ORIGINAL ARTICLE

Assessment of the Effectiveness of Multicomponent Nursing Care on Pin-site Infection among Patients with External Fixators in Ortho Wards of Mahatma Gandhi Medical College and Research Institute

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Abstract

The most prevalent external fixator consequence is pin-site infection. Pin-site infections increase the frequency of hospital visits needed during a patient's therapy and may necessitate extra treatment, such as antibiotics and surgery. In comparison with other series from affluent and developing nations, there is a significant frequency of pin-tract infections after external fixation for fracture.

Aims and objectives:

- To assess the pin-site infection among patients with external fixators.
- To evaluate the effectiveness of multicomponent nursing care on pin-site infection among patients with external fixators.
- To find out the association between multicomponent nursing care on pin-site infection among patients with external fixators and their selected demographic variables.

Materials and methods: This study took a quantitative research technique. This study used a two-group pretest and posttest design. Using a simple random sampling procedure, 60 samples were selected and divided into two groups. Pretest and posttest use Checketts and Otterburn grading system, as well as an assessment of pin-site infection. On pin-site infection among patients with external fixators and their specified demographic factors, multicomponent nursing care was given to experimental group I and routine care was given to control group II.

Results: According to the data of the 60 participants in group I (experimental), 26 (86.7%) had no pin-site infection, while 4 (13.3%) had minor pin-site infection, and 0 (0%) had major pin-site infection of external fixators. In group II (control), 2 (6.7%) had no pin-site infection 28 (93.3%) had minor pin-site infection and 0 (0%) had major pin-site were having minor pin-site infection. And the *p*-value of 0.005* indicates that the result is statistically significant. As a result, H_1 and H_2 were accepted. In patients with external fixators, the effectiveness of multicomponent nursing care on pin-site infection is reduced.

Keywords: External fixator, Multicomponent nursing care, Pin-site infection.

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Introduction

Metal pins are used in external skeletal fixators. When these pins are placed into the bone through the skin, they act as foreign bodies because they are in contact with the outside world.[1] It is used to treat complex musculoskeletal disorders in orthopedics.[2] Level one represents normal/physiologic changes in skin color, skin warmth, pin-site drainage and resolves within 72 hours; level two represents erythema, warmth, drainage, possible pain, and positive culture; and level three represents erythema, warmth, drainage, possible pain, and positive culture, all of the aforementioned maybe with the addition of pus, pin loosening, or enhanced microbial growth on cultures at level three.[3]

The nurses provide standard postoperative care as well as particular care for the affected side, observe vital signs, administer postoperative drugs as prescribed, elevate the limb, monitor the pin-site for signs and symptoms of infection, and care for the wound.[4]

Need for the Study

According to the prevalence of external skeletal fixation in India, pin-site infection was found in a sample of 1,223 patients with unilateral frames on external fixators at AIIMS, New Delhi, ranging from 4.7 to 71.4%.[5] A total of 474 patients were included in the study based on the prevalence of Puducherry. Between the ages of 32 and 64, 409 (86%) were males and 65 (14%) were females. Overall, buried K-wire fixation had a lower rate of postoperative pin-site infection than unburied K-wire fixation. A total of 141 patients suffered a postoperative pin-site infection.[6]

A unique multicomponent nursing care to prevent pin-site infections is required to overcome these infections. The goal of

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this study is to see how effective multicomponent nursing care is at preventing pin-site infection in patients with external fixators.

Objectives

- To assess the pin-site infection among patients with external fixators.
- To evaluate the effectiveness of multicomponent nursing care on pin-site infection among patients with external fixators.
- To find out the association between multicomponent nursing care on pin-site infection among patients with external fixators and their selected demographic variables.

Research Methodology

A two-group pretest and posttest design was used in the investigation. The participants of this study were patients with pin-site infection who were hospitalized at Mahatma Gandhi Medical College and Research Institute, Puducherry. By using a simple random sampling procedure, 60 samples were chosen and divided into two groups, with 30 in each group, group I receiving multicomponent nursing care and group II receiving regular care. The Institutional Human Ethical Committee granted permission, and the subjects gave their informed written consent. The demographic characteristics of patients with pin-site infection were obtained using an interview schedule, and pin-site infection was assessed using the Checketts and Otterburn classification grading system. Group I received multicomponent nursing care, while group II received routine intervention.

