

The Effect Of The Training Program On Nursing Staff Knowledge Regarding Delirium In The Elderly

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Abstract:

Background: Delirium is a growing public health problem as it is associated with various negative outcomes that burden patients, families, and the healthcare system among geriatric patients.

Aim: To determine the effect of a training programme on nursing staff knowledge regarding delirium in the elderly.

Design: A quasi-experimental design (Pre-Posttest) was used to carry out this study.

Setting: The study was conducted at medical and surgical units, operation units, and intensive care units at Damanhour National Medical Institute in El-Beheira Governorate in Egypt.

Subjects: All nurses (n = 30 nurses) working in the previously mentioned setting comprised the study sample.

Tools of data collection: Tool I: Structured interview schedule about socio-demographic characteristics

Tool II: Delirium Knowledge Questionnaire

Result: The age of the studied nurses ranged from 30–48 years, with a mean age of 37.73 ± 5.13 years. Statistically significant differences were observed among knowledge about the presentation, symptoms, and outcomes of delirium before and after the educational program ($P = 0.000$). Statistically significant differences were observed among the knowledge about causes and risk factors of delirium before and after the implementation of the educational programme ($P = 0.000$). More than half of the studied nurses had a moderate level of total knowledge about delirium before programme implementation compared to the majority of nurses who had good total knowledge about delirium after programme implementation. Statistically significant differences were observed among the total knowledge about delirium before and after the implementation of the educational program. The nurses' knowledge of delirium was highly improved after the implementation of the educational programme about delirium, and it had a clear effect on the nurses.

Recommendations: Delirium assessment should be integrated into daily nursing care. In addition, more research is needed on the prevention of delirium, especially in critically ill patients.

Keywords: Nursing Staff, Knowledge Regarding Delirium, Elderly

INTRODUCTOIN

Delirium is a growing public health problem as it is associated with various negative outcomes that burden patients, families, and the healthcare system among geriatric patients (Avidan, 2017). Delirium is extremely common in hospitalized older adults. It is the most common surgical complication among older adults, with an incidence of 15 to 25% after major elective surgery and 50% after high-risk procedures such as hip-fracture repair and cardiac surgery, and among patients undergoing mechanical ventilation in the Intensive Care Unit (ICU). The cumulative incidence of delirium, when combined with stupor and coma, exceeds 75% (Chaiwat et al., 2019).

The prevalence of delirium is present in 10 to 15% of older adults in the emergency department. The prevalence of delirium at the end of life approaches

85% in palliative care settings (Pedrez-Ros, 2019). The Diagnostic and Statistical Manual of Mental Disorders (DSM-5), 5th edition defined delirium as an acute onset of fluctuating cognitive impairment and a disturbance of consciousness that is characterized by disturbances of orientation, memory, language skills, thinking, perception, motor behavior, sleep-wake cycle, and with impaired attention as the core cognitive disturbance that is not better explained by a pre-existing, established, or other evolving neurocognitive

disorder (**American Psychiatric Association, 2013**).

Several physiological changes in the central nervous system put older adults at higher risk for a higher incidence and severity of postoperative delirium. These changes include decreased brain neuronal density, cerebral blood flow, and a number of neurotransmitters, in addition to degeneration and atrophy of nerve cells, which may lead to recent memory loss, and a less efficient hypothalamus in regulating body temperature (**Bugiani, 2021**). Moreover, older adults are more easily distracted, less able to retain information for more than 45 minutes, have sleep pattern changes, and require a low anesthetic dose (**Appukuttan, 2016**).

The risk factors for delirium have been classified into two groups: predisposing and precipitating factors. Older age, dementia (often not recognized clinically), functional disabilities, and a high burden of coexisting conditions are common predisposing factors. Male sex, poor vision and hearing, depressive symptoms, mild cognitive impairment, laboratory abnormalities, and alcohol abuse have also been associated with increased risk. Among the precipitating factors are drugs (especially sedative hypnotic agents and anticholinergic agents), surgery, anesthesia, high pain levels, anemia, infections, acute illness, and acute exacerbation of chronic illness. The more predisposing factors that are present, the fewer precipitating factors that are needed. This explains why delirium often develops in older, frail adults who have precipitants that would not cause delirium in younger adults (**Marcantonio 2017**).

Postoperative delirium can cause cognitive impairment and dementia, longer hospitalization, institutionalization, increased risk of nosocomial complications, poor prognosis, and higher morbidity and mortality (**Inouye, 2014**). Nursing knowledge surveys have highlighted a lack of knowledge related to delirium risk factors, its presentation and prevalence (especially the hypoactive subtype), non-pharmacological interventions, the associated increase in mortality, and its fluctuating presentation (**Bellelli et al., 2015; Hosie et al., 2019**).

