

Effectiveness of Heparin, Glycerine Magnesium Sulphate and Moist Heat Applications on Infiltration and Extravasation among IV Cannulisation Patients

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Abstract

The present study was aimed to evaluate the effectiveness of heparin, glycerine magnesium sulphate and moist heat applications on infiltration and extravasation among the IV cannulisation patients in a selected hospital of Bangalore. The conceptual framework for this study was based on the Goal Attainment theory by Imogene King. Quasi experimental time series design was used for this study. The samples were selected using convenient sampling technique; 45 samples were selected to assess the effectiveness of heparin, glycerine magnesium sulphate and moist heat applications on infiltration and extravasation among the IV cannulisation patients by using semi-structured self-administered questionnaire. Infiltration was assessed using Infiltration Grading scale (Infusion Nurses Society, 2011), extravasation was assessed using Extravasation grading scale (Nurse Consultant, Intravenous Therapy Nursing Lisa Dougherty, updated 2015) and Numerical Pain Rating scale was used to assess pain. Out of 45 samples, 15 samples were selected for all three groups of heparin, glycerine magnesium sulphate and moist heat applications which were applied as interventions in three different groups. Content validity and reliability of the tool was established by test-retest method. The final data was collected, analysed and interpreted by using descriptive and inferential statistics. The study concluded that all three interventions, heparin, glycerine magnesium sulphate and moist heat were equally effective.

Intravenous therapy, although one of the most commonly performed procedures in hospitalised patients, remains susceptible to complications. More than 85 percent of all hospitalised patients receive intravenous therapy (Deborah Carson, 2012). Infusion Nurses Society reported infiltration and extravasations as early complications of peripheral intravenous administration. Infiltration is the inadvertent leakage of a non-vesicant solution into surrounding tissue and extravasation is the inadvertent leakage of a vesicant solution into surrounding tissue.

Injury can be from minor to serious complications, including full-thickness skin loss and muscle and tendon necrosis requiring reconstructive surgery or even amputation, leading to longer hospital stays, increased morbidity, and increased costs (Lynn Hadway, 2009). The Centres for Disease Control and Prevention (CDC) estimated that each year in the United States there are about 1.7 million nosocomial infections in hospitals and 99,000 associated deaths.

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In this statistics the IV cannula associated infections plays a major role (Centres for disease control and prevention, 2002). According to a prospective study done in Karnataka Institute of Medical Sciences, Hubli the estimated incidence is 4.5 IV cannula related infections per 100 admissions.

Factors believed to affect extent of injury include effective interventions at early stage. Various interventions are available among which moist heat, glycerine magnesium sulphate, topical heparin applications are most effective and commonly used interventions. Warm compresses promote vasodilatation, increase drug distribution and decrease local drug concentrations. Glycerine magnesium sulphate is hygroscopic, thus fluid is drawn out of the tissue and oedema subsides. Heparin has ability to penetrate pathologically altered tissue immediately upon application and has an anti-phlogistic and anti-exudative effect, thus alleviating pain and promoting tissue metabolism and the process of healing. To identify a best and effective intervention among three, study was conducted on assessment of effectiveness of glycerine magnesium sulphate, heparin gel and moist heat treatment on infiltration and extravasation among the IV cannulisation patients.

Objectives

- To assess infiltration and extravasations among the IV cannulisation patients.
- To compare the effectiveness of heparin, glycerine magnesium sulphate and moist heat treatment.

Review of Literature

Saini, et al (2011) investigated the epidemiology of infiltration caused by intravenous therapy in Nehru Hospital, PGIMER Chandigarh. A total of 168 patients with peripheral intravenous cannula included in the study using purposive sampling technique were studied prospectively. Infiltration Grading scale developed by Infusion Nurses Society was used to assess infiltration. The study revealed incidence of infiltration as 31.5 percent and also that nurses are directly involved in the handling of peripheral intravenous cannula. The protocol need to be developed to use by the nurses for prevention and management of infiltration caused by peripheral intravenous cannula.

Gopalkrishna & Kamble (2015) conducted an experimental study to assess the effectiveness of Guggul paste application versus other standard care measures (magnesium sulphate dressing, warm compress and thrombophob application) on intravenous infiltration among hospitalised patients in Pune. A pre-test post-test control group design was used. The study sample size was 60 patients having intravenous infiltration randomly assigned to the experimental and control group. After applying interventions on both groups observations were carried out using the Infusion nurses' society infiltration scale at an interval of 12 hours for three days. A paired t test was used to assess the effectiveness of guggul application in experimental group and magnesium sulphate dressing, warm compress and thrombophob application in control group. The corresponding p-values were less than 0.05 at 29 degrees of freedom. Thus it was concluded that all treatments were equally effective in intravenous infiltration.

