Effect of Nursing Interventions Program on Incidence of Postoperative Delirium among Hospitalized Geriatric Patients Undergoing Hip Fracture Surgery

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Abstract

Background: Postoperative delirium is a life-threatening medical emergency which is associated with greater morbidity and mortality among geriatric patients undergoing hip fracture surgery. It a highly prevalent clinical syndrome and has negative impact on the geriatric patients, their families, health care systems, and whole community. In this context, implementing preventive nursing interventions in order to prevent or decrease incidence of postoperative delirium is a valuable priority. Objective postoperative delirium among geriatric patients. Design: a quasi-experimental research design. Setting: The orthopedic department of El-Hadara Orthopedic and Traumatology University Hospital. Subjects: The study included eighty geriatric patients. Tools: Five tools were used: 1) Saint Louis University Mental Status Examination, 2) Geriatric Depression Scale–Short Form, 3) Socio-demographic and Clinical Data Structured Interview Schedule, 4) Delirium Environmental Risk Assessment, 5) Delirium Index Scale. Results: Findings of the present study revealed decrease in the incidence of postoperative delirium among the study subjects as compared with the control group with a statistically significant difference (P=0.009).Conclusion: Implementing the nursing interventions program resulted in a statistically significant reduction in the incidence of postoperative delirium among the study subjects as compared with those in the control group. Recommendations: Develop in-service training programs for nurses about postoperative delirium at different surgical wards to identify high risk geriatric patients and implement early preventive strategies.

Keywords: Postoperative delirium, incidence, hip fracture surgery, nursing interventions, geriatric patients.

Introduction

Postoperative delirium is a life-threatening medical emergency which is characterized by impairment of consciousness, attention, perception, thinking, memory, and sleep-wake cycle. (Bai et al., 2020). It is the most common surgical complication among geriatric patients with a prevalence ranging from 9% to 87% worldwide (Ansaloni et al., 2010).

Postoperative delirium inhibits postoperative rehabilitation, adversely affects patient's prognosis and recovery, contributes to functional decline and loss of independence, prolongs hospitalization time, and leads to cognitive impairment or even permanent dementia (de Jong et al., 2019). In addition, it is a predictor of dangerous nosocomial complications including pressure sores, falls, fractures, incontinence, and pneumonia. (NICE, 2017). Yet, delirium is one of the most frequent misdiagnosed neurological disorders among geriatric patients following hip surgery (Ritter et al., 2018).

Aims of the Study

This study aims to determine the effect of nursing interventions program on incidence of postoperative delirium among hospitalized geriatric patients undergoing hip fracture surgery.

Hypothesis of the study

Hospitalized geriatric patients undergoing hip fracture surgery who receive the proposed nursing interventions program exhibit lower incidence of postoperative delirium than those who do not.

Materials and Method

Materials

Design: A quasi-experimental research design was used.

Settings: The study was carried out at the orthopedic department of El-Hadara Orthopedic and Traumatology University Hospital, Alexandria, Egypt.

Subjects: The study included eighty (80) subjects aged 60 years and above, undergoing hip fracture surgery, able to communicate, free from preoperative delirium, with intact cognitive function, and have no or mild depression. They were randomly divided in to two equal groups (study and control).

Tools: Five tools were used:

Tool (I): Saint Louis University Mental Status (SLUMS) Examination:

This tool was developed by Tariq et al.(Tariq, Tumosa, Chibnall, Perry& Morley, 2006). It was used to assess the preoperative cognitive function of geriatric patients. It is classified depending on the respondent's level of education; in case of "High school education", 27 to 30 indicate normal cognitive function. While, in case of "Less than high school education", 25 to 30 indicates normal cognitive function. A specific score for "Illiterate respondents" was added by the researcher in which 24 to 30 indicates normal response.

Tool (II): Geriatric Depression Scale–Short Form (GDS-SF).