In this respect, **Hayhurst et al. (2016)** reported that nurses frequently fail to recognize delirium, with non-detection rates as high as two thirds. Contributing reasons for non-detection include insufficient knowledge of delirium, lack of widespread screening, and the use of imprecise terms such as "confusion" and heterogeneous presentation of delirium. This problem is the fact that delirium is preventable, with the evidence base for prevention being stronger than for treatment.

Arguably, a greater understanding and implementation of preventative strategies could reduce the incidence of delirium and its associated complications (**Lee et al., 2020**).

Significance of study:

Delirium is the most common neuropsychiatric condition in hospitals, 15% to 25% on general medical wards, up to 60% on surgical wards-critical care, and 80% in the sickest ventilated patients (**Halter, 2018**). Delirium is a concern for ICU nurses because the early recognition of patients with developing delirium requires the assessment of patients at risk for this syndrome. Baseline neurological assessment of ICU patients is often limited (**Ribeiro et al., 2016**). Nurses' performance regarding assessment and management of patients with delirium may be difficult or varied from one nurse to another and depends on their previous clinical experience (**Hayhurst et al., 2016**).

The role of the professional nurse is to assist patients to be as independent as possible in managing their health. As a result, nurses who deal with patients will develop new techniques in health education that can improve patients' compliance and confidence level to increase their self-care behavior. This will indirectly promote healthy living by improving health status and reducing the potential for complications. On the other hand, the nurse is capable of providing preventive measures, including education of patients and their caregivers, encouraging early mobilization, maintaining adequate hydration, providing measures to prevent constipation, encouraging adequate nutritional intake, and promoting enough sleep. Furthermore, cognitive orientation and stimulation, providing adequate pain management, encouraging use of eyeglasses and hearing aids if needed, anxiety relief, and modifying environmental risk factors are among the most important interventions. (Zaubler, 2013). Finally, it will improve health status and reduce the potential for complications while also lowering health-care costs and hospital burden.

Application of the proposed study training programme for the purpose of improving nursing staff knowledge to decrease or prevent the incidence of delirium as well as decrease its severity contributes to promotion of wellbeing, improving quality of life, and maintaining independence of older adults. This is consistent with the health goals of the international Sustainable Development Goals (SDGs) and Egypt Vision 2030, which focus on ensuring healthy lives and promoting well-being for all at all ages through early interventions and preventive care. In

accordance, the Ministry of Health and Population (MOHP) in Egypt focuses on the provision and enhancement of primary healthcare through preventive measures (WHO 2020).

The aim of the study is to determine the effect of a training programme on nursing staff knowledge regarding delirium in the elderly.

Research Hypotheses: Nursing staff who receive the proposed training programme exhibit a higher level of knowledge regarding delirium than those who do not receive the proposed training program.

Study design: A quasi-experimental design (Pre-Posttest study) was used to carry out this study.

Setting: A purposive sample of 30 nurses recruited from medical and surgical units, the ENT department, the operation unit, and the ICU department at Damanhour National Medical Institute in El-Beheira Governorate in Egypt.

Subject : All nurses (n = 30 nurses) working in the Medical and Surgical Units, Operation Unit, and Intensive Care Units at Damanhour National Medical Institute in El-Beheira Governorate.

Inclusion criteria: all nurses who worked in the selected unit for more than a year before the start of the study.

Tools for data collection:

In order to collect the required data from the study subjects, the following tools were used:

Tool 1: Interview schedule for socio demographic characteristics:

This tool was developed by the researcher after reviewing the recent literature. This part is used to assess nurses' socio-demographic data, such as age, gender, work facility, work area, position, employment hours per day, level of education, years of experience

Tool 2: Delirium knowledge Questionnaire:-

This tool was developed by Har et al. (2008). It is composed of 35 items grouped into 3 relevant domains, namely knowledge about the presentation, symptoms, and outcomes of delirium (10 items), knowledge about causes and risk factors of delirium (11 items), and knowledge about delirium prevention and management strategies of delirium (14 items). The scoring system: the total score was adjusted from 0 to 35 and classified into poor knowledge (0–11), moderate knowledge (11–21), and good knowledge (22–35).

METHODS

The study was implemented according to the following steps:

I. Administrative process

- An official letter from the Faculty of Nursing at Damanhour University was directed to the Damanhour National Medical Institute at El-Beheira Governorate to seek their permission to conduct the study.
- Meetings were held with the directors of the selected settings to obtain their approval and to gain their cooperation and support during data collection. In these meetings, the purpose of the study and procedures to be carried out were discussed.

II. Development of the study tools

- Tool I was developed by the researcher after reviewing recent literature. The tool was further reviewed and validated by the researcher.
- The Arabic version of Tool II was used. The tools were revised by a jury composed of five experts in the fields of community health nursing and gerontological health nursing for content validity. Recommended modifications were made accordingly.

