Original Article

The Impact of an Educational Programme on Jordanian Intensive Care Nurses' Knowledge, Attitudes, and Practice Regarding Delirium and their Levels of Self-Efficacy: A Quasi-Experimental Design

Abstract

Background: Delirium is a common problem among patients in Intensive Care Units (ICUs); however, it remains underdiagnosed. We aimed to determine the impact of a nursing education program on Jordanian nurses' knowledge, practice, attitudes, self-efficacy, and ability to detect delirium among ICU patients. **Materials and Methods:** We conducted a nonequivalent, quasi-experimental design from January 2019 to January 2020. A total of 175 nurses who work in an ICU were included at the baseline and divided into two groups: (1) intervention (86 nurses), who received education for 6 hours each day across two different days and (2) a control group (89 nurses), who maintained their usual routine of care. Data were collected by means of a booklet of questionnaires about the nurses' knowledge and practice, attitudes, and self-efficacy. **Results:** Data from 160 nurses were included in the analysis. The education program intervention (n = 81) significantly increased nurses' knowledge and practice, positive attitudes, and self-efficacy compared with the control group (n = 79, $p < 0.001$). In addition, nurses who received the educational intervention were able to detect more cases of delirium (28%, from a total of 51 patients) than the controls, who detected three (6.50%) out of a total of 31 patients ($p = 0.003$). **Conclusions:** The ICU nurses who received the delirium-focused educational program increased their knowledge and practice, positive attitudes, and their self-efficacy; in addition, their ability to detect delirium was increased. The implementation of such a program is recommended for the health policymakers and stakeholders.

Keywords: *Attitude, delirium, education, knowledge, intensive care units, self efficacy*

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Introduction

Delirium, defined as "an acute confusion state involving a disturbance of consciousness accompanied by a change in cognition,"[1] is a common syndrome in the world's Intensive Care Units (ICUs). It is associated with a negative impact on patients' health because it increases comorbidity and mortality, health expenditure, increased hospital length of stay, and overall cost of health care.[2] Around 15% of people admitted to a hospital to receive treatment for their general medical conditions develop delirium once they become inpatients.[3] This percentage is estimated to increase to 30% to 50% among older acutely ill clients and may reach up to 80% of ICU patients.[4] Delirium resulting from physical disorders (e.g., metabolic disturbances). The main risk factors for delirium included higher severity of physical illness, old age, and baseline cognitive impairment.[1,4]

The diagnosis of delirium requires careful assessment and history taking because its signs and symptoms are similar to those of a number of psychiatric disorders (e.g., dementia, depression, psychosis).[5] The treatment of delirium (e.g., adequate nutrition, fluids, and adequate sleep) is done by identifying and dealing with the underlying cause and medical condition.[1] Some types of sedation and antipsychotic medication (e.g., Haloperidol) are used to decrease the psychomotor agitation associated with delirium[1]; therefore, there is a need to tailor appropriate nursing interventions to reduce delirium burden. Nurses play an important role in detecting and managing delirium; some studies have reported that educating nurses about delirium might improve the quality of care they provide to the patient.[1,5,6] However,

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Travers *et al.*[7] found that although the education itself did not have any effect on nurses' practice, continuous observation and audit improved it. Thomas *et al.*[8] conducted a systematic review of 10 studies and found that nurses had a lack of knowledge about delirium; the authors recommended education to improve patient care and increase nurses' confidence. The nurses perceived a lack of knowledge that negatively affected their clinical practice.[8] Additional education about delirium might enhance nurses' knowledge, practice, attitudes, and self-efficacy.[1,5,6]

The concept of self-efficacy refers to confidence in one's ability to carry out a specific action effectively and successfully.[9] Providing a useful delirium education program might equip nurses with accurate information and bolster their confidence and, consequently, enhance their self-efficacy when assessing, detecting, and managing delirious patients in ICUs.[5,10,11] In addition, a higher rate of detection of delirium among ICU patients can be enhanced by the use of validated assessment tools for delirium, such as the intensive care delirium screening checklist worksheet, observation screening scales, and the nursing delirium screening scale (Nu-DESC).

