




The efficacy of educational interventions on neonatal intensive care unit nurses knowledge and attitude toward neonatal palliative care

Sawsan Abuhammad ^{1*} , Marah Elayyan ¹ , Mohanad El-Bashir ¹ 

¹Faculty of Nursing, Jordan University of Science and Technology, Irbid, JORDAN

*Corresponding Author: shabuhammad@just.edu.jo

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ABSTRACT

Aim: The objective of this study is examining the impact of an educational interventions in improving knowledge and attitudes towards neonatal palliative care (NPC) among nurses in Jordan.

Method: A pre-post-test design was used to examine the efficacy of an educational program nurses' knowledge and attitude toward NPC. Almost 164 nurses participated in the study, 82 intervention groups and 82 control groups.

Results: The overall NPC mean knowledge score for the control group was 30.60 (SD=4.01) and for the intervention group was 73.85 (SD=5.78). The control group's mean attitude for the NPC score is 88.94 (SD=14.45), whereas the intervention group's is 82.13 (SD=10.59). There was also a substantial favorable effect of education program on nurses' knowledge and attitude regarding NPC. Furthermore, there was no influence of characteristics on nurses' knowledge and attitude regarding NPC.

Conclusion: Depending on the findings of this study, the NPC educational program is beneficial in improving nurse knowledge and attitudes for NPC services, as well as providing an effective educational program for nurses. With the rising demand for NPC services with chronic critical illnesses and the documented good impact of NPC services on neonates in need and their families, it became imperative to improve the nurse's knowledge and attitude toward NPC.

Keywords: neonate, palliative, educational, knowledge, attitude, NICU

INTRODUCTION

Neonates are presently receiving attention through the provision of instructions and supportive measures in the neonatal intensive care unit (NICU) [1]. Many care settings throughout the world vary in their approval of this style of care and their ability to choose it as needed [2]. Prematurity and chromosomal anomalies are the leading causes of neonatal death, necessitating end-of-life care [3, 4]. End-of-life care for infants, families, and doctors is crucial [5-7]. Regardless of the necessity for neonatal end-of-life care, no plan or information was offered regarding this sort of care for newborns and their parents, making it a huge problem loaded with emotions and uncertainty [4]. Parents of neonates around the time of death are feeling the loss of the neonate before their death, instead of being inspired with optimism and hope for a brighter future with their neonates [1-3]. Parents are anxious for their neonates that may suffer from anguish and physical pain at the time of end-of-life [4, 5]. They wish their neonate's death to be as comfortable as possible and they need a special type of care called neonatal palliative care (NPC). The NPC seeks to avoid and relieve physical, emotional, and psychological pain in sick neonates [6]. Health care teams that include nurses should focus on pain and symptom.

Management as well as patient support anywhere at any given time, perhaps there are many unknown factors [7, 8]. Both health care providers that include nurses and families are undergoing adjustments. It's hard to forecast how long somebody will live, whether in hours, minutes, days, or weeks [6]. Despite all the challenges, more research into the attitudes and demands of Jordanian NICU nurses for NPC is needed to better our awareness of the problem and develop appropriate NPC guidelines for use in Jordanian hospitals.

According to prior research, nurses need education as well as practical understanding in the evaluation and treatment of neonatal symptoms, as well as assisting and providing experienced care at the moment of death. Nurses have been at the vanguard of efforts to reform organizational policies and practices in order to support the NPC of critically sick newborns [11, 13]. In Taiwan, it was examined the schooling requirements for neonatologists and newborn nurses in terms of NPC [14]. According to the data, 50% of neonatal nurses need more pain management training. The need of improving NPC performance is becoming more generally understood [15]. There are currently various models in place for neonates and their families to receive treatment that is centered on quality of life, peaceful death, and family support. Previous research has emphasized the need for nursing education to equip nurses to participate in NPC as part of their daily routine in the NICU [13].

In Jordan, the only NPC standards accessible to NICU nurses are those supplied by the selling firm, which often contain instructions on how to operate the machines, how to pick the right size of cannulas for patients, how and where to rinse out, and how to adjust flow rates [14]. Furthermore, earlier data revealed that there is a deficiency in nursing knowledge and practice for NPC among NICU nurses. Health care providers and nurses could benefit NPC patients and their families by implementing an “evidence-based” education intervention.

Evidence-based NPC teaching can increase nurses' confidence by increasing their knowledge and encouraging favorable attitudes toward NPC delivery, according to this pilot study [9, 10]. Another study found that locally hosted workshops help neonatal workers shift attitudes and gain expertise. As a first step in making a wide range of NPC services more accessible and usable [9, 11]. The goal of this study is to examine neonatal nurses' knowledge and attitude toward NPC and to determine the effect of educational program on nurses' knowledge and attitudes toward NPC in NICU.