Criteria for Sample Selection

Inclusion Criteria

- Patients who were hospitalized with pin-tract infection on either lower or upper extremities.
- Patients above 18 years of age.
- Patients available during the time of data collection.
- Patients with the external fixation method having their first postoperative return visit.

Exclusion Criteria

- Patients who refused to take part in the study.
- There is an active infection in the limb that is being treated.
- All of the patients received femur and/or tibia surgery for a variety of reasons, including bone lengthening, strengthening, transfer, compression, and tension.

Results

The first objective of the study was to assess the level of pin-site infection among patients with external fixators.

Figure 1 shows distribution of level of pin-site infection among patients with external fixators in group I (experimental) and group in II (control) during pretest. In pretest group I (experimental), 5 (16.7%) were having minor pin-site infection and 25 (83.3%) were having major pin-site infection of external fixators. In group II (control), 2 (6.7%) were having minor pin-site infection and 28 (93.3%) were having major pin-site infection level of external fixators.

Figure 2 shows the distribution of level of pin-site infection among patients with external fixators in group I (experimental) and group II (control) during posttest. In posttest group I (experimental), 26 (86.7%) were having minor pin-site infection, 4 (13.3%) were having minor pin-site infection, and 0 (0%) were having major pin-site infection level of external fixators. In group II (control), 2 (6.7%) were having no pin-site infection 28 (93.3%) were having minor pin-site infection and 0 (0%) were having major pin-site infection level of external fixator. The mean postassessment pin-site infection scores of experimental group I and control group II will be significantly lower than the mean preassessment scores of them. As a result, H_1 was approved.

The second objective of the study was to evaluate the effectiveness of multicomponent nursing care on pin-site infection among patients with external fixators.

Table 1 shows that the mean score in the level of grading of pin-site infection pretest was group I (experimental) 4.5 (4, 5) and group II (control) 5 (5, 5), respectively.

The estimated Wilcoxon and Mann–Whitney test interquartile range (IQR) value was 0.521 with a *p*-value of 0, indicating that the pretest in the level of grading was statistically not significant.

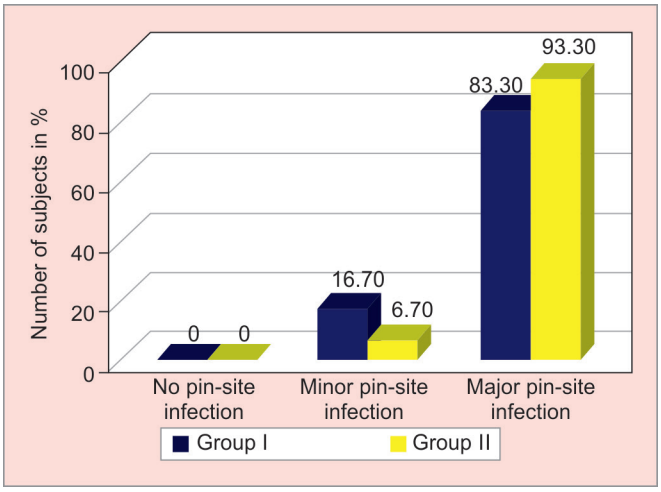

Fig. 1: Level of pin-site infection among patients with external fixators in group I (experimental) and group in II (control) during pretest

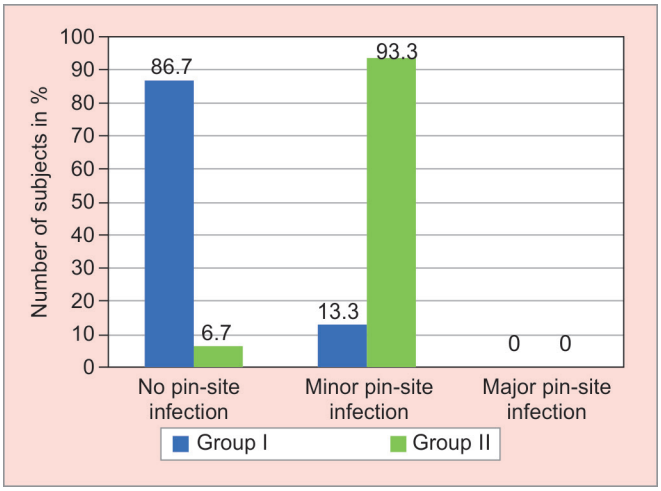

Fig. 2: Level of pin-site infection among patients with external fixators in group I (experimental) and group in II (control) during posttest

