	df 3	NS
3	<b>Occupation</b>										
	a. Unemployed	10	33.3	-	-	-	-	2	6.6		
	b. Self employed	5	16.6	-	-	-	-	1	3.3	16.92	7.57
	c. Government employee	5	16.6	-	-	-	-	-	-		
	d. Private employee	4	13.3	-	-	-	-	3	10	df 9	NS
4	<b>Monthly income (Rs)</b>										
	a. Up to 5000	11	36.6	-	-	-	-	2	6.6		
	b.5001 – 10,000	4	13.3	-	-	-	-	3	10	16.92	5.78
	c.10,001 – 15,000	3	10	-	-	-	-	1	3.3	df 9	NS
	d. Above 15001	6	20	-	-	-	-	-	-		
5	<b>Place of Residence</b>										
	a. Urban	6	20	-	-	-	-	3	10	7.82	3.42
	b. Rural	18	60	-	-	-	-	3	10	df 3	NS
6	<b>Bad Habits</b>										
	a. Smoking	6	20	-	-	-	-	2	6.6	16.92	
	b. Alcoholism	1	3.3	-	-	-	-	1	3.3	df 9	6.762
	c. Drug abuse	-	-	-	-	-	-	-	-		NS
	d. None of the above	17	56.6	-	-	-	-	3	10		
7	<b>Size of the cannula (in gauge)</b>										
	a.18										

b.20	5	16.6	-	-	-	-	2	6.6	7.82	4.418
	19	63.3	-	-	-	-	4	13.3	df 3	NS
<b>8 Weight (in Kg)</b>										
a. Below 40	-	-	-	-	-	-	-	-		
b. 40-50	6	20	-	-	-	-	2	6.6	21.03	2.604
c. 51-60	9	30	-	-	-	-	3	10		NS
d. 61-70	6	20	-	-	-	-	1	3.3	df 12	
e. Above 70	3	10	-	-	-	-	-	-		
<b>9 Site of Cannula</b>										
<b>Right side</b>										
a. Dorsum of hand	3	10	-	-	-	-	2	6.6	16.92	5.60
b. Forearm	6	20	-	-	-	-	-	-		NS
c. Antecubital region	2	6.6	-	-	-	-	-	-	df 9	
d. Upper arm	-	-	-	-	-	-	-	-		
<b>Left side</b>										
a. Dorsum of hand	4	13.3	-	-	-	-	1	3.3	16.92	6.16
b. Forearm	5	16.6	-	-	-	-	2	6.6		NS
c. Antecubital region	4	13.3	-	-	-	-	1	3.3	df 9	
d. Upper arm	-	-	-	-	-	-	-	-		

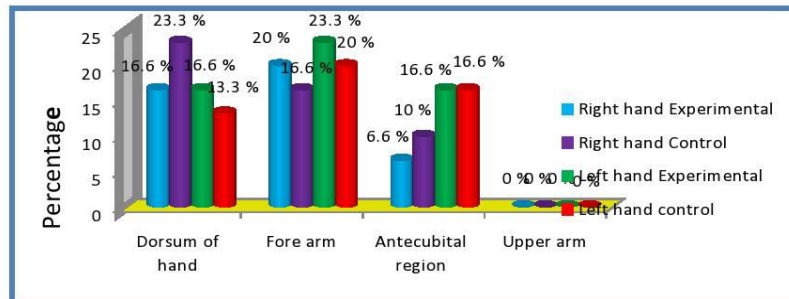
Significant at ( $P < 0.05$ ) level S-Significant

NS-Non Significant

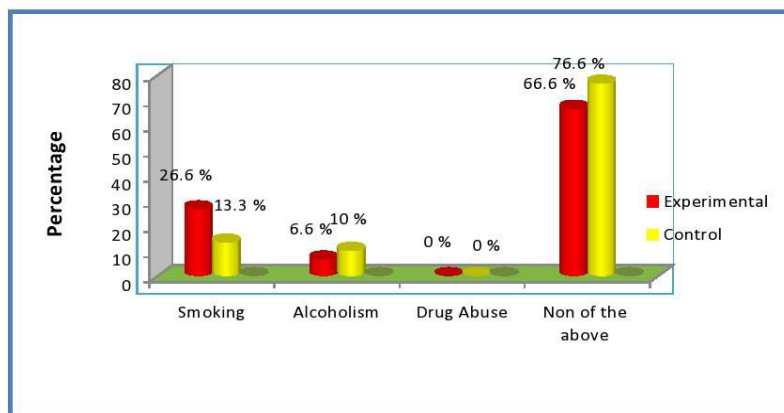
**Fig. 1:** Frequency and percentage distribution of patients according to the size of the cannula in experimental and control group.