III. Pilot study: A pilot study was conducted prior to starting the field work in order to:

- Obtain information about the working hours for the units.
- Plan the proper time to carry out the field work.
- Decide about the organizational and administrative procedures needed for research work.
- Test the data collection tools regarding the phrasing, the order, and feasibility of each question used in the interview.
- Estimate the time needed to complete data collection.
- The pilot was conducted on a sample of 3 nurses from ICU units from Kaf Eldawar general hospital. The data obtained from the pilot were not included in the main study.

IV. Actual study:

Collection of data:

- All procedures covering the present study were carried out entirely by the researcher.
- A separate room to interview and a quiet environment were selected in the facility.

- The data was collected individually from the nurses after a brief explanation of the purpose and nature of the research.
- An oral and written consent for participating in the study were obtained.
- The study subjects were informed that their participation was completely voluntary.
- The interviewing process was carried out by the researcher. Questions were clearly explained in a standard way to minimize errors in interviewing.
- Each interview took around 60 minutes.
- The data was collected over a period of 2 months (from January 2022 to the end of February 2022).
- All nurses included in the sample agreed to be interviewed.

V. Implementation phase:

- An educational programme was developed by the researchers based on literature review and the results of pretest evaluation for nurses and was carried out for all nurses in educational class room in the intensive care unit. The programme consisted of two sessions on two consecutive days. Every session takes approximately one hour.
- The program's first session covered the following topics: the purpose of the research study; an introduction to elderly ill patients and the impact of delirium; the definition of delirium; causes and risk factors for delirium; types of delirium; signs and symptoms of delirium; and methods for assessing delirium.
- The second session of the educational programme covered delirium management strategies, the nursing role in preventing delirium in elderly ill patients, and a summary of the educational program.
- Teaching methods included group discussion with powerpoint media. Teaching media were handed out and illustrative graphs.

VI. Evaluation Phase:

- A post-test evaluation was carried out for all nurses after one month from the implementation of the programme by using tool II. Each nurse was interviewed for a reassessment of basic knowledge about delirium. The time taken for posttest evaluation was one hour for each nurse.

Ethical considerations

- Oral and written consent was obtained from nurses before the interview, after a full

explanation of the purpose of the research. The researchers emphasize that their participation is voluntary.

- Anonymity of individual responses was guaranteed, and confidentiality of data was maintained. Code numbers were used instead of names.
- Privacy was ensured for all subjects.

Data processing and analysis:

- All raw data was coded.
- The collected data were fed into a computer using a social science statistical package (SPSS version 25.0).
- Tables were constructed and developed.
- Numbers, percentages, the arithmetic mean, and standard deviation were used to describe quantitative data.
- Associations between categorical variables were tested using the t test and the Chi-Square test.
- The Fisher Exact test was used in 2x2 tables for corrections of the Chi-square test to compare between different groups when 25% of cells or more have an expected count of less than five.
- The Monte Carlo method (M^{CP}) was used for analysis of CxR contingency tables for correction of the Chi-square test when more than 25% of cells have an expected count of less than five.
- The significance of the obtained results was judged at the 5% level.

Budget

- The researcher financed all expenses needed in carrying out the present research.

Dissemination of results

- Evaluation and discussion of the paper.
- A summary of the final results will be distributed to the directors of the selected settings.

Benefits

- The present study gives a complete and balanced view of delirium knowledge among nurses in Damanhour National Medical Institute in El-Beheira Governorate.

Limitations

- The present study only reflected nurses residing in Damanhour National Medical Institute in El-Beheira Governorate.

- The approvals and the correspondence that were required to carry out this study took more time and effort.

Result

Table (1) showed that, the age of the studied nurses ranged from 30-48 years, with a mean age of 37.73 ± 5.13 years. As regard the work facility, all studied nurses had the same work facility. Concerning gender, it was found that less than two thirds of the studied nurses (63.3%) were females. Concerning the work area, it was found that more than one thirds (36.6%) of them worked in ENT department, more than one fifth (30.0% and 20.0%) worked in medical department and intensive care department, respectively. While, only (13.4%) of nurses' worked in or department. As regards to position of nurses, it was found that more than three-quarters (83.3%) of the studied nurses had bachelor degree (head nurse) nurse and only (16.7%) of nurses had technical nurse (staff nurse). The majority of nurses (90.0%) were employment 6 hours per day every week. This table also revealed that less than half (46.7%) of the nurses had diploma degree, 43.3% of them hadn't any highest qualification, and only 10.0% of nurses had master degree. All (100.0%) of studied nurses didn't attend work shop among delirium before. Less than two thirds (63.3%) of nurses had 1-3 years of experience and more than one tenth (13.3%) of nurses had 10-12 years of experience in practice.