METHOD

We use a pre-post-test design to examine the efficacy of an educational program on nurses' knowledge and attitude toward NPC. The target group was nurses who worked in NICUs. Accessible nurses were those who had previously worked in the neonate units of the chosen institutions. Nurses from Prince Rahmeh Education Hospital (PREH) and King Abdallah Hospital (KAUH) were employed as the control group due to difficulties in group selection, whereas nurses from Al-Bashir Hospital (AH), where the researcher works, was used as the experimental group in this study to save time and money for the researcher. Inclusion criteria stated having a bachelor's degree or higher educational level, the ability to communicate in Arabic or English, and the desire to participate in the study.

Based on sample size calculation, the required sample was 120 nurses. The pre/post-test design included 120 nurses who met the inclusion criteria, with an extra 44 nurses included to account for the drop rate and missing data. The final number recruited was 164 nurses. The participants were recruited using a convenience sample approach.

Setting

The research was conducted in three Jordanian hospitals: a university educational hospital (KAUH), a governmental hospital (PREH), and a governmental educational hospital (AH). These hospitals were chosen because they offer neonatal health care for most neonates in the North of Jordan.

Educational hospital KAUH is linked with Jordan University of Science and Technology in Irbid, Al-Ramtha. Hospital admissions from the Ministry of Health make up around half the total number at this facility. Departments of neonates are involved.

Instrument

The data gathering tools are divided into three sections: a demographic section, the NPC attitude scale (NiPCAS), and the palliative care questionnaire for nurses (NPCQN). The first section included demographic questions. This section was introduced by the researchers to provide more thorough and relevant statistics on education and practice in nursing in

Jordan, as well as to better comprehend the convenient sampling of nurses enrolled.

The NiPCAS [12] is a standardized tool for evaluating neonatal nurses' attitudes regarding palliative care procedures for neonates with a poor prognosis. There are 26 items on the NiPCAS that assess attitudes via a Likert scale of 1 to 5. Its scale has been coded, as follows: a severe disagreement is indicated by a 1, a moderate disagreement by a 2, a moderate agreement by a 3, a strong agreement by a 4, and a doubtful situation by a 5. This instrument discusses three issues that include the nursing organization in which each nurse works, resources available to support a palliative care model and parental demands and technological imperatives.

The NPCQN palliative care knowledge questionnaire consists of twenty *true, false, or do not know* inquiries were presented in the form. This tool examines the nurses about palliative care philosophy and concepts, as well as pain and symptom management and psychosocial aspects of care. Each accurate answer was worth one point, while incorrect or unknown responses were worth nothing. The reliability correlation coefficient for test-retest reliability was 0.56. The 20-item quiz had an internal consistency of 0.78, suggesting a high level of internal consistency [13].

The researcher received permission from Jordan University of Science and Technology IRB and the head nurse of the neonatal department in each institution. Nurses who fit the criteria were recruited to take part in the study. They offered their informed consent when they accepted to participate. The data collection method was used between August 2021 and November 2021.

Experimental Group

A pre-test questionnaire was sent to all nurses at Al-Bashir Hospital after they had given informed permission, and they were requested to fill it out. Any time and any place were available for the nurses to conduct the educational program of their choice. An educational session was subsequently held for all attendees through WhatsApp, using a laptop and a PowerPoint presentation, which was then shared with the visitors. After the session, participants were invited to fill out a post-test questionnaire. After obtaining informed permission from the participants, all KAUH and PREH nurses were assigned as the control group. For each of the two times they were requested to complete the questionnaire, they were given a written questionnaire from the nurses' office to complete. After the control group data was obtained, the same educational program was presented to them to avoid injustice.

The Intervention

An educational program was applied to the interventional group. The nurses were asked to read it to increase their understanding of NPC. This intervention was not previously available for AH nurses in the experimental group. The educational sessions were run on a schedule suitable for nurses, which comprised the date, location, topic, time, and duration of the educational session. The educational sessions were divided into two parts: theoretical (definition of palliative care, concepts, causes, and the role of the nurse in palliative care, etc.) and practical (nursing role in pain control, comfort measures, symptom management, and family support). The researchers began each session by giving a recap of the prior one. Lectures with a PowerPoint presentation on a laptop,

Table 1. Pre-test comparison of nurses' socio-demographic & professional characteristics between two groups of nurses (n=164)