Table 1: Comparison of the pretest and posttest levels of grading of the multicomponent nursing care on pin-site infection among patients with external fixators

Comparison of the level of grading of pin-site infection	*Group I (experimental)*	*Group II (control)*	*IQR value*	*p value*
Pretest	4.5 (4, 5)	5 (4, 5)	0.521	0
Posttest	0 (0, 0)	4.5 (4, 5)	0	0.005*

*p <0.005 significant

Table 2: Frequency and percentage-wise distribution association between pin-site infection and their selected demographic variables ($N = 60$)

Demographic variables	*%*	*n*	*%*	*df*	*x^2*	*p value*
Age				3	3.19	0.363 NS
18–30	28.6	5	9.4			
31–40	14.3	21	39.6			
41–50	42.9	18	34			
Above 51	14.3	9	17			
Gender				1	0.459	0.498 NS
Males	42.9	12	22.6			
Females	57.1	37	69.8			
Religion				2	2.441	0.161 NS
Hindu	71.4	39	73.6			
Christian	0	8	15.1			
Muslim	28.6	6	11.3			
Education				3	5.146	0.161 NS
Illiterate	0.0	8	15.1			
Read and write	14.3	21	39.6			
Secondary education	71.4	16	30.2			
University	14.3	8	15.1			
Occupation				2	1.684	0.431 NS
Manual work	57.1	37	69.8			
Office work	0.0	4	7.5			
Student	42.9	12	22.6			
Residential area				1	0.459	0.498 NS
Urban	42.9	16	30.2			
Rural	57.1	37	69.8			
Unhealthy habits				3	2.022	0.568 NS
Tobacco chewing	0.0	6	11.3			
Alcoholism	85.7	34	64.2			
Smoking	14.3	7	13.2			
Drug abuse	0.0	6	11.3			
Duration of hospitalization				3	7.413	0.005* S
1–3 months	100.0	24	45.3			
4–6 months	0.0	13	24.5			
6–8 months	0.0	12	22.6			
>1 year	0.0	4	7.5			

*p <0.005 significant

Table 1 shows that the mean score in the level of grading of pin-site infection posttest was group I (experimental) 0 (0, 0) and group II (control) 4.5 (4, 5), respectively.

The estimated Wilcoxon and Mann–Whitney test IQR value was 0 with a p-value of 0.005*, indicating that the posttest in the level of grading was statistically significant.

After intervention group I (experimental) and group II (control) was pin-site infection value was differ. Pin-site infection was reduced. Stated hypotheses H_2 was acceptable.

The third objective of the study was the association between multicomponent nursing care on pin-site infection among patients with external fixators and their selected demographic variables.

Age, gender, religion, education, occupation, residential area, unhealthy habits are not significant. There is a significant association between duration of hospitalization $^{*}p < 0.005$ significant of pin-site infection among patients with their selected demographic variables. As a result, H_3 was accepted (Table 2).

Recommendations

- A comparison study of the efficiency of betadine dressing vs. regular saline dressing on pin-site infection in patients with external fixators might be undertaken.
- A study comparing the efficiency of hydrogen peroxide dressing vs. regular saline dressing on pin-site infection in patients with external fixators might be done.

Conclusion

The intervention of multicomponent nursing care was statistically proven to be one of the most important therapy modalities for boosting nursing care among patients with pin-site infection in this study. Group I received multicomponent nursing care, while group II received routine care. According to the findings, multicomponent nursing care is more successful than routine nursing care in preventing pin-site infection in patients with external fixators.

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