Table (1) Distribution of the studied nurses by their socio-demographic characteristics Items		Sample(no=30)	
		No	%
Gender			
- Male		11	36.7
- Female		19	63.3
Age (in years)			
- 20 to less than 30		1	3.3
- 30 to less than 40		21	70.0
- 40 to 60		8	26.7
Mean ± SD		37.73 ± 5.13	
Work area(name of ward or department)			
- ICU department		6	20.0
- ENT department		11	36.6
- Medical department		9	30.0
- OR department		4	13.4
Position			
- Bachelor degree nurse (head nurse)		25	83.3
- Technical nurse (staff nurse)		5	16.7
Employment hours per work day			
- 6		27	90.0
- 8		2	6.7
- 12		1	3.3
Highest qualification			
- No highest qualification		13	43.3
- Diploma degree		14	46.7
- Master degree		3	10.0
- Doctorate degree		0	0.0

Had you attended delirium workshop before?		
- Yes	0	0.0
- No	30	100.0
Years of nursing experience in practice		
- 1-3 years	19	63.3
- 4-6years	2	6.7
- 7-9years	3	10.0
- 10-12years	4	13.3
- 13+years	2	6.7

Table 2 showed a comparison between studied nurses' knowledge regarding the presentation, symptoms, and outcomes of delirium before and after implementation of the educational program. Statistically significant differences were observed among knowledge about the presentation, symptoms, and outcomes of delirium before and after implementation of the educational programme where (P = 0.000). The mean of nurses (0.333±0.182) answered correctly that the symptoms of depression may mimic delirium before the programme Compared to the mean of nurses (0.833±0.379) after the program, the mean of nurses (0.633±0.490) correctly chose the correct answer. When compared to the mean of nurses (0.7330.449) after the program, the patient who is lethargic and difficult to rouse does not have delirium.

Table (2) Comparison between studied nurses regarding knowledge about the presentation, symptoms and outcomes of delirium before and after implementation of the educational program

Items related to knowledge about the presentation, symptoms and outcomes of delirium (Correct items)	SAMPLE SIZE N=30		Test of significant	
	Pretest (Mean ±SD)	Posttest Mean ±SD	P-value	T test
Fluctuation between orientation and disorientation is a typical feature of delirium	0.333±0.479	0.933±0.253	10.090	0.000*
1. Symptoms of depression may mimic delirium	0.333±0.182	0.833±0.379	6.717	0.000*
2. Patients never remember episodes of delirium	0.266±0.449	0.733±0.449	7.681	0.000*
3. Delirium never lasts for more than a few hours	0.400±0.498	0.733±0.449	8.784	0.000*
4. A patient who is lethargic and difficult to rouse does certainly not have a delirium	0.633±0.490	0.733±0.449	11.280	0.000*
5. Patients with delirium are always physically and/or verbally aggressive	0.300±0.466	0.900±0.305	9.407	0.000*
6. Patients with delirium have a higher mortality rate	0.266±0.449	0.833±0.379	8.492	0.000*
7. Behavioral changes in the course of the day are typical of delirium	0.107±0.314	0.933±0.257	8.090	0.000*
8. A patient with delirium is likely to be easily distracted and/or have difficulty following a conversation	0.300±0.466	0.833±0.370	8.784	0.000*
9. Patients with delirium will often experience perceptual disturbances (e.g., visual and/or auditory hallucinations)	0.366±0.490	0.900±0.305	10.095	0.000*

Table 3 showed comparison between studied nurses' knowledge of causes and risk factors of delirium before and after the educational program. Statistically significant differences were observed among the knowledge about causes and risk factors of delirium before and after implementation of the educational programme where ($P = 0.000$). The mean of nurses (0.333 ± 0.479) answered that diabetes is an important risk factor for delirium before the programme compared to the mean of nurses (1.000 ± 0.000) after the programme. The mean of nurses (0.233 ± 0.430) answered correctly that a family history of dementia predisposes a patient to delirium compared to the mean of nurses (0.800 ± 0.406) after the programme.

Table (3) Comparison between studied nurses among knowledge about causes and risk factors of delirium before and after implementation of the education program