Variable	Neonatal nurses' group, n (%)		Test statistic	p-value
	Control group=82	Experimental group=82		
Age (years), mean (SD)	30.744 (4.402)	31.18 (6.14)	t(162)=0.526	0.600
Age group (years)				
20-30 years	47 (56.1)	46 (56.1)	$\chi^2(2)=1.963$	0.380
31-38 years	30 (36.6)	26 (31.7)		
>=39 years	5 (6.1)	10 (12.2)		
Marital status				
Married	60 (73.2)	43 (52.4)	$\chi^2(3)=9.31$	0.025
Single	21 (25.6)	35 (42.7)		
Widow	1 (1.2)	1 (1.2)		
Divorced	0 (0)	3 (3.7)		
With children				
Yes	58 (70.7)	39 (47.6)	$\chi^2(1)=9.11$	0.003
No	24 (29.3)	43 (52.4)		
Overall nursing experience years, mean (SD)	7.03 (4.58)	7.82 (5.59)	t(162)=0.986	0.326
Nursing experience years in nursing categorized				
1-6 years	47 (57.3)	46 (56.1)	$\chi^2(2)=0.485$	0.785
7-13 years	25 (30.5)	23 (28)		
14-20 or more years	10 (12.2)	13 (15.9)		
Experience years in neonatal department, mean (SD)	6.213 (4.26)	6.56 (5.65)	t(162)=0.445	0.660
Experience years in pediatrics categorized				
1-6 years	51 (62.2)	55 (67.1)	$\chi^2(2)=3.597$	0.166
7-13 years	25 (30.5)	16 (19.5)		
14-20 years	6 (7.3)	11 (13.4)		
Nursing educational level				
Bachelor of nursing	76 (92.7)	77 (93.9)	$\chi^2(1)=0.097$	0.755
Master's degree or higher	6 (7.3)	5 (6.1)		
Current working hospital				
AL-Basheer Hospital	0	82 (100)		
King Abdullah University Hospital	67 (81.7)	0	$\chi^2(2)=164$	<0.001
Jerash Governmental Hospital	15 (18.3)	0		
Taken course on NPC previously				
Yes	20 (24.4)	27 (32.9)	$\chi^2(1)=1.46$	0.227
No	62 (75.6)	55 (67.1)		
Working in department giving NPC workshops				
Yes	23 (28)	23 (28)	$\chi^2(1)\leq 0.001$	1
No	59 (72)	59 (72)		
Have you worked at KHCC previously				
Yes	12 (14.6)	9 (11)	$\chi^2(1)=0.492$	0.483
No	70 (85.4)	73 (89)		

brainstorming, group discussion, demonstration, and re-demonstration were used as educational methods.

The nurses were told to read it carefully, and they were informed that they will be examined. Additionally, the nurses underwent online NPC training sessions up to five hours. The instructional handbook summarized the most important topics including the attitudes and principles of palliative care, how to establish the eligibility of a neonate for palliative care, communication, pre-birth care, transition from an active postnatal to a post-care situation, pain management, and general teamwork skills.

The introduction section of this educational program explains what NPC is, when it is needed, how to stratify neonates, whether they are eligible for NPC or not, and the difference between neonate and adult palliative care. Then, assessment and management of pain section consists of the definition of pain, myths and facts about neonate pain, type of physical pain, steps of pain management, and how to assess pain in neonates in pharmacological and non-pharmacological ways, the WHO guidelines for pain management, and some information about morphine in general. Additionally, communication techniques with neonates and breaking bad news to parents. Then, how to deal with grieving and bereavement of families, stages of grief, characteristics of grief depending on the age group. Finally, the end-of-life section is

divided into subjects like the good death, symptoms in need of control, artificial nutrition and hydration at the end-of-life period. Management of symptoms including respiratory symptoms, gastrointestinal symptoms, psychological and neurological symptoms, the dermatological and hematological symptoms. For more information about the educational material visit.

Data Analysis

Following coding, all data obtained from the participants by the questionnaire was loaded into the SPSS database. The categorical variables were described using frequencies and percentages, whereas the continuously measured variables were described using means and standard deviations. The t-test had been used to evaluate the statistical significance of mean differences on continuous variables across the levels of categorically measured variables.

RESULTS

Description of the Nurses

All the nurses (n=164, 100%) were female neonatal nurses. The age ranged from 23 to 49 years (M=29.3 years, SD=6.34) (Table 1).