This tool was developed by Yesavage et al. and was used to assess the presence of preoperative depression. (Yesavage et al., 1983).It was classified as follows; a score from 0 to 4 indicates no depression, 5 to 8 indicates mild depression, 9 to 11 indicates moderate depression, and 12 to 15 indicates severe depression.

Tool (III): Socio-demographic and Clinical Data Structured Interview Schedule:

This tool was developed by the researcher, and included three parts:

Part (1): Socio-demographic data such as age, sex, marital status, educational level, occupation, and income.

Part (2): Clinical data including; medical and surgical history, preoperative life style, preoperative functional as well as sensory status.

Part (3): Postoperative data such as type of surgery, its duration, type of anesthesia, attached devices. In addition to measurement of physiological parameters including blood pressure, pulse, body temperature, oxygen saturation, and random blood glucose.

Tool (IV): Delirium Environmental Risk Assessment:

This tool was developed by the researcher to assess environmental factors of postoperative delirium. It is classified as: No environmental risk (Score 0), Low risk (Score 1–5), Moderate risk (Score 6–10), and High risk (Score 11-15).

Tool (V): Delirium Index Scale (DIS):

It was developed by McCusker et al. to assess incidence of delirium (McCusker et al., 2004). The score was classified as follows; 0-2 indicates no delirium, 3-7 indicates mild delirium, 8-14 indicates moderate delirium, and 15-21 indicates severe delirium.

Method

1) **Preparation phase:**

During which the researcher obtained the study approval from the responsible authorities, preparing the study tools to collect the necessary data, performing pilot study, and prepared the nursing interventions program.

2) Implementation phase

The proposed nursing interventions program was implemented through three individual sessions; two sessions before the planned surgery and focused on general and specific goals, age-related changes of the central nervous system, basic and simple information about postoperative delirium, preoperative orientation and psychological preparation. While the third session was carried out postoperatively and was repeated each day throughout the first four postoperative days. It focused on delirium preventive strategies.

The data collection started from the beginning of January until the end of May 2021.

3) Evaluation phase:

Incidence of postoperative delirium was assessed for each geriatric patient in the study and control groups using tool V three times per day throughout the four postoperative days.

Ethical considerations:

An informed written consent was obtained from each study subject after explanation of the study purpose. Anonymity and privacy of the study subjects, confidentiality of the collected data, and the subject's right to withdraw at any time were maintained.

Statistical Analysis

Data was analyzed using PC with statistical package for social science (SPSS) version 26. The level of significance was ≤ 0.05.

Results

Table (1) shows the socio demographic characteristics of the study geriatric patients. The age of the study and control subjects ranged from 60 to 85 years with a mean of 72.32 ± 6.43and 69.55 ± 7.32 respectively. Females constituted more than half of the subjects in the both groups. Also, 62.5% and 52.5% of the study and control subjects respectively were illiterate or just read and write.

Table (2) reveals incidence of postoperative delirium among the study geriatric patients. Only 20% of those in the study group compared to 47.5% of those in the control group suffered from delirium, with statistically significant difference (P=0. 009).

Table (3) illustrates the average of postoperative physiological parameters among the study geriatric patients. A statistical significant difference was found between the study and control groups regarding average of blood pressure (p=0.006), body temperature (P= 0.034), oxygen saturation (P= 0.026), and random blood glucose (P= 0.037).

Table (4) reveals the distribution of the study geriatric patients according to their postoperative mobilization. Earlier mobilization within 6 hours was found among 55% of the study subjects. On the contrary, delayed mobilization within either 24 or 48hours was reported by 40% and 37.5% respectively of the control subjects, with a statistically significant difference between the two groups (P=0.001).

Table (5) portrays the postoperative complaints among the study geriatric patients namely pain, constipation, insomnia, anxiety, and wound infection which were less frequently found among the study subjects compared with the control subjects. A statistically significant difference was found between the two groups (P=0.004).

Discussion

Despite recent advances in perioperative care of geriatric patients undergoing hip surgery, postoperative delirium remains a frequent complication (Abraham &Neuman, 2021).It is identified as the most essential topic in the care

of older adults. So, its prevention has attracted global interest. (AGS, 2015[a]).