In Jordan, a study conducted by Mansour-Hamdan *et al.*[12] showed that ICU nurses needed education to equip them with adequate knowledge and skills to effectively manage delirium patients. Delirium remains poorly managed, not only in Jordan but worldwide, although there are many available measures to ameliorate this[6] Several studies have estimated that 30% to 40% of all delirium cases are preventable.[1,4] Thus, healthcare professionals, in particular, nurses, must be educated about these preventive measures in order to manage delirium effectively.[5,10,11] To our knowledge, no experimental studies have been conducted in Jordan in relation to this topic, so the objective of this study was to assess the impact of an education package that addressed four topics: (1) nurses' knowledge of and practices related to delirium, (2) nurses' attitudes toward people with delirium, (3) nurses' self-efficacy, and (4) nurses' ability to detect delirium. Therefore, this study aimed to determine the impact of a nursing education program on Jordanian nurses' knowledge, practice, attitudes, self-efficacy, and ability to detect delirium among ICU patients.

Materials and Methods

The study was conducted over 12 months, from January 2019 to January 2020. We used a nonequivalent, quasi-experimental design to test the effectiveness of the nurses' education package. Because of the lack of randomization, the nonequivalent, quasi-experimental design let us control the study conditions by using eligibility criteria. Participants were recruited by means of convenience sampling. The two eligibility criteria were (1) registered nurses working in ICUs and (2) able to write and read English. The setting included six hospitals (two teaching, two governmental, and two private). A total number of 275 employed nurses from various included hospitals were included. We excluded associate nurses and those who did not understand English. The sample size was calculated according to power analysis with the following criteria: statistical significance less than. 05 as an acceptable level, 80% power; the standard deviation of the study's outcomes would be approximately 0.7 (based on the data in the published article),[13] the effect size would be 24.70%, and an assumed dropout rate of 15%. The total expected sample size was estimated to be 130 nurses.

The participants were divided into two groups: (1) a control group, which included nurses working in hospitals who were told to continue their usual care and (2) the intervention group, which included nurses working in hospitals who continued their usual care but also attended the delirium education program we had developed. The delirium education program was delivered by means of a didactic teaching method 6 hours per day, over 2 days, by trained research assistants using face-to-face methods. The objective of the program was developed on the basis of Bloom's Taxonomy.[14] The objectives of the education program were to help the nurses recall knowledge regarding critical features of delirium at the bedside; report the multifactorial etiology of delirium and its leading risk factors; and demonstrate good practice and positive attitudes toward, and show confidence in using, diagnostic tools and analyzing strategies for the prevention and management of delirium. On the first day of the program, the topics included definitions, pathophysiology, signs and symptoms, diagnostic and statistical manual of mental disorders[15] epidemiology, and risk factors. The second day included discussions of the comparison between delirium versus dementia, the impact of delirium regarding clinical outcomes and hospital cost, introduction to the Nu-DESC delirium screening tool, prevention measures, medications, and nonpharmacological interventions. The content of program was developed on the basis of previous qualitative studies and literature (what the nurses experienced in terms of lacking knowledge about term "delirium," identification delirium, tools used, and management).[8,16,17] After that, we sent the developed draft of package to three professors of nursing and two registered ICU nurses who were experts in the field to review and validate the content. Their responses were considered during the preparation of the final copy of the education package. The final version was sent again to the same experts, who agreed on the content. After developing the educational program, we recruited participants. Research assistants (RAs) posted flyers on nurses' notice boards at the ICUs. Interested nurses contacted the RAs for further information, and the RAs provided them with a prospective' information sheet. RAs arranged a meeting with potential participants to answer their questions regarding the study and to confirm their rights. Nurses who agreed to participate signed the