Tiziana et al (2012) found that the difference between the adjusted means of the heparin sulphate group and of the non-pharmacological group was equal to 2.03. The 95 percent bilateral CI for the difference between the adjusted means of the heparin sulphate group and of the non-pharmacological group in the ANCOVA model was 1.23 to 2.82, and the lower limit was greater than the pre-specified limit of -0.2, thus showing that heparin sulphate was non-inferior to non-pharmacological measures. The difference between groups was statistically significant. Thus the study concluded that heparin sulphate is a

safe and effective local treatment thus clinically applicable.

Anjum (2007) in a quasi-experimental study to assess the effectiveness of hot fomentation versus cold compress for treatment of intravenous infiltration in Pune, showed that the pre-treatment mean score of degree of infiltration was 7.1667, which decreased to 0.7071 on the third day of treatment with hot fomentation. In cold compress group, pre-treatment mean score of degree of infiltration was reduced from 6.9333 to 0.7571 on the third of cold compress treatment. The intensity of pain was reduced from severe (56.66%) to no pain (93.4%) in hot fomentation group. In cold compress group, the intensity of pain was reduced from moderate (60.0%) to no pain (86.6%). The mean score of hot fomentation group was 6.5067 in reducing the degree of infiltration while in cold compress the mean score was 6.6. The study concluded that hot fomentation was slightly better than that of cold compress.

Methodology

Quasi-experimental time series study was carried out in the medical and surgical wards of selected hospital, Bangalore using evaluative research approach. The samples consisted of total 45 adult patients (15 each in glycerine magnesium sulphate group, heparin group and in moist heat application group) who were in-patients with peripheral intravenous cannula admitted during data collection period. Convenient sampling technique was used to select the samples.

The tools used for data collection were semi structured self-administered questionnaire on demographic and clinical profile for each subjects and standardised tools- Infiltration grading scale (Infusion Nurses Society, 2011) for assessing degree of infiltration, Extravasation grading scale (Nurse Consultant, Intravenous Therapy Nursing Lisa Dougherty, updated 2015) for assessing degree of extravasation, Numerical pain rating scale to assess pain and Electronic thermometer to measure temperature. The content validity was established by the experts and calibrated electronic thermometer was used. The reliability of the tools was established by test-retest correlation-coefficient method.

Final data collection was done by following first pre-test observation of infiltration and extravasations on the day one by using infiltration grading scale and extravasations grading scale, respectively. Interventions were applied for 15 minutes two times a day up to 4 days for all three groups, heparin ointment for first group, magnesium sulphate and glycerine for

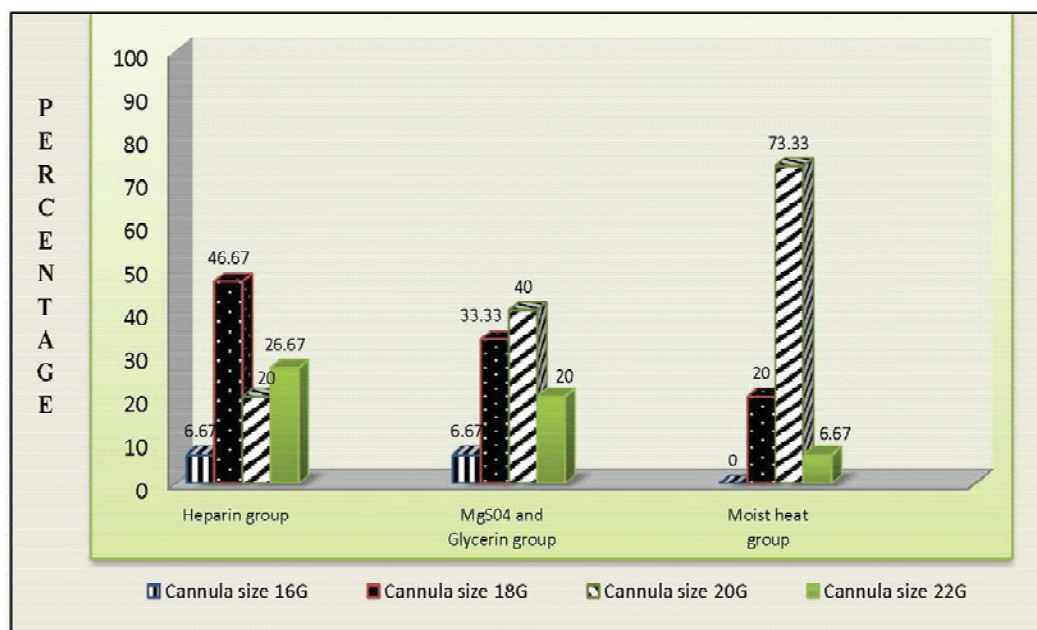


Figure 1: Percentage distribution of samples according to the cannula size used for samples.

second group and moist heat application for third group. After 1 hour of application of interventions post-test scoring were assessed. Pre-test and post-test scoring was done twice a day up to 4 days for each patients and the data were analysed by descriptive and inferential statistics.