Items related to knowledge about the knowledge about causes and risk factors of delirium (Correct items)	SAMPLE SIZE N=30		Test significant of	
	Pretest Mean \pm SD	Posttest Mean \pm SD	P-value	T-test
1. A patient admitted with pneumonia and having diabetes, visual and auditory disturbances has the same risk for delirium as a patient admitted with pneumonia without co-morbidities	0.266 \pm 0.449	0.933 \pm 0.2537	9.407	0.000*
2. The risk for delirium increases with age	0.333 \pm 0.479	0.900 \pm 0.3051	9.742	0.000*
3. A patient with impaired vision is at increased risk of delirium	0.533 \pm 0.507	0.900 \pm 0.3051	12.216	0.000*
4. The greater the number of medications a patient is taking, the greater their risk of delirium	0.300 \pm 0.466	0.966 \pm 0.1825	10.095	0.000*
5. A urinary catheter reduces the risk of delirium	0.533 \pm 0.508	0.966 \pm 0.1825	13.304	0.000*
6. Poor nutrition increases the risk of delirium	0.466 \pm 0.507	0.900 \pm 0.3051	11.733	0.000*
7. Dementia is an important risk factor for delirium	0.633 \pm 0.490	0.966 \pm 0.1825	12.216	0.000*
8. Diabetes is an important risk factor for delirium	0.333 \pm 0.479	1.000 \pm 0.000	16.212	0.000*
9. Dehydration can be a risk factor for delirium	0.333 \pm 0.466	0.966 \pm 0.182	10.468	0.000*
10. Delirium is generally caused by alcohol withdrawal	0.333 \pm 0.479	0.966 \pm 0.182	10.095	0.000*
11. A family history of dementia predisposes a patient to delirium	0.233 \pm 0.430	0.800 \pm 0.406	8.784	0.000*

Table (4) showed a comparison between studied nurses' knowledge of delirium prevention and management strategies before and after the implementation of an educational program. Statistically significant differences were observed in knowledge about delirium prevention and management strategies before and after the educational program. Where ($P = 0.000$). The mean of nurses (0.700 ± 0.466 , 0.333 ± 0.479 respectively) answered that stimulation of patients to perform different activities at the same time is a way to prevent delirium and providing patients with familiar objects (e.g., photos, clocks, newspapers) is important to prevent sensory deprivation before the programme compared to the mean of nurses (1.00 ± 0.262 , 0.833 ± 0.379 respectively) after the programme.

Table (4) Comparison between studied nurses among knowledge about delirium prevention and management strategies before and after implementation of educational program

Items related to knowledge about delirium prevention and management strategies of delirium (Correct items)	Sample size N=30		Significance	
	Pretest Mean \pm SD	Posttest Mean \pm SD	P-value	T-test
Treatment of delirium always includes sedation	0.133 \pm 0.345	0.933 \pm 0.253	9.088	0.000*
1. Daily use of the Mini-Mental State Examination (MMSE) is the best way for diagnosing delirium	0.300 \pm 0.466	0.933 \pm 0.253	8.784	0.000*
2. Providing as much staff as possible to take care at the patients' bedside is an important strategy in the prevention of delirium	0.333 \pm 0.479	0.766 \pm 0.4301	7.681	0.000*
3. The use of physical restraints in patients at risk for delirium is the best way to ensure their safety	0.333 \pm 0.479	0.733 \pm 0.449	6.717	0.000*
4. Encouraging patients to (correctly) wear their visual/hearing aids is necessary to prevent delirium	0.400 \pm 0.498	0.733 \pm 0.449	7.942	0.000*
5. Adequate hydration is an important strategy in the prevention of delirium	0.700 \pm 0.466	0.667 \pm 0.479	7.681	0.000*
6. The maintenance of a normal sleep-wake cycle (e.g., avoidance of sleep interruption) is an important strategy in the prevention of delirium	0.400 \pm 0.563	0.700 \pm 0.466	7.942	0.000*
7. The use of haloperidol in preoperative surgical fracture patients is a way to prevent delirium	0.466 \pm 0.507	0.633 \pm 0.490	7.942	0.000*
8. The stimulation of patients to perform different activities at the same time is a way to prevent delirium	0.700 \pm 0.466	1.00 \pm 0.262	16.280	0.000*
9. Keeping instructions for patients as simple as possible is important in the prevention of delirium	0.366 \pm 0.490	0.766 \pm 0.430	8.523	0.000*
10. Early activation/ambulation (e.g., getting patients out of bed as soon as possible) of patients is an important strategy in the prevention of delirium	0.433 \pm 0.504	0.700 \pm 0.466	9.088	0.000*
11. Providing patients with familiar objects (e.g., photos, clock, newspaper) is important to prevent sensory deprivation	0.333 \pm 0.479	0.833 \pm 0.379	9.131	0.000*
12. Avoid eye contact in the prevention of delirium because it can be seen as a threat	0.457 \pm 0.458	0.866 \pm 0.345	9.742	0.000*
13. Keeping oral contact with the patient is an important strategy in the prevention of delirium	0.345 \pm 0.487	0.633 \pm 0.490	8.211	0.000*

Table (5) represents comparison between total knowledge score of the studied nurses before and after the educational program.