consent form. The data (pre-post) were collected by four means. First, they completed a questionnaire to obtain baseline demographic data (gender, age, type of ICU, education, experience, and type of hospital). Second, they completed a questionnaire, developed on the basis of the pertinent literature[18] to measure knowledge and practice. This questionnaire had 20 questions; items 1 to 11 measured knowledge, and the rest measured practice. Each question is answered by "yes" or "no," or "do not know." A "yes" response means the nurse had good knowledge and practice of delirium. The third measure was a nurses' attitudes scale that was adopted from Devlin *et al.*[10] that measures how nurses feel and think about delirium. Seven items were used, each measured with a 5-point Likert scale that ranged from strongly agree to strongly disagree. The fourth measure was a 5-point Likert scale adapted from Bandura[9] that was intended to assess the nurses' levels of self-efficacy. The scale ranged from very confident to very not-confident. To control confounding factors, we randomly selected one governmental, one private, and one educational hospital to be in the intervention arm of the research and the remaining three hospitals to be in the control arm. We prepared the educational packages, including the necessary instruments; each package had a unique number. Baseline data were collected before starting the intervention in the meeting room where the education was carried out; these data were also collected after the intervention group had completed the 2-day education program in the same place. The additional measures of a detection of delirium were administered 3 months after the educational program. To assess nurses' detection of delirium, we used the Nu-DESC because it is an easily administered pertinent screening and detecting tool with improved sensitivity in comparison with other instruments.[19] The Nu-DESC is used to evaluate the presence of delirium on the basis of observation of the following five essential features: (1) disorientation, (2) inappropriate behavior, (3) inappropriate communication, (4) illusions/hallucinations, and (5) psychomotor retardation. Each item is rated on one of three levels as follows: 0 = absent, 1 = mild, and 2 = severe. The Nu-DESC has been found to be a valid screening tool in assessing and detecting delirium among hospitalized patients in the haemato-oncology/internal unit, with a sensitivity of 85.70% and specificity of 86.80%.[20] It was used at a 3-month follow-up to count the number of delirium cases in the control and intervention groups. Nurses in both groups filled out the Nu-DESC as a daily assessment and observation of delirium. To determine the nurses' competency in using the Nu-DESC, each nurse (in both the intervention and control groups) used the instrument for 1 month in the ICU setting with at least five patients who were not included in the study. During this month, an RA was with the nurse to answer any instrument-related questions and to confirm that the nurse correctly used the Nu-DESC (by taking notes; see Figure 1).

The face and content validity of all the questionnaires was reviewed by three professors (who were experts in the field) and two registered nurses (who worked in ICUs). The questions were modified and improved as per their suggestions. Those experts agreed that (with their suggested modifications) the questionnaires were valid and measured the concepts of interest. The developed instruments were reliable, with Cronbach's alpha scores of 0.78 for knowledge and practice, 0.66 for nurses' attitudes, and 0.67 for the self-efficacy questionnaire. We used IBM SPSS Statistics (Version 21, IBM Corp., Armonk, NY) to analyze the results. We used descriptive statistics to summarize demographic and clinical characteristics as appropriate for continuous and categorical variables. We used independent *t* test and χ^2 tests to compare the differences between the control and intervention groups with values <0.05 considered statistically significant. The study had a single-blind design; RAs who were blinded to the participants' group assignment measured the outcomes. The data analysis was conducted by a statistician blinded to the study allocator. This arrangement helped decrease threats to internal validity.

Ethical considerations

This study was approved by Philadelphia University's institutional review board ethics committee (B E100/34/300- Jan2019). In addition, ethical approval was obtained from all the hospitals in which the study was conducted. The participants gave their written consent to participate. Their confidentiality and privacy were confirmed and maintained. All participant nurses were identified on an electronic database by ID number. The ID numbers were not linked to any names, and hence, anonymity of the participants was maintained. All collected data were securely stored and were accessible only to the researchers. This research complied with the Data Protection Act, which requires data to be anonymized as soon as it is practical to do so.

Results

A total of 175 nurses were included at the baseline of the study; however, the analysis was conducted with data from 160 [see Figure 1]. There were no missing data. Table 1 shows the demographic characteristics of the participants. The mean age was 30.22. There were no significant differences between the two groups of participants at baseline. A χ^2 test indicated that there were no significant differences between the control and intervention groups in terms of knowledge and practice, nurses' attitudes, or self-efficacy at baselines.