Results & Discussion

Data analysis revealed that majority of the samples were in the age group of 18-35 in heparin group (n=8, 53.33%), in MgSO₄ and glycerine group were in the group of 36-55 (n=8, 53.33%) and in moist heat group were in the group of 36-55 (n=8, 53.33%); majority were males in each group that is 11 (73.33%) in heparin group, 12 (80%) in MgSO₄ and glycerine group and 12 (80%) in moist heat group.

Frequency and percentage distribution of the sub-

(66.67%).

The findings on frequency and percentage distribution of the samples according to the degree of infiltration before and after interventions showed that there was significant decrease in the infiltration scores of all three groups after interventions, that is for 13 (86.667%) samples in heparin group, for 9 (60%) in magnesium sulphate and glycerine group and for moist heat group 8 (53.333%). Similarly another finding on frequency and percentage distribution of the samples according to the degree of extravasation before and after interventions also showed that there was significant decrease in extravasation the scores of all three groups after interventions, that is for 14 (93.333%) in heparin group, in magnesium sulphate and glycerine group for 12 (80%) samples had reduction and in moist heat group for 12 (80%) samples.

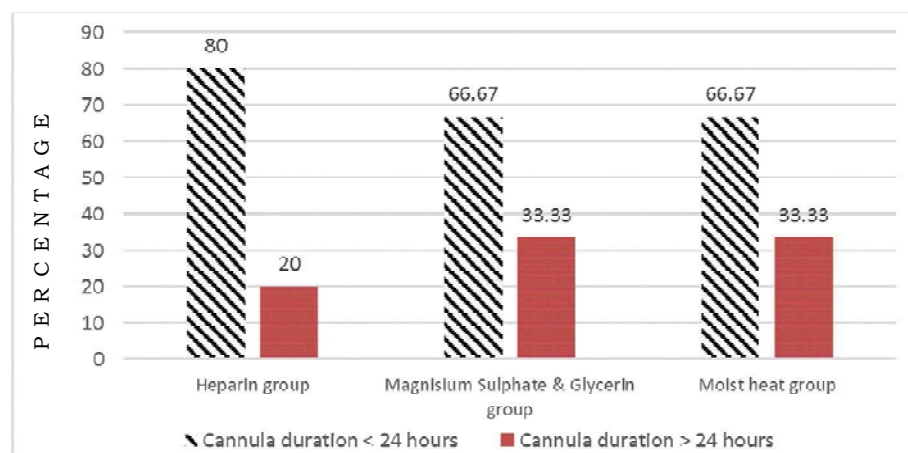


Figure 2: Percentage distribution of samples according to duration of cannula at the site.

jects according to the clinical variables in terms of cannula size, cannula duration at the site was done.

Figures 1 and 2 reveal that in two groups that is MgSO₄ and glycerine group and moist heat group the majority of cannula size used for samples was 20G and in one group that is heparin group was 18G. For majority of samples cannula duration at the site was for 24 hours in all three groups, heparin group 12 (80%), in MgSO₄ and glycerine group 10 (66.67%) and in moist heat group 10

The post-test infiltration and extravasation scores of the samples between the heparin group, MgSO₄ and glycerine group and moist heat group (Table-1) showed that there is significant reduction of the degree of infiltration and extravasation in all three groups at 0.05 level of significance with ANOVA F-value of 0.711. Thus, comparison of the differences between the groups showed that there was no significant difference between the groups, thus, all three interventions were effective in reduction of various grading of infiltration and extravasation.

Table 1: Comparison of F value between the post-test infiltration and extravasation reading of the samples in the heparin group, MgSO₄ and glycerine group and moist heat group (N=45)

Sources	Sum of squares (SS)	Df	Mean square (MS)	F Value	p Value
Between groups	0.553	2	0.276	0.711	0.497
Within groups	16.316	42	0.388		
Total	16.869	44			

Level of significance at 0.05; Table value df (2, 42) = 3.22

Nursing Implications

Nursing Practice

Heparin ointment, MgSO₄ and glycerine application and moist heat treatment are easy to use and easily available and take less time for personnel administration thus can be adopted and practiced.

Nursing Education

With the emerging nursing care trends, nursing education must focus on applying conservative treatments as important nursing responsibilities for prevention and management of complications of peripheral IV therapy. The research finding serves as a guide to evidence and also helps nursing students to deliver nursing care effectively to the IV cannulisation patients.

Nursing Administration

The nurse administrators should organise staff development programme to update the knowledge of nurses on applications of conservative interventions to prevent and manage infiltration and extravasations at early stage. Also the nursing standards and guidelines could be re-set in such a way that it will include application of conservative treatments.

Nursing Research

Studies conducted by Indian nurses on these conservative interventions for management of infiltra-

tion and extravasations for adult patients are very few. Thus further research studies needed to provide scientifically tested materials to improve standard of care for such patients and prevent severity which may lead to amputation.

Conclusion

Nurses knowledge need to be updated on conservative interventions which will be easy to administer and prevent and manage the complications of infiltration caused by peripheral intravenous cannula at early stage.

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