Table 2. Comparison of nurses indicators of NPC knowledge at post-experimental time between two analyzed groups

No	EG (n=82)	CG (n=82)	p-value	No	EG (n=82)	CG (n=82)	p-value
1	Palliative care is appropriate only in situations, where there is evidence of a downhill trajectory or deterioration.			11	Men generally reconcile their grief more quickly than women.		
	Yes, n (%)	23 (28)	53 (64.6)	<0.001	Yes, n (%)	20 (24.4)	49 (59.8)
	No, n (%)	59 (72)	27 (32.9)		No, n (%)	59 (72)	22 (26.8)
	I do not know	0	2 (2.4)		I do not know	3 (3.7)	11 (13.4)
2	Morphine is standard used to compare analgesic effect of other opioids.			12	Philosophy of palliative care is compatible with that of aggressive treatment.		
	Yes, n (%)	71 (86.6)	53 (64.6)	0.001	Yes, n (%)	68 (82.9)	45 (54.9)
	No, n (%)	11 (13.4)	21 (25.6)		No, n (%)	12 (14.6)	25 (30.5)
	I do not know	0	8 (9.8)		I do not know	2 (2.4)	12 (14.6)
3	The extent of the disease determines the method of pain treatment.			13	The use of placebos is appropriate in treatment of some types of pain.		
	Yes, n (%)	29 (35.4)	66 (80.5)	<0.001	Yes, n (%)	27 (32.9)	59 (72)
	No, n (%)	53 (64.6)	11 (13.4)		No, n (%)	55 (67.1)	12 (14.6)
	I do not know	0	5 (6.1)		I do not know	0	11 (13.4)
4	Adjuvant therapies are important in managing pain.			14	In high doses, codeine causes more nausea & vomiting than morphine.		
	Yes, n (%)	77 (93.9)	62 (75.6)	0.003	Yes, n (%)	72 (87.8)	49 (59.8)
	No, n (%)	5 (6.1)	15 (18.3)		No, n (%)	9 (11)	7 (8.5)
	I do not know	0	5 (6.1)		I do not know	1 (1.2)	26 (31.7)
5	It is crucial for family members to remain at bedside until death occurs.			15	Suffering and physical pain are synonymous.		
	Yes, n (%)	24 (29.3)	62 (75.6)	<0.001	Yes, n (%)	34 (41.5)	55 (67.1)
	No, n (%)	58 (70.7)	16 (19.5)		No, n (%)	48 (58.5)	11 (13.4)
	I do not know	0	4 (4.9)		I do not know	0	16 (19.5)
6	During the last days of life, the drowsiness associated with electrolyte imbalance may decrease the need for sedation.			16	Demerol is not an effective analgesic in the control of chronic pain.		
	Yes, n (%)	64 (78)	49 (59.8)	0.002	Yes, n (%)	71 (86.6)	40 (48.8)
	No, n (%)	17 (20.7)	20 (24.4)		No, n (%)	11 (13.4)	22 (26.8)
	I do not know	1 (1.2)	13 (15.9)		I do not know	0	20 (24.4)
7	Drug addiction is a major problem when morphine is used on a long-term basis for the management of pain.			17	The accumulation of losses renders burns out inevitable for those who seek work in palliative.		
	Yes, n (%)	31 (37.8)	62 (75.6)	<0.001	Yes, n (%)	24 (29.3)	67 (81.7)
	No, n (%)	51 (62.2)	11 (13.4)		No, n (%)	56 (68.3)	10 (12.2)
	I do not know	0	9 (11)		I do not know	2 (2.4)	5 (6.1)
8	Individuals who are taking opioids should also follow a bowel regime.			18	Manifestations of chronic pain are different from those of acute pain.		
	Yes, n (%)	73 (89)	38 (46.3)	<0.001	Yes, n (%)	72 (87.8)	63 (76.8)
	No, n (%)	9 (11)	26 (31.7)		No, n (%)	10 (12.2)	15 (18.3)
	I do not know	0	18 (22)		I do not know	0	4 (4.9)
9	The provision of palliative care requires emotional detachment.			19	The loss of a distant or contentious relationship is easier to resolve than the loss of one that is close or intimate.		
	Yes, n (%)	7 (8.5)	28 (34.1)	<0.001	Yes, n (%)	28 (34.1)	51 (62.2)
	No, n (%)	75 (91.5)	45 (54.9)		No, n (%)	54 (65.9)	18 (22)
	I do not know	0	9 (11)		I do not know	0	13 (15.9)
10	During the terminal stages of an illness, drugs that can cause respiratory depression are appropriate for the treatment of severe.			20	The pain threshold is lowered by anxiety or fatigue		
	Yes, n (%)	67 (81.7)	38 (46.3)	<0.001	Yes, n (%)	66 (80.5)	37 (45.1)
	No, n (%)	15 (18.3)	29 (35.4)		No, n (%)	16 (19.5)	34 (41.5)
	I do not know	0	15 (18.3)		I do not know	0	11 (13.4)

Note. EG: Experimental group & CG: Control group

NPC Knowledge Among Nurses

The Chi-square test was used to compare the nurses' views of NPC knowledge at the post-experimental phase. The Chi-square test findings demonstrated that following the teaching session, a new pattern of attitudes emerged in the experimental group (**Table 2**).