The data in Table 2 shows that there were significant differences between the control and intervention groups in regard to all items of the knowledge and practice questionnaire (*p* < 0.05). The frequency of the items
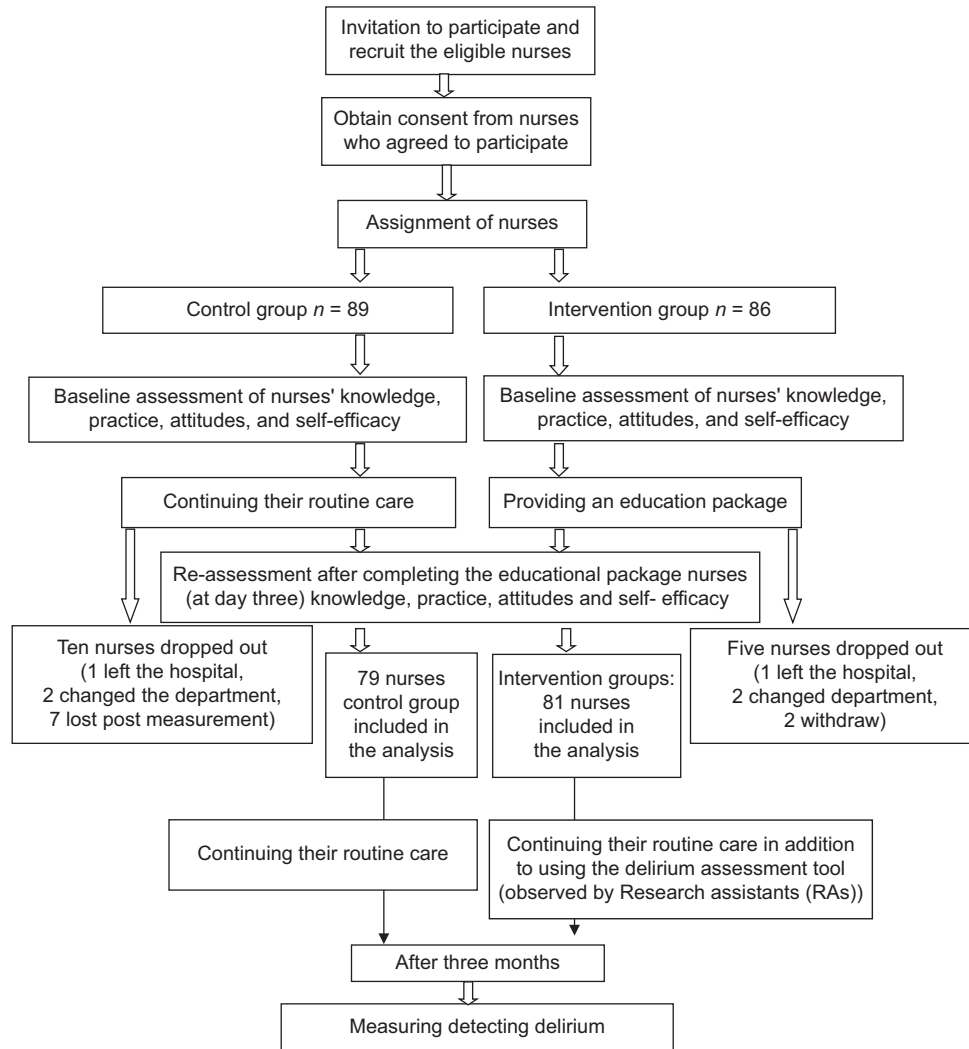
Figure 1: Flow of the participants through the study

Table 1:Demographic characteristic of the participants			
Characteristic	**Control group (*n*=79), Mean (SD)**	**Intervention group (*n*=81), Mean (SD)**	***p***
Age	29.98 (6.30)	30. 46 (5.70)	0.60
Duration of experience	5.60 (3.50)	5.40 (3.90)	0.80
	***n* (%)**	***n* (%)**	
Female	42 (52.50)	43 (53.80)	1
Education			
Diploma	10 (12.50)	16 (20)	0.40
Bachelor's	63 (78.80)	56 (70)	0.40
Master's	7 (8.80)	8 (10)	0.40
Hospital types			
Governmental	77 (96.30)	74 (92.50)	0.50
University teaching	2 (2.50)	3 (3.80)	0.50
Military	1 (1.20)	3 (3.80)	0.50

with "yes" responses in the intervention group was higher than that of the control group. Meanwhile, the frequency of the items with "Do not know" responses was lower in the intervention group compared with the control group (*p* < 0.001). The nurses who received

the education program were more knowledgeable and demonstrated good practice in regard to delirium, its risk factors, consequences, treatment, and nonpharmacological interventions. In addition, the intervention group had adopted new practices in their treatment of patients with

Table 2: Differences between the control and intervention groups in knowledge and practice: second day of the Intervention