The present study revealed that 20% of the study subjects who received the nursing interventions program suffered from postoperative delirium as compared to 47.5% of those in the control group with relative risk reduction of 58% (table 2). This finding is consistent with those of other studies done in United Kingdom by Siddiqi et al. (2016), in China by Wang et al. (2020), and in Netherlands by Rood et al. (2021). Conversely, Durst and Wilson (2020) in USA claimed that there is no significant impact of nursing interventions on the incidence of delirium. This contradiction may be because this study focused only on postoperative interventions without taking into consideration preoperative period.

According to the present study, it is evident that the implementation of proposed program is effective in decreasing delirium incidence. This result may be related to the early and effective application of the proposed program preoperatively through two sessions. Also, preventive interventions were applied within first hours after the surgery and continued for three consecutive postoperative days to ensure patients' proper adherence and compliance. This is recommended by the National Institute for Health and Clinical Excellence for delirium prevention (NICE, 2019).

The previously reported effect of the nursing interventions program in reducing delirium incidence could be attributed to the positive impact of such program on physiological parameters, postoperative mobilization, and postoperative complaints.

As regards postoperative physiological parameters namely blood pressure, body temperature, oxygen saturation, and random blood glucose, the present study revealed that geriatric patients in the study group had a higher average of normal levels of these parameters as compared with those left for routine hospital care with a statistically significant difference between the two groups (table 3). This interpreted as; stable physiological parameters are good

indicators of hemodynamic stability which thereby prevent postoperative delirium as supported by other studies (Choi et al., 2017; Jung et al., 2021).

As for postoperative mobilization, earlier mobility was reported by geriatric patients of the study group with a statistically significant difference between the two groups (table 4). This finding may be explained by the fact that early mobilization increases oxygen distribution to brain tissues and improves the cognitive function as well as general wellbeing of elders making them less risky for delirium. This finding is congruent with that of another study done by Kenyon-Smith et al. (2019).

As the proposed nursing interventions program was directed toward addressing precipitating problems of delirium including pain, insomnia, anxiety, constipation, and wound infection as well as preventing their occurrence; limiting incidence of delirium among the study subjects was not surprising (table 5). This could be reasonable explanation for their lower incidence of delirium. This finding is consistent with that of another study (Janssen et al., 2019).

Conclusion

From this study it can be concluded that implementing the nursing interventions program resulted in a statistically significant reduction in the incidence of postoperative delirium among the study subjects as compared with those in the control group. Thus, the study hypothesis is supported by the present study findings.

Recommendations

In line with the findings of the study, the following recommendations are made:

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Nurse educators should develop in-service training programs for nurses at different surgical wards about postoperative delirium to identify high risk geriatric patients and implement early preventive interventions

Gerontological nurses should develop educational booklet about postoperative delirium and its preventive interventions for all geriatric patients undergoing hip surgery in each orthopedic department

Table (1): Distribution of the study geriatric patients according to their socio-demographic characteristics

Items	Study group (n=40)		Control group (n=40)		Test of Significant
	No.	%	No.	%	
Age in years					
60-	4	10.0	6	15.0	
65-	8	20.0	9	22.5	χ^2=5.302
70-	12	30.0	11	27.5	P= 0.151
75-85	16	40.0	14	35.0	
Mean ± SD	72.32 ± 6.43		69.55 ± 7.32		t =1.801 P= 0.076
Sex					
Male	19	47.5	18	45.0	χ^2=0.450
Female	21	52.5	22	55.0	P= 0.502
Marital status					
Married	24	60.0	25	62.5	
Widow	12	30.0	13	32.5	χ^2=1.681 P=0.431
Divorced	4	10.0	2	5.0	
Level of education					
Illiterate/ Read & write	25	62.5	21	52.5	
Basic education	10	25.0	11	27.5	χ^2= 2.323
Secondary education	3	7.5	4	10.0	^{MC}p=0.714
Higher education	2	5.0	4	10.0	
Occupation before retirement					
Employee	14	35.0	13	32.5	
House wife	12	30.0	13	32.5	χ^2=0.648
Skilled worker	8	20.0	6	15.0	P= 0.885
Free business	6	15.0	8	20.0	
Sufficiency of income					
Enough	17	42.5	20	50.0	χ^2=0.453
Not Enough	23	57.5	20	50.0	P=0.501
Source of income					
Pension	21	52.5	18	45.0	
Social security programs	8	20.0	9	22.5	χ^2=0.457
Family	6	15.0	7	17.5	P= 0.928
Current work	5	12.5	6	15.0	