This table reveals that more than half of the studied nurses (53.3%) had a moderate level of total knowledge about delirium before the programme implementation and more than one third (40.0%) had a weak level of total knowledge about delirium. Only 6.7% of nurses had good total knowledge of delirium. On the other hand, the majority of nurses (90.0%) had good total knowledge about delirium after the programme and (10.0%) of nurses had moderate levels of total knowledge about delirium. None (0.0%) of the nurses after the programme had a weak level of total knowledge about delirium. Statistically significant differences were observed among the total knowledge about delirium before and after the implementation of the educational program. Where ($X^2=42.446$, $P=0.000$). Table (5) shows a comparison between the total knowledge scores of the studied nurses before and after the educational program.

	Total Delirium Knowledge				Test of significant
	Pretest		Posttest		
	No	%	No	%	
knowledge about the presentation, symptoms and outcomes of delirium					
- Weak	21	70.0	1	3.3	$X^2=41.669$ $P=0.000^*$
- Moderate	8	26.7	4	13.3	
- Good	1	3.3	25	83.3	
Knowledge among causes and risk factors of delirium					
- Weak	12	40.0	0	0.0	$X^2=36.610$ $P=0.000^*$
- Moderate	15	50.0	4	13.3	
- Good	3	10.0	26	86.7	
Knowledge among prevention and management strategy of delirium					
- Weak	11	36.7	0	0.0	$X^2=34.876$ $P=0.000^*$
- Moderate	17	56.7	6	20.0	
- Good	2	6.7	24	80.0	
Total knowledge about delirium					
- Weak	12	40.0	0	0.0	$X^2=42.446$ $P=0.000^*$
- Moderate	16	53.3	3	10.0	
- Good	2	6.7	27	90.0	

Table (6) relation between socio-demographic data and pretest level of nurses' knowledge among delirium, this table reveals the relationship between socio-demographic data and pretest level of nurses' knowledge among delirium. A statistically significant difference was observed between nursing knowledge in delirium and the area of work before programme implementation. $X^2 = 8.606$; $P = 0.003$. On the other hand, no significant differences were observed between the total level of knowledge among delirium and other socio-demographic data such as gender, age, work facility, position, hours of employment, highest qualification, attended delirium education before, and years of nursing experience in practice.

Table (7) reveals a relationship between socio-demographic data and the posttest level of nurses' knowledge of delirium. Statistically significant differences were observed between nursing knowledge and delirium with position ($X^2 = 6.000$, $P = 0.014$) and employment (Hours) ($X^2 = 9.424$ and $P = 0.009$) among the studied nurses after programme implementation. On the other hand, no significant differences were observed between the total level of knowledge among delirium and other socio-demographic data such as gender, age, work facility, work area, position, hours of employment, highest qualification, attended delirium education before, and years of nursing experience in practice.

Items	Nursing Knowledge (Posttest (n=30))				Test significance
	Moderate Knowledge (n=3)		Good Knowledge (n=27)		
	No	%	No	%	
Gender					
- Male	0	0.0	11	36.7	$X^2= 1.930$ $P=0.279$
- Female	3	100.0	16	63.3	
Age (in years)					
- 20-	0	0.0	1	3.3	$X^2= 1.429$ $P=0.422$
- 30-	3	100.0	18	70.0	
- 40-	0	0.0	8	26.7	
Work facility					
- Damanhour health education hospital	3	100.0	27	100.0	NA
Work area					
- ICU department	2	66.7	4	14.8	$X^2= 6.852$ $P=0.363$
- ENT department	0	0.0	11	40.7	
- Medical department	0	0.0	9	33.3	
- OR department	1	33.3	3	11.1	
Position					
- Bachelor degree nurse	1	33.3	24	88.9	$X^2= 6.000$ $P=0.014$
- Technical nurse	2	66.7	3	11.1	
Employment (Hours)					
- 6	2	66.7	25	92.6	$X^2= 9.424$ $P=0.009$
- 8	0	0.0	2	7.4	
- 12	1	33.3	0	0.0	
Highest qualification					
- Diploma	3	100.0	24	88.8	$X^2= 0.696$ $P=0.631$
- Bachelor	0	0.0	3	11.1	
- Master	0	0.0	0	0.0	
- Doctorate	0	0.0	0	0.0	
How many years since you graduated from your basic qualification					
- 1-5 years	0	0.0	3	11.1	$X^2= 1.905$ $P=0.592$
- 6-10 years	2	66.7	8	29.6	
- 11-15 years	1	33.3	13	48.1	
- 15-20 years	0	0.0	3	11.1	
Had you attended delirium education before?					
- Yes	0	0.0	0	0.0	NA
- No	3	100.0	27	100.0	
Years of nursing experience in practice					
- 1-3 years	3	100.0	16	59.3	$X^2= 1.930$ $P=0.847$
- 4-6years	0	0.0	2	7.4	
- 7-10years	0	0.0	3	11.1	
- 11-15years	0	0.0	4	14.8	
- 16-20years	0	0.0	2	7.4	
- 21-25years	0	0.0	0	0.0	