Knowledge and practice questionnaire	Control group, *n* (%)			Intervention group, *n* (%)			*F*	df	*p*
	Yes	No	DN***	Yes	No	DN			
Brain anoxia increase the risk of ICU** delirium	34 (43)	22 (28)	23 (29)	78 (96)	3 (4)		54	2	0.001*
Electrolytes imbalance increases the risk of delirium in ICU	45 (57)	17 (21.50)	17 (21.50)	74 (92)	4 (5)	3 (3)	24	2	0.001*
Aging is one of the main causes of ICU delirium	28 (35)	34 (43)	17 (22)	76 (94)	5 (6)		60	2	0.001*
Hallucination and confusion are the signs of ICU delirium	42 (53)	17 (22)	20 (25)	76 (94)	4 (5)	1 (1)	35	2	0.001*
Agitation is a sign of ICU delirium	43 (55)	15 (19)	21 (26)	72 (89)	7 (9)	2 (2)	25	2	0.001*
Delirium increases the length of stay	51 (65)	17 (22)	11 (14)	62 (77)	17 (21)	2 (2)	7	2	0.026*
Sedation of patients is a barrier to assessing for ICU delirium	44 (56)	11 (14)	24 (30)	71 (88)	7 (9)	3 (3)	23	2	0.001*
Alcohol use increases risk of delirium	44 (56)	12 (15)	23 (29)	80 (99)	1 (1)		42	2	0.001*
There is relationship between increased body temperature and delirium	41 (52)	16 (20)	22 (28)	77 (96)	2 (3)	1 (1)	40	3	0.001*
The most common drug used to treat delirium is Haloperidol	44 (56)	20 (25)	15 (19)	73 (90)	8 (10)		27	2	0.001*
Hypoactive delirium is the most common type of ICU delirium	21 (27)	28 (35)	30 (38)	22 (27)	53 (66)	6 (7)	23	2	0.001*
In practice: decreasing audiovisual stimulation could decrease delirium	37 (47)	22 (27)	20 (26)	75 (93)	5 (6)	1 (1)	40	2	0.001*
Using pain management techniques reduce risk of delirium	43 (54)	21 (27)	15 (19)	73 (90)	8 (10)		28	2	0.001*
Reorienting the patient to person, place and time is a common practice in ICU	49 (62)	12 (15)	18 (23)	77 (95)	4 (5)		28	2	0.001*
Using cognitive stimulation such as recalling events in life is used in ICU	27 (34)	38 (48)	14 (18)	70 (86)	10 (12	1 (2)	46	2	0.001*
Sleep assistance methods other than medication (e.g., relaxation) are used in ICU	41 (52)	3 (38)	8 (10)	62 (77)	17 (21)	2 (2)	11	2	0.001*
Restraints are used for agitated patients	43 (54)	29 (37)	7 (9)	41 (51)	38 (47)	2 (2)	4	2	0.135
Education about disease, signs and symptoms, and treatment options is usually done for patient/family	46 (58)	18 (23)	15 (19)	75 (93)	5 (6)	1 (1)	26	2	0.001*
There a sedation protocol that is usually used in the unit.	50 (63)	29 (37)		54 (67)	27 (33)		0.20	1	0.778
There an assessment tool used for screening of delirium?	14 (18)	57 (72)	8 (10)	61 (75)	19 (24)	1 (1)	53	2	0.001*

**DN=Do not Know; ***ICU=Intensive Care Unit. *Significant

delirium, such as decreasing audiovisual stimulation and providing reorientation. However, there were no significant differences on two items: (1) restraints were used for agitated patients and (2) is there a sedation protocol that is usually used in the unit? [see Table 2].

There were significant differences between the control and intervention groups regarding all items on the attitude scale ($p < 0.001$). Nurses in the intervention group believed that delirious patients are agitated and that the signs and symptoms are not difficult to distinguish from others. They also believed that delirium associated with severe complications required active interventions; furthermore, they considered it as an undiagnosed ICU problem. There was no significant difference between groups in their response to the item "Delirium is challenging to assess in ICU patients" ($p = 0.69$ [see Table 3].

The intervention group was significantly different from the control group in their self-efficacy responses ($p < 0.001$). The frequency of confident and very confident answers was observed more frequently in the intervention group compared with the control group. The nurses who received the education package perceived themselves as either very confident or confident in their ability to assess and manage delirium.

In term of the effect of an educational program on the ability to detect delirium, after 3 months, just 130 nurses used the Nu-DESC. Eighty-two patients were admitted in the study's settings during the 3-month study period (51 patients at intervention group settings and 31 at control settings). The Nu-DESC was used to detect delirium among all patients in both groups. Although the number of admitted patients was high among the intervention group setting, there was a significant difference between the two groups of nurses in their ability to detect delirium; nurses who had attended the educational intervention were able to detect 15 cases with delirium (28%) from 51 patients by using Nu-DESC instrument (whereby their Nu-DESC showed mild to severe scores). Nurses in the interventional group reported that they notified the ICU physicians about patients who were detected as having delirium by using Nu-DESC. Those physicians prescribed specific treatment plans in coordination with ICU nurses' interventions to manage these cases. Meanwhile, nurses in the control group identified three cases (6.50%) from a total of 31 patients (without education, based on their clinical judgment). We did not consider all delirium risk factors but instead looked at the patient's illness severity for both groups (which were similar).