NPC Attitude Among Nurses

To examine how well the experimental and control groups knew NPC after intervention, descriptive analysis and an independent t-test test were utilized. The outcomes revealed that nurses who had attended the teaching session (the experimental group) were substantially more likely to have correctly replied to item Q (4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 22, 23, and 24) (**Table 3**).

Table 3. Comparison of nurses post-experimental questions of attitude toward NPC between two analyzed groups

	EG (n=82): M (SD)	CG (n=82): M (SD)	p-value
1. Palliative care is as important as curative care in the neonatal environment.	3.16 (0.64)	2.88 (0.866)	0.019
2. I have had experience of providing palliative care to dying neonates and their families.	2.27 (0.02)	2.66 (0.93)	0.011
3. I feel a sense of personal failure when a neonate dies.	2.9 (0.96)	2.7 (0.796)	0.135
4. There is support for NPC in society.	2.24 (0.869)	2.55 (0.85)	0.024
5. The medical staff support palliative care for dying neonates in my unit.	2.34 (0.91)	2.54 (0.9)	0.17
6. The physical environment of my Unit is ideal for providing palliative care to dying neonates	2.01 (0.81)	2.62 (1.01)	<0.001
7. My unit is adequately staffed for providing needs of dying neonates requiring palliative care & their families.	1.5 (0.82)	2.5 (1.069)	<0.001

Table 3 (Continued). Comparison of nurses post-experimental questions of attitude toward NPC between two analyzed groups

	EG (n=82): M (SD)	CG (n=82): M (SD)	p-value
8. In my unit, parents participate in decisions about their dying neonate.	1.95 (0.92)	2.5 (0.959)	<0.001
9. My previous experiences of providing palliative care to dying neonates have been rewarding.	2.65 (0.95)	2.46 (0.97)	0.224
10. When neonates are dying in my Unit, providing pain relief is a priority for me.	2.28 (0.93)	2.66 (0.86)	0.008
11. I am often exposed to death in the neonatal environment.	3.15 (0.89)	2.65 (0.94)	0.001
12. Palliative care is necessary in neonatal [nursing] education.	3.4 (0.74)	2.65 (0.94)	<0.001
13. When a neonate dies in my Unit, I have sufficient time to spend with the family.	1.38 (0.73)	2.41 (1.05)	<0.001
14. There are policies/guidelines to assist in the delivery of palliative care in my unit.	1.6 (0.716)	2.46 (1.068)	<0.001
15. In my unit, when a diagnosis with a likely poor outcome is made, parents are informed of palliative care options.	2.06 (0.91)	2.62 (1.12)	0.001
16. In my unit, team expresses its opinions, values, and beliefs about providing care to dying neonates.	2.22 (0.94)	2.68 (1.1)	0.004
17. Caring for dying neonates is traumatic for me.	3.27 (0.847)	2.76 (1.07)	0.001
18. I have received in-service education that assists me to support and communicate with parents of dying neonates.	2.68 (0.75)	2.73 (1.112)	0.742
19. All members of the healthcare team in my unit agree with and support palliative care when it is implemented for a dying neonate.	2.38 (0.94)	2.6 (1.14)	0.181
20. In my Unit, the staff go beyond what they feel comfortable with in using technological life support.	2.7 (0.76)	2.59 (0.99)	0.379
21. In my Unit, staff are asked by parents to continue life-extending care beyond what they feel is right.	2.46 (0.878)	2.76 (1.06)	0.056
22. My personal attitude about death affects my willingness to deliver palliative care.	2.55 (0.958)	2.73 (0.956)	0.223
23. Palliative care is against the values of neonatal [nursing] care.	2.2 (1.17)	2.5 (1.03)	0.058
24. When a neonate dies in my Unit, counseling is available if I need it.	1.8 (0.95)	2.5 (1.08)	<0.001
25. There is a belief in society that neonates should not die, under any circumstances.	2.45 (0.958)	2.66 (0.997)	0.176
26. Curative care is more important than palliative care in the NICU environment.	2.91 (0.97)	2.82 (1.032)	0.534

Note. EG: Experimental group; CG: Control group; M: Mean; & SD: Standard deviation