χ^2: Chi square test   MC: Monte Carlo

t: Student t-test   P: p value for comparing between the study and control groups

* Statistically significant difference at P ≤ 0.05

Table (2): Distribution of the study geriatric patients according to incidence and severity of postoperative delirium:

Items	Study group (n=40)		Control group (n=40)		Test of Significant
	No.	%	No.	%	
Incidence of postoperative delirium					
No	32	80.0	21	52.5	χ^2=6.765
Yes	8	20.0	19	47.5	P=0.009*

χ^2: Chi square test   MC: Monte Carlo   t: Student t-test

P: p value for comparing between the study and control groups

* Statistically significant difference at P ≤ 0.05

Table (3): Distribution of the study geriatric patients according to the average of their postoperative physiological parameters:

Items	Study group (n=40)		Control group (n=40)		Test of Significant
	No.	%	No.	%	
Blood pressure (mmHg)					
< 90/60	1	2.5	3	7.5	χ^2=9.351
90 < 140 / 60<90	33	82.5	20	50.0	^{MC}p=0.006*
≥ 140 / 90	6	15.0	17	42.5	
Heart rate (b/m)					
< 60	3	7.5	4	10.0	χ^2= 2.143
60 -100	30	75.0	24	60.0	^{MC}p=0.348
> 100	7	17.5	12	30.0	
Body temperature (°C)					
< 36	1	2.5	3	7.5	χ^2= 6.140
36-37	34	85.0	24	60.0	^{MC}p=0.034*
> 37	5	12.5	13	32.5	
Oxygen saturation(%)					
< 96%	7	17.5	16	40.0	χ^2= 4.943
96-100%	33	82.5	24	60.0	P=0.026*
Random blood glucose (mg/dl)					
< 70	0	0.0	4	10.0	χ^2= 7.880
70< 250	36	90.0	26	65.0	^{MC}p=0.037*
≥ 250	4	10.0	10	25.0	

χ^2: Chi square test   MC: Monte Carlo
P: p value for comparing between the studied groups
*: Statistically significant difference at p ≤ 0.05

Table (4): Distribution of the study geriatric patients according to postoperative mobilization:

Items	Study group (n=40)		Control group (n=40)		Test of Significant
	No.	%	No.	%	
Mobilization after the surgery					
Within 6 hours	22	55.0	1	2.5	χ^2= 45.199
Within 12 hours	15	37.5	8	20.0	P=0.001*
Within 24 hours	3	7.5	16	40.0	
Within 48 hours	0	0.0	15	37.5	

χ^2: Chi square test
P: p value for comparing between the study and control groups
* Statistically significant difference at P ≤ 0.05

Table (5): Distribution of the study geriatric patients according to postoperative complaints:

Items	Study group (n=40)		Control group (n=40)		Test of Significant
	No.	%	No.	%	
Postoperative complaints: #					
Pain	15	37.5	35	87.5	
Constipation	11	27.5	26	65.0	χ^2= 18.957
Insomnia	8	20.0	19	47.5	^{MC}P=0.004*
Anxiety	6	15.0	21	52.5	
Wound infection	1	2.5	5	12.5	

More than one response
χ^2: Chi square test   MC: Monte Carlo
P: p value for comparing between the study and control groups
* Statistically significant difference at P ≤ 0.05

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