Table 3: Differences in attitude between the control and intervention groups: second day of the intervention

Item	Control group, *n* (%)	Intervention group, *n* (%)	*F*	df	*P*
Delirium is challenging to assess in ICU** patients			1.44	3	0.69
Strongly agree	33 (42)	32 (39)			
Agree	34 (44)	33 (41)			
To some extent	7 (9)	8 (10)			
Do not agree	4 (5)	8 (10)			
Strongly disagree					
ICU patients with delirium are rarely agitated			23	4	0.001*
Strongly agree	7 (9)	1 (1)			
Agree	33 (42)	17 (25)			
To some extent	12 (15)	7 (9)			
Do not agree	20 (25)	49 (60)			
Strongly disagree	7 (9)	7 (9)			
Signs and symptoms of delirium are difficult to distinguish from other signs			46	4	0.001*
Strongly agree	11 (14)	2 (2)			
Agree	36 (46)	11 (14)			
To some extent	14 (17)	13 (16)			
Do not agree	9 (11)	48 (59)			
Strongly disagree	9 (11)	7 (9)			
Delirium is associated with severe complications			49	4	0.001*
Strongly agree	6 (7)	25 (31)			
Agree	24 (30)	45 (56)			
To some extent	9 (11)	8 (10)			
Do not agree	14 (18)	1 (1)			
Strongly disagree	26 (33)	2 (2)			
Delirium is a major ICU problem that requires active intervention			54	4	0.001*
Strongly agree	9 (11)	32 (40)			
Agree	28 (36)	44 (54)			
To some extent	4 (5)	5 (6)			
Do not agree	24 (30)				
Strongly disagree	14 (18)				
Delirium is a common response to the environment of ICU			38	4	0.001*
Strongly agree	13 (17)	34 (42)			
Agree	26 (33)	39 (48)			
To some extent	9 (11)	5 (6)			
Do not agree	9 (11)	3 (8)			
Strongly disagree	22 (28)				
Delirium is an underdiagnosed problem			27	4	0.001*
Strongly agree	19 (24)	28 (35)			
Agree	24 (30)	41 (51)			
To some extent	13 (17)	6 (7)			
Do not agree	1 (1)	4 (5)			
Strongly disagree	22 (28)	2 (2)			

*Significant ,**ICU: Intensive Care Unit

Discussion

This study reveals that nurses in the intervention group (who received an educational package about delirium) were significantly different from those in the control group regarding knowledge and practice, confident attitudes, self-efficacy, and ability to detect delirium.

Attending the delirium education program increased both nursing knowledge and practice in the intervention group.

Several studies have found that providing nurses with education about delirium increased their knowledge about the condition. Speed[21] conducted a pre-post intervention designed to examine the delirium knowledge levels of ICU nurses. The findings revealed that there was a significant difference in pre- and post-intervention scores, indicating that the educational intervention had an impact on the nurses' knowledge about delirium. This also was supported by Grealish *et al.*'s[17] results. Another study reported that

educating nurses about delirium improved their clinical practice.[2] This might suggest there is a relationship between increased knowledge and improved clinical practice; however, a study conducted by Lee *et al*.[2] found no significant relationship between delirium-related knowledge and practice. Our findings could be explained by the fact that the research team focused on the importance of delirium management, with particular attention paid to delirium recognition; there was a significant relationship between recognition (necessity of delirium-related intervention) and practice.[2] In addition, after taking part in an educational program, nurses were able to improve their positive perceptions about, knowledge of, and practice regarding delirium.[22] However, these findings were limited by uncertainty about the validity and reliability of the instrument that was used to measure the outcomes because it was developed by the research team.[22] Another study, of 40 nurses in a general hospital in South Korea, involved a 3-month education program about cognitive impairment.[11] The researchers found that their educational program had a positive impact on nurses' knowledge and attitudes. Although that study applied only to older adult patients, the findings are consistent with our research in Jordanian ICUs. Previous studies[11,23,24] are congruent with our findings in terms of how education about delirium increased nurses' positive attitudes. This could be rationalized by the assumption that increasing knowledge is associated with greater influence on attitudes.[25] We think that cognition plays an important role in the forming of attitudes: When we learn new information, we become more knowledgeable and so increase our concern. This might affect behavior and practice, and consistency in practicing of this behavior shapes our attitudes.

