

Effectiveness of Vein Visualization Device on Selected Parameters During Peripheral Intravenous Cannulation

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Abstract:-

Background

Peripheral intravenous cannulation is basic skilled procedure which has been performed by nurses. But this is challenging task while dealing with difficult venous access (DIVA) patients. Vein finder is innovative approach to locate veins during cannulation which ease problems arising during venous access for cannulation.

Objectives

The main objectives of study was to access effect of vein visualization device on selected parameters include time required to visualize vein, number of attempt and intensity of pain also study was conducted with purpose of find out association of selected demographic variables with selected parameters.

Method

The pilot study was conducted on 30 samples, in 2020, Chandrapur Maharashtra. Samples were randomly assigned to experimental group (N=15) and control group (N=15). Peripheral intravenous cannulation performed in experimental group by using vein visualization device based on transillumination technology and control group exposed to standard method.

Result

Vein visualization device contributed to reduce time to locate veins that mean score found to be 3.53 for experimental group which get reduced in control group to 3.1 (mean variance =0.43). first attempt success rate of experimental group was 93.33% and of control group was 66.66%,. Intensity of pain got reduced in experimental group (mild pain :53.33%, moderate 46.66%) than control group (mild: 40%, moderate : 33.33%, severe: 13.33%, worst : 33.33%). Association of skin characteristics found with time required to visualize vein, number of attempts and intensity of pain. also there were association between BMI and time required to visualization of vein.

Conclusion

Vein visualization device found to be effective to locate veins, reduce number of attempts and intensity of pain.

I. INTRODUCTION

Peripheral intravenous catheterization (PIVC) is one of the most frequently performed invasive skills by nurses working in hospitals.[1] 70% to 80 % of hospitalized patients requiring medication delivered through a vein cannula. [2] PIVC failure rate is increasing due to accidental removal, dislodgement, occlusion, phlebitis, pain and infection. With each failure reinsertion of PIV cannula is necessary for continuation of treatment which may more painful to patient and pain level may elevate with insertion difficulty.[3,4,5]

Vascular cannulation success rate and time are crucial to the optimal resuscitation of a critically-ill patient. This can be a challenging to even the most experienced emergency nurse. Rate of first attempt failure were 40% in adults and 64% in children.[6]

Some hospitals they permit only two IV insertion attempts by a nurse and if the attempt is failed, a second nurse will make an additional attempt. when nurses fail to insert a peripheral IV line successfully then the task may go to a doctor for evaluation of status of the IV cannulation and they may order for emergency vascular access methods rather than peripheral IV cannulation (Etzel-Hardman, 2008). And therefore, it may affect expenditure and hospital policies as well as lead to delayed treatment.[7]

The National Academy of Sciences (1999) issued report by the Institute of Medicine (IOM) which suggest that there is need to create solutions and find alternatives that will improve patient safety. If errors will occur, healthcare workers are responsible for their actions, and the system is responsible to provide advance resources for practitioners to prevent the same error. Hence there is need to improve patient's safety by reducing multiple venepuncture attempts during cannulation. [8]

There are number of vein visualization devices are available at market which may help to find the best veins and reduce multiple pricking attempts during peripheral IV cannulation.

Some studies found that vein visualization devices help to visualize vein easily and improve first attempt success at peripheral IV cannulation and even can reduce

time required to complete PIV cannulation procedure.[9,10,11]

II. RESEARCH METHODOLOGY

Pilot study by using quantitative research approach was conducted in 2020, Chandrapur, Maharashtra. True experimental post test only design used in study. This study included total 30 clients which randomly assigned to experimental group (N=15) and control group (N=15). Experimental group exposed to peripheral intravenous cannulation by using vein visualization device based on transillumination technology which use LED light resources and control group exposed to standard method of cannulation. Effect of vein visualization device measured with help of observation checklist prepared on selected parameter includes time required to visualize vein, number of attempts and intensity of pain. Demographic variables collected by using structured interview schedule. Relation of selected parameter and selected demographic variables were measured by using chi square test. Z test used to test significance of difference between efficacy of vein visualization device and standard care for vascular access during peripheral intravenous cannulation.

III. RESULT

In experimental group 53.33% samples required < 5 seconds to visualize veins 46.66% samples required 5-10 seconds. Control group required more time to visualize veins (< 5sec: 26.66%, 5-10 sec: 60%, 10-15 sec: 13.33%). The mean score of experimental group (3.53) was more than mean score of control group (3.1) for parameter time required to visualize veins ($p < 0.00001$) and result was significant at 5% level.

First attempt success rate of experimental group (93.33%) was higher than control group (66.66%). Mean score difference found to be 0.43 ($SD_1 = 0.25$, $SD_2 = 0.74$). Z test score found to be 6.16 ($p < 0.00001$) and result was significant at 5% level.

Intensity of pain ranged from mild to moderate in experimental group (mild: 53.33%, moderate: 46.33%) which ranged in control group from mild to worst (mild: 40%, moderate: 33.33%, severe: 13.33%, worst: 13.33%). Mean score difference found to be 0.53 and z score was 11.81 ($p < 0.00001$). Result found significant at 5% level.

Characteristics of skin and BMI shown significant association with parameter, time required to visualize vein ($p < 0.05$). Number of attempt shown significant relationship with demographic variable, characteristic of skin ($p < 0.05$) at 5% level. Intensity of pain level shown relationship with skin characteristics ($p < 0.05$) at 5% level.

IV. CONCLUSION

Vein visualization device based on trans-illumination technology which use LED light sources contribute to easily locate veins during peripheral intravenous cannulation and facilitate to improve first attempt success rate by reducing intensity by pain level during cannulation even if among obeys and patient with thick characteristic skin.

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