Items	Nursing Knowledge among Delirium Pretest (n=30)						Test of significance
	Weak Knowledge (n=12)		Moderate Knowledge (n=16)		Good Knowledge (n=2)		
	No	%	No	%	No	%	
Gender							
- Male	4	33.3	6	37.5	1	50.0	$X^2=0.2153$ $P=0.897$
- Female	8	66.7	10	62.5	1	50.0	
Age (in years)							
- 20-	0	0.0	1	6.3	0	0.0	$X^2= 1.905$ $P=0.753$
- 30-	8	66.7	11	68.8	2	100.0	
- 40-	4	33.3	4	25.0	0	0.0	
Work facility							
- Damanhour health education hospital	12	100.0	15	100.0	3	100.0	NA
Work area							
- ICU department	4	33.3	2	12.5	0	0.0	$X^2= 8.606$ $P=0.003*$
- ENT department	6	50.0	5	31.3	0	0.0	
- Medical department	2	16.7	6	37.5	1	50.0	
- OR department	0	0.0	3	18.8	1	50.0	
Position							
- Bachelor degree nurse	10	83.3	13	81.2	2	100.0	$X^2= 0.450$ $P=0.799$
- Technical nurse	2	16.7	3	18.8	0	0.0	
Employment (Hours)							
- 6	10	83.3	15	93.8	2	100.0	$X^2= 1.794$ $P=0.227$
- 8	1	8.3	1	6.3	0	0.0	
- 12	1	8.3	0	0.0	0	0.0	
Highest qualification							
- Diploma	11	91.7	14	87.5	2	100.0	$X^2= 5.929$ $P=0.475$
- Master	1	8.3	2	12.5	0	0.0	
- Doctorate	0	0.0	0	0.0	0	0.0	
How many years since you graduated from your basic qualification							
- 1-5 years	1	8.3	2	12.5	0	0.0	$X^2= 10.521$ $P=0.074$
- 6-10 years	2	16.7	6	37.5	2	100.0	
- 11-15 years	9	75.0	5	31.3	0	0.0	
- 15-20 years	0	0.0	3	18.8	0	0.0	
Had you attended delirium education before?							
- Yes	0	0.0	0	0.0	0	0.0	NA
- No	12	100.0	16	100.0	2	100.0	
Years of nursing experience in practice							
- 1-3 years	9	75.0	9	56.3	1	50.0	$X^2= 9.493$ $P=0.338$
- 4-6years	0	0.0	2	12.5	0	0.0	
- 7-10years	1	8.3	2	12.5	0	0.0	
- 11-15years	0	0.0	3	18.8	1	50.0	
- 16-20years	2	16.7	0	0.0	0	0.0	
- 21-25years	0	0.0	0	0.0	0	0.0	

Table 7: Relation between socio-demographic data and posttest level of nurses' knowledge among delirium

Discussion

Delirium is a common condition in the elderly, affecting up to one third of all geriatric patients admitted to hospitals (Marcantonio, 2017). It is common in a variety of health care settings and is more common in surgical inpatients, particularly after hip fracture or vascular surgery, but also in patients in the intensive care unit (ICU) (Visser et al., 2021). Delirium patients have higher morbidity and mortality rates, longer hospital stays, higher treatment costs, lower treatment outcomes, cognitive and functional decline, and a higher risk of long-term institutionalisation care (Miu et al., 2016). Detection of the incidence of delirium in different health care settings may be severely underestimated by medical and nursing staff (Awad, 2019). Thus, a better understanding and knowledge of delirium among health care professionals can lead to early detection, reduction of modifiable risk factors, and better management of delirium in the acute phase (Gnerre et al., 2016). Thus, the aim of this study was to determine the impact of a training programme on nursing staff knowledge regarding delirium in the elderly. In the present study, results revealed that the implementation of a training programme about delirium had a significant improvement in all items of knowledge among the studied nurses. In relation to the studied nurse's total knowledge of delirium, the present study showed that the majority of the studied nurses had weak or moderate knowledge before applying the program. While the majority of the studied nurses had good knowledge after using the program, The difference was statistically

significant between both the pre and post program. This can be justified by the training programme focused on teaching the studied nurses about the presentation, symptoms, causes, risk factors, outcomes, prevention, and treatment of delirium. Also, all of the studied nurses had not previously participated in any educational programme about delirium (table 1) and did not have enough time to update their knowledge. The findings of the present study are supported by other studies done in Egypt, Tanta by **Younis & Abo El-Fetoh (2016)**, in Belgium by **Detroyer et al., (2016)**, in Canada by **Hickin et al., (2017)**, in the United States by **Blevins & DeGennaro (2018)**, and in Australia by **Ho et al., (2021)**, who found that there was a significant improvement in nurses' over all knowledge regarding delirium after the implementation of an educational program.