Nurses' education regarding delirium that is both effective and relevant increases their confidence in both assessing and managing this condition.[24] Self-efficacy is influenced by experience and verbal persuasion, the latter often being in the form of education.[7,26] In the current study, nurses who received delirium-focused education reported higher self-efficacy compared with the control group; simply put, they were more confident. The two groups of participants did not differ in their level of experience, which suggests that education is the variable that influenced self-efficacy in the current study.

Early detection of delirium appears to allow prompt management of the condition, consequently reducing its adverse complications.[27–29] Travers *et al*.[7] found that 34 nurses who received delirium-focused education managed to identify 69% of patients with delirium from a total of 181. Another study, by van Velthuijsen *et al*.,[30] revealed that, after a nurse education initiative, there was a significant increase in the frequency of correct delirium screenings when using a 13-item delirium screening scale. The results of all of these studies are consistent with our findings, which showed that there were significant increases in the intervention group nurses' correct detection of patients with delirium compared with nurses in the control group; however, the severity of the patients' illness was similar in both groups. Meanwhile, the other underlying risk factors were not considered. This outcome could be the result of nurses' increased delirium-centric knowledge; their positive attitudes enhanced their ability to identify delirium-affected patients.

We recommend that future studies use large sample size with different communities and evaluate the psychometric properties of the questionnaires we used (to ensure their reliabilities and validity; Cronbach's alpha in the current study ranged between acceptable and good levels). Future studies should determine the generalizability of the current study's findings using robust methods (e.g. a randomized controlled trial, large sample, variety of settings). There are some limitations to the current study, although the blinding of the outcome assessors and data analysts increased the validity of the findings. First, the study is limited by the sampling procedure, which increased the potential of selection bias. Second, the use of self-report instruments increased reporting bias; third, we did not measure all confounding factors that might affect the results, such as delirium risk factors or patient treatment-related differences between both groups. Therefore, future research must consider all these limitations and should use random sampling to increase the generalizability of the findings.

Conclusion

The ICU nurses who took part in the delirium-focused educational program increased their knowledge and practice, positive attitudes, and their self-efficacy compared with the control group nurses, and their ability to detect delirium was increased. The results of this study suggest that nursing education, with a specific, contemporary focus, is required in clinical settings (in particular, ICUs). Because delirium may lead to permanent mental problems, policymakers must focus on adopting a delirium screening tool, in particular in the ICU practice area; initiate national programs to manage carefully such educational interventions, whether in ICU or psychiatric health settings; and direct health policy to focus in detection of cognitive disorders and thereby reduce their burden in term of mortality and expenditure.

Conflicts of interest

Nothing to declare.

References

1. Pandharipande PP, Ely EW, Arora RC, Balas MC, Boustani MA, La Calle GH, *et al*. The intensive care delirium research agenda: A multinational, interprofessional perspective. Intensive Care Med 2017;43:1329–39.

2. Lee K, Park M, Kim G. A study of knowledge, recognition and practice about delirium in general hospital nurses. Intern J Bio-Scie Bio-Techn 2016;8:219–30.

3. Feast AR, White N, Lord K, Kupeli N, Vickerstaff V, Sampson EL. Pain and delirium in people with dementia in the acute general hospital setting. Age Ageing 2018;47:841–6.

4. Ahmed S, Leurent B, Sampson EL. Risk factors for incident delirium among older people in acute hospital medical units: A systematic review and meta-analysis. Age Ageing 2014;43:326–33.

5. Blevins CS, DeGennaro R. Educational intervention to improve delirium recognition by nurses. Am J Crit Care 2018;27:270–8.

6. Hickin SL, White S, Knopp-Sihota J. Nurses' knowledge and perception of delirium screening and assessment in the intensive care unit: Long-term effectiveness of an education-based knowledge translation intervention. Intensive Crit Care Nurs 2017;41:43–9.

7. Travers C, Henderson A, Graham F, Beattie E. CogChamps: Impact of a project to educate nurses about delirium and improve the quality of care for hospitalized patients with cognitive impairment. BMC Health Serv Res 2018;18:534.

8. Thomas N, Coleman M, Terry D. Nurses' experience of caring for patients with delirium: Systematic review and qualitative evidence synthesis. Nurs Rep 2021;11:164–74.

9. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. Psychol Rev 1977;84:191–215.

10. Devlin JW, Marquis F, Riker RR, Robbins T, Garpestad E, Fong JJ, *et al*. Combined didactic and scenario-based education improves the ability of intensive care unit staff to recognize delirium at the bedside. Crit Care 2008;12:R19.

11. Kang Y, Moyle W, Cooke M, O'Dwyer S. An educational programme to improve acute care nurses' knowledge, attitudes and family caregiver involvement in care of people with cognitive impairment. Scand J Caring Sci 2017;31:631–40.

12. Mansour-Hamdan A, Farhan N, Othman E, Yacoub M. Knowledge and nursing practice of critical care nurses caring for patients with delirium in intensive care units in Jordan. J Contin Educ Nurs 2010;41:56-71.

13. Hesse S, Kreuzer M, Hight D, Gaskell A, Devari P, Singh D, *et al*. Association of electroencephalogram trajectories during emergence from anaesthesia with delirium in the postanaesthesia care unit: An early sign of postoperative complications. Br J Anaesth 2019;122:622–34.

14. Krathwohl D. A revision of Bloom's taxonomy: An overview. Theory Pract 2002;41:212–8.

15. European Delirium Association and American Delirium Society. The DSM–5 criteria, level of arousal and delirium diagnosis: Inclusiveness is safer. BMC Med 2014;12:141.

16. Helgesen AK, Adan YH, Dybvik Bjørglund C, Weberg-Haugen C, Johannessen M, Åsmul Kristiansen K, *et al*. Nurses' experiences of delirium and how to identify delirium—A qualitative study. Nurs Open 2021;8:844–9.

17. Grealish L, Todd J-A, Krug M, Teodorczuk A. Education for delirium prevention: Knowing, meaning and doing. Nurse Educ Pract 2019;40:102622. doi: 10.1016/j.nepr. 2019.102622.

18. Elfeky HA, Ali FS. Nurse's practices and perception of delirium in the intensive care units of a selected university hospitals in Egypt. J Educ Pract 2013;4:61–70.

19. Heinrich TW, Kato H, Emanuel C, Denson S. Improving the validity of nurse-based delirium screening: A head-to-head comparison of nursing delirium-screening scale and short confusion assessment method. Psychosomatics 2019;60:172–8.

20. Gaudreau J, Gagnon P, Harel F, Tremblay A, Roy M. Fast, systematic, and continuous delirium assessment in hospitalized patients: The nursing delirium screening scale. J Pain Symptom Manage 2005;29:368–75.

21. Speed G. The impact of a delirium educational intervention with intensive care unit nurses. Clin Nurse Spec 2015;29:89–94.

22. Marino J, Bucher D, Beach M, Yegneswaran B, Cooper B. Implementation of an intensive care unit delirium protocol: An interdisciplinary quality improvement project. Dimens Crit Care Nurs 2015;34:273–84.

23. Solberg LM, Plummer CE, May KN, Mion LC. A quality improvement program to increase nurses' detection of delirium on an acute medical unit. Geriatr Nurs 2013;34:75–9.

24. Stone L. Development of a Delirium Educational Program for Hospital Medicine Providers. Wegmans School of Nursing: St John Fisher College; 2017.

25. Fabriger L, Petty E, Smith S, Crites S. Understanding knowledge effects on attitude–behavior consistency: The role of relevance, complexity, and amount of knowledge. J Pers Soc Psychol 2006;90:556–77.

26. Robb M. Self-efficacy with application to nursing education: A concept analysis. Nurs Forum 2012;47:166–72.

27. Cerejeira J, Mukaetova-Ladinska EB. A clinical update on delirium: From early recognition to effective management. Nurs Res Pract 2011;2011:875196. doi: 10.1155/2011/875196.

28. Harroche J, St-Louis L, Gagnon M. The detection of delirium in the ICU: An important aspect of care. J Nurs Educ Pract 2014;4:135–45.

29. Angel C, Brooks K, Fourie J. Standardizing management of adults with delirium hospitalized on medical–surgical units. Perm J 2016;20:27–32.

30. van Velthuijsen EL, Zwakhalen SMG, Warnier RMJ, Ambergen T, Mulder WJ, Verhey FRJ, *et al*. Can education improve clinical practice concerning delirium in older hospitalised patients? Results of a pre-test post-test study on an educational intervention for nursing staff. BMC Med Educ 2018;18:59.