Table 4. Paired samples t-test comparing nurses overall attitudes and knowledge score both pre- and post-intervention program for each group of nurses separately

	Pre-intervention Mean (SD)	Post-test Mean (SD)	MD (95% C.I.)	EF- Cohen's d	t/df**	p-value
Control group, n=82						
NPC knowledge	30.60 (4.01)	30.13 (3.82)	-0.17 (-2.15: 0.547)	3.188	0.157/80	0.002
NPC attitude	88.94 (14.45)	89.80 (13.79)	0.158 (-0.311: 0.503)	-1.606	1.679/80	0.112
Experimental group, n=82						
NPC knowledge	32.85 (5.78)	28.55 (1.74)	-1.336 (-4.035: -1.17)	0.703	7.31/80	<0.001
Attitudes toward NPC	82.13 (10.59)	87.93 (9.16)	-6.88 (-15.336: -6.442)	0.710	4.66/80	<0.001

Note. **Paired samples t-test, Cohen's d: <https://www.simplypsychology.org/effect-size.html>; ***Effect size calculator for paired t-test: https://memory.psych.mun.ca/models/stats/effect_size.shtml; MD: Mean difference; EF: Effect size; & SD: Standard deviation

Table 4 shows the paired samples t-test comparing nurses overall attitudes and knowledge score both pre- and post-intervention program for each group of nurses separately.

Influence of the Educational Program (Post-Test)

The results showed that the control group had significantly distinct NPC knowledge ($t=3.188$, $p=0.002$). Similarly, there was no significant difference in NPC opinions among the control nurses ($t=-1.606$, $p=0.112$). The experimental group was substantially different in NPC knowledge when the authors tested it for the second time ($t=6.385$, $p=0.001$). Furthermore, the data demonstrated a statistically significant shift in the attitudes of NPC among the experimental group of nurses ($t=10.216$, $p=0.001$). When the two groups are combined, GLMixed evaluates the impact of time, treatment, and the interaction between time and treatment on nurses' NPC knowledge and attitudes. Therefore, the data was transformed to a lengthy format, which allowed the computer to calculate the intervention's influence on nurses' NPC knowledge and attitudes while controlling for the consequences of time, the treatment, and the link between time and the intervention.

DISCUSSION

This one of the few studies in Jordan to examine the impact of educational specialized program in NPC among NICU nurses. Our study found that nurses in the intervention group were

more favorable attitude toward NPC than nurses in the non-experimental group ($p=0.001$). This conclusion is consistent with previous research. According to research in [21], a communication method training increased nurses' ability to react to parents' sentiments with empathy. The nurses reported that the course was beneficial to their profession regarding knowledge and attitude toward NPC.

In a study [9], the results showed that nurses who working in NICU with NPC policies were showed more positive attitude toward NPC. Similarly, it was found improvement in knowledge and attitudes after providing courses regarding NPC for nurses who working in NICU [14, 15]. Four pre-post-tests studies were conducted regarding the impact of educational interventions regarding NPC among NICU nurses in many western countries [11, 16-18]. They found that educational interventions have a greater influence on the knowledge and attitude toward NPC.

It was shown that teaching practicing nurses about NPC is an effective way to increase knowledge and improve attitudes [16, 17]. Over 79% of participants mentioned that the course about NPC was satisfactory to all their learning needs [11]. After the sessions, there was a shift in their mindset from a focus on dying/end-of-life to integrating NPC as part of a holistic treatment plan, as evidenced by open and closed text replies. Attending continuing education on NPC impacts ethical concerns in end-of-life for nurses and helps them to be more comfortable to care for neonates that need NPC [19]. A study in Seoul, Korea [20] found after implementing a palliative care educational program in NICU is very beneficial.

It is worth noting that no prior studies in literature have contradicted our outcomes in terms of nurses' attitudes. In conclusion, the educational program had a significant impact on nurses' awareness of NPC, which is consistent with earlier research articles.

Our study found these characteristics had no statistically significant relationship with nurses' knowledge in the pre- or post-intervention periods. On the other hand, a study conducted in Iran [21] found there was a relationship between the age of nurses and their attitudes towards NPC in different cultures. The attitudes toward NPC were impacted with paternity and legislation reform [22]. Similarly, it was found gender and occupational degree as predictors of knowledge and attitude toward NPC [23]. A correlation between age, religion, and the attitude of personal spirituality was found [16]. Also, years of experience had an effect on NPC knowledge and attitude. In a study in Jordan, they found that religion had a significant impact on nurses' attitude toward NPC [24]. It means the covariate did not affect our study result, indicating that the educational program and our study intervention had a beneficial impact on our outcome.