Concerning the effect of the training programme on sub-items of knowledge about delirium, the majority of the studied nurses had weak or moderate knowledge about the presentation, symptoms, outcomes, causes, risk factors, prevention, and management of delirium before the program. This may be due to about three-quarters of the studied nurses aged 30 to less than 40 years, which means they graduated a long time ago and since graduation they didn't participate in any post-graduate education regarding delirium (table 1). Also, about half of them did not have the highest education and about two thirds of them had from 1 to less than 3 years of experience in nursing practise (table 1). Similarly, other studies conducted in Egypt, Mansoura by **El-Nosary et al., (2016)**, and Yemen by **Abdullah et al., (2020)**, discovered that the majority of nurses lacked knowledge in all of the previously mentioned delirium sub-items. While after applying the program, most of the studied nurses had good knowledge regarding the previously mentioned items of knowledge, with statistically significant differences between pre and post program. This can be rationalised by the fact that they had never received training and knowledge about delirium since graduation (table 1). Also, this educational programme covered all of these knowledge items. In the same line, previous studies conducted in Egypt by **Morsy et al. (2015)**, in South Korea by **Oh (2018)**, and in Australia by **Lee et al. (2020)** showed that application of an educational programme about delirium significantly improved nurses' knowledge regarding assessment, risk factors, clinical manifestations, and nursing management of delirium.

In the present study, the main factors which have a significant relationship with the studied nurses' knowledge of delirium preprogram were type of working area. The studied nurses' knowledge of

delirium preprogram was high among those who worked in the medical department and OR department. This could be because those working in the medical and OR departments have more time to update their knowledge than those working in the ICU. This result is in agreement with another study done in Korea by **Kim & Lee (2016)**, who demonstrated that the level of knowledge had presented statistically significant higher scores in nurses in the medical unit. The result of the present study is inconsistent with other studies done in Korea by **Jang & Yeom (2018)** and in Yemen by **Abdullah et al. (2020)**, who found that there was no significant difference between work units and the mean knowledge score of nurses.

The present study showed that there was no statistically significant relationship between socio-demographic data of the studied nurses and the level of knowledge before the program. This may be explained by the fact that the studied nurses had poor knowledge levels about all items of delirium and needed educational programmes to be able to provide high quality nursing care for the elderly to prevent the occurrence of delirium. This result is in line with other studies done in Yemen by **Abdullah et al. (2020)** and in Korea by **Kim & Eun (2013)**, who reported that no significant relationship between socio-demographic characteristics of nurses and mean knowledge score was noted. Similarly, a study conducted in Egypt, Tanta, by **Younis & Abo El-Fetoh (2016)** found that there was not a statistically significant difference between socio-demographic data and the mean knowledge score of the nurses, except for their job. This result contradicts with other studies done in Malaysia by **Ramoo et al. (2018)**, in Georgia by **Speed (2015)** and in Holland by **van et al. (2015)**, who reported that there was a statistically significant difference between nurses' knowledge scores and their age groups, duration of work in ICU, level of education, and nursing experience before the educational program. Also, a study conducted in Korea by **Jang & Yeom (2018)** demonstrated that a significant relationship between nurses' level of education and mean knowledge score was found. All of the studied nurses had not participated previously in any educational programme about delirium (table 1).

On the other hand, the present study showed that there was not a statistically significant difference between the level of knowledge about delirium among the studied nurses post-program and socio-demographic characteristics except for position and employment hours. This result is congruent with the finding of another study done in Holland by **van et al. (2015)**, who reported that there was no statistically significant difference with post-

programme knowledge scores in regard to socio-demographic characteristics of the nurses post-program. The results of the present study contradict those reported by **Younis & Abo El-Fetoh (2016)**, who reported no significant relation between the job and the knowledge of nurses about delirium post program. In line with this, other studies done in Georgia by **Speed (2015)** and Malaysia by **Ramoo et al. (2018)** demonstrated that there was a significant relation between the knowledge of nurses about delirium post-program and socio-demographic characteristics such as age, education, and nursing experience. The result of the present study can be rationalized by the fact that nursing positions give nurses a chance to acquire knowledge from different resources, such as physicians, as well as the fact that if the working hours of nurses increase, this will allow them to come into contact with a lot of cases, which helps them acquire more knowledge by practice.

Conclusions: A highly improved in nurses' knowledge of delirium was observed after the implementation of an educational programme about delirium, and it had a clear effect on the nurses.

Recommendations: Based on the findings of the present study, it can be recommended that:

- Integrating delirium assessment into nursing care daily.
- Incorporation of delirium assessment, in particular in nursing education courses.

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