**Fig. 2:** Frequency and percentage distribution of patients according to the size of the cannula in experimental and control group.



**Fig. 3:** Frequency and percentage distribution of patients according to their bad habits in experimental and control group.



## Discussion

In this study the result shows that the post level of patency in experimental group and control group. In experimental group it reveals that, majority of patients 24 (80%) were maintaining the patency of Peripheral Intravenous Catheter after intermittent Normal Saline flush and 6 (20%) patients had mild blockage. Whereas in Control group majority of the

patients 10 (33.3%) had mild blockage, 8 (26.6%) patients had moderate blockage, 9 (30%) patients had severe blockage and only 3(10%) patients had no blockage.

The finding of this study is supported by the study conducted by Vinoli S.G. (2007). A simple random sampling was adopted to select 60 samples based on certain

predetermined criteria. Objectives and subjective scoring were done on three consecutive days of Peripheral Intravenous Catheter patient with second hourly intermittent Normal saline flushing for experimental group and without normal saline flushing for control group. The tool used were questionnaire examining the demographic, clinical variables and observation check list .The objective and subjective patency score were found to be significantly maintained within experimental group when compared to control group. Thus intermittent normal saline flushing was found to be effective in maintaining the patency of Peripheral Intravenous Catheter.

It reveals that there is a significant difference between the level of patency and the aspects such as resistance in flow of fluid (7.54), presence of tenderness (2.52), discoloration around the I.V site (2.25), swelling around the I.V site (3.58), presence of pain near the I.V site (4.06), presence of palpable venous cord (3.41), skin tight and leaking (2.25) at 0.05 level of significance. Whereas there is no significant difference between the level of patency and the aspects such as I.V site appears healthy (1.43), skin cool to touch (1.43), presence of erythema (0.396) at 0.05 level of significance.

The findings of this study are supported by Shoaf J, Oliver. S evaluated the effectiveness of normal saline versus normal saline containing 10units per 1ml heparin for preventing loss of an intermittent intravenous site (heparin lock).The sample consisted of 260 surgical patients from a general surgery and a cardiovascular surgery nursing unit at a tertiary care hospital. Results indicated that heparinised saline is not needed to maintain the patency of an intermittent intravenous site, and the use of saline solution is less irritating, causes less phlebitis, is less expensive to patients, and saves nursing time.

The findings of the present study support the findings of Kaur, Sharma, & Jain, (2006) which revealed that the intermittent normal saline was effective in maintaining the patency of intravenous cannula. Sucheta,(2006) in her study found that both heparinized solution and non-heparinized solution were effective for the maintenance of patency of peripheral intracathline. The present study findings are further supported by the study conducted by (Babadi, Ghadiriyan, & Hosseini, 2015) where it was found that performing saline lock in the intervention group compared with the control group, which did not have saline lock, had significant impact in reducing the incidence of phlebitis.

### Conclusion

The study result revealed that the experimental group has got 24(80%) no blockage, however the control group has 3(10%) blockage, the mild blockage is around 6(20%) among experimental group whereas the control group got 10(33.3%) mild blockage. Among control group the moderate blockage was 8(26.6%) and the severe blockage is 9(30%) in contrast the experimental group has no severe and moderate blockage. The study is concluded that the intermittent normal saline flush is effective in maintaining the patency in peripheral intravenous catheter. Normal saline flush has no complication, less cost effective and easy to administer to the patients. The researcher found that normal saline flush is best and effective method to maintain the patency of Peripheral intravenous Catheter among patients. The study has enlightened on the importance of the role of the nurse in

identifying the patency during normal saline flush on Peripheral Intravenous Catheter and they can administer to reduce the level of blockage.

### Acknowledgement

I wish to acknowledge my heartfelt gratitude to the **Lord Almighty** for all the wisdom, knowledge, guidance, strength, protection, shield and support, he has offered me throughout this endeavour and given me courage to overcome the difficulties and thus complete this study successfully.

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