Implications

Based on the literature review and the findings of our study, there is strong evidence that NPC educational interventions improve nurses' knowledge and attitudes toward NPC which will benefit the pediatric population in need of NPC facilities by improving their life. The results of this paper concerning the impacts of NPC education intervention provide healthcare professionals with evidence-based data that also indicate their clinical practice as an implementation of skills and reflect on the struggles on those neonates and their parents [25-27]. These initiatives can be translated into healthcare and lead to a fundamental change in the standard NPC in Jordan, namely the integration of education into normal treatment [28, 29].

CONCLUSION

Depending on the findings of this study, the NPC educational program is beneficial in improving nurse knowledge and attitudes for NPC services, as well as providing an effective educational program for nurses. With the rising demand for NPC services with chronic critical illnesses and the documented good impact of NPC services on neonates in need and their families, it became imperative to improve the nurse's knowledge and attitude toward NPC.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

REFERENCES

1. Connor S. Global atlas of palliative care. London: The Worldwide Hospice Palliative Care Alliance. 2020. https://doi.org/10.1007/978-3-319-77740-5_4
2. Khraisat OM, Alakour NA, O'Neill TM. Pediatric end-of-life care barriers and facilitators: Perception of nursing professionals in Jordan. *Indian J Palliat Care*. 2017;23(2):199-206. <https://doi.org/10.4103/0973-1075.204232> PMID:28503041 PMCID:PMC5412129
3. Khraisat OM, Alkhalwaldeh A, Abuhammad S. Spirituality-focused end-of-life care among paediatric patients: evidence from Saudi Arabia? *Int J Palliat Nurs*. 2019;25(12):610-6. <https://doi.org/10.12968/ijpn.2019.25.12.610> PMID:31855517
4. Abuhammad S, Almasri R. Impact of educational programs on Nurses' knowledge and attitude toward pediatric palliative care. *Palliat Support Care*. 2022;20(3):397-406. <https://doi.org/10.1017/S1478951521001139> PMID:34380586
5. Abuhammad S, Muflih S, Alzoubi KH, Gharaibeh B. Nursing and PharmD undergraduate students' attitude toward the "do not resuscitate" order for children with terminally ill diseases. *J Multidiscip Healthc*. 2021;14:425-34. <https://doi.org/10.2147/JMDH.S298384> PMID:33658789 PMCID:PMC7917390
6. Ferrell B, Thaxton CA, Murphy H. Preparing nurses for palliative care in the NICU. *Adv Neonatal Care*. 2020;20(2):142-50. <https://doi.org/10.1097/ANC.0000000000000705> PMID:32053525
7. Abuhammad S, Alzoubi KH, Muflih S, Almasri R. Pediatric palliative care from nursing and PharmD perspectives. *Pediatr Int*. 2021;63(10):1236-41. <https://doi.org/10.1111/ped.14631> PMID:33533075
8. AbuYahya O, Abuhammad S, Hamoudi B, Reuben R, Yaqub M. The do not resuscitate order (DNR) from the perspective of oncology nurses: A study in Saudi Arabia. *Int J Clin Pract*. 2021;75(8):e14331. <https://doi.org/10.1111/ijcp.14331> PMID:33960067
9. Chin SDN, Paraszczuk AM, Eckardt P, Bressler T. Neonatal nurses' perceptions of palliative care in the neonatal intensive care unit. *MCN Am J Matern Child Nurs*. 2021;46(5):250-7. <https://doi.org/10.1097/NMC.0000000000000738> PMID:34162793
10. Kain VJ. The praecox program: Pilot testing of an online educational program to improve neonatal palliative care practice. *J Neonatal Nurs*. 2017;23(4):188-92. <https://doi.org/10.1016/j.jnn.2016.11.003>
11. Twamley K, Kelly P, Moss R, et al. Palliative care education in neonatal units: impact on knowledge and attitudes. *BMJ Support Palliat Care*. 2013;3(2):213-20. <https://doi.org/10.1136/bmjspcare-2012-000336> PMID:24644571
12. Kain VJ, Wilkinson DJ. Neonatal palliative care in action: Moving beyond the rhetoric and influencing policy. *J Res Nurs*. 2013;18(5):459-68. <https://doi.org/10.1177/1744987113490713>
13. Reed E, Todd J, Lawton S, et al. A multi-professional educational program to improve and sustain respondents' confidence to deliver palliative care: A mixed-methods study. *Palliat Med*. 2018;32(2):571-80. <https://doi.org/10.1177/0269216317709973> PMID:28604265

14. Hall SL, Famuyide ME, Saxton SN, et al. Improving staff knowledge and attitudes toward providing psychosocial support to NICU parents through an online education course. *Adv Neonatal Care*. 2019;19(6):490-9. <https://doi.org/10.1097/ANC.0000000000000649> PMID: 31306236 PMCID:PMC6882527
15. Murakami N, Tanabe K, Morita T, et al. Going back to home to die: Does it make a difference to patient survival? *BMC Palliat Care*. 2015;14:7. <https://doi.org/10.1186/s12904-015-0003-5> PMID:25821408 PMCID:PMC4376364
16. O'Shea ER, Wallace M, Griffin MQ, Fitzpatrick JJ. The effect of an educational session on pediatric nurses' perspectives toward providing spiritual care. *J Pediatr Nurs*. 2011;26(1):34-43. <https://doi.org/10.1016/j.pedn.2009.07.009> PMID:21256410
17. O'Shea ER, Mager D. End-of-life nursing education: Enhancing nurse knowledge and attitudes. *Appl Nurs Res*. 2019;50:151197. <https://doi.org/10.1016/j.apnr.2019.151197> PMID:31734002
18. Zhang Z-G, Chen F, Chen J-Z. Introducing an antibiotic stewardship program in a pediatric center in China. *World J Pediatr*. 2018;14(3):274-9. <https://doi.org/10.1007/s12519-018-0133-y> PMID:29508365
19. Zhang W, Lane BS. Promoting neonatal staff nurses' comfort and involvement in end of life and bereavement care. *Nurs Res Pract*. 2013;2013:365329. <https://doi.org/10.1155/2013/365329> PMID:23606955 PMCID:PMC3625592
20. Sabaq AG, Khalaf SM. Effect of educational program on nurses' performance regarding neonatal palliative care. *Tanta Sci Nurs J*. 2016;10(1):43-71. <https://doi.org/10.21608/tsnj.2016.71191>
21. Forouzi MA, Banazadeh M, Ahmadi JS, Razban F. Barriers of palliative care in neonatal intensive care units: Attitude of neonatal nurses in southeast Iran. *Am J Hosp Palliat Care*. 2017;34(3):205-11. <https://doi.org/10.1177/1049909115616597> PMID:26602317
22. Chatziioannidis I, Pouliakis A, Cuttini M, et al. Nurses' involvement in end-of-life decisions in neonatal intensive care units. *Nurs Ethics*. 2022;29(3):569-81. <https://doi.org/10.1177/09697330211035505> PMID:35142573
23. Ismail MSM, Mahrous ES, Mokbel RA. Facilitators and barriers for delivery of palliative care practices among nurses in neonatal intensive care unit. *Int J Nurs Health Sci*. 2020;6:18-28. <https://doi.org/10.14445/24547484/IJNHS-V6I1P103>
24. Razeq NMA, Alduraidi H, Halasa S, Cuttini M. Clinicians' self-reported practices related to end-of-life care for infants in NICUs in Jordan. *J Obstet Gynecol Neonatal Nurs*. 2020;49(1):78-90. <https://doi.org/10.1016/j.jogn.2019.11.005> PMID:31811824
25. Kasem A, Abuhammad S. Pediatric basic life support among nursing students in Jordan: Stimulation-based education. *Open Nurs J*. 2022;16(1):e187443462208110. <https://doi.org/10.2174/18744346-v16-e2208110>
26. Kasem A, Abuhammad S, Alswaiti EM. Maternal awareness of breastfeeding policies in baby-friendly hospitals in Jordan. *Nurs Forum*. 2022;57(5):843-50. <https://doi.org/10.1111/nuf.12731> PMID:35441376
27. Kasem A, Razeq NMA, Abuhammad S, Alkhazali H. Mothers' knowledge and attitudes about newborn screening in Jordan. *J Community Genet*. 2022;13:215-25. <https://doi.org/10.1007/s12687-021-00572-x>
28. Abuhammad S, Alzoubi KH, Al-Azzam SI, Karasneh RA. Knowledge and practice of patients' data sharing and confidentiality among nurses in Jordan. *J Multidiscip Healthc*. 2020;13:935-42. <https://doi.org/10.2147/JMDH.S269511> PMID:32982270 PMCID:PMC7502382
29. Karasneh R, Al-Mistarehi A-H, Al-Azzam S, et al. Physicians' knowledge, perceptions, and attitudes related to patient confidentiality and data sharing. *Int J Gen Med*. 2021;14:721-31. <https://doi.org/10.2147/IJGM.S301800> PMID:33688243 PMCID:PMC7936708