

Telenursing vs Traditional Health Education: Effect on Adherence to Planned Nursing Care for Children after Kasai Operation

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Abstract: Biliary Atresia is the most common cause of pediatric end-stage liver disease and the leading indication for pediatric liver transplantation. So, a planned nursing care for those children is important. Purpose of this study was to assess the effect of telenursing vs traditional health education on nurse's adherence to planned nursing care for children after Kasai operation. A quasi-experimental design was utilized. The study was conducted in Surgical Intensive Care Unit at National Liver Institute, Menoufia University. A purposive sample of 50 nurses caring for children after kasai operation were selected. Two instruments were used: Knowledge about biliary atresia structured interview questionnaire and an observational checklist for nurses' adherence to planned nursing care while caring for children after kasai operation. The findings of this study revealed that there was a highly statistical significant difference between nurses' knowledge on pre, post and follow up tests. Also, a highly statistical significant difference between mean score of studied nurses practice on pre, post and follow up tests. As well as, there were positive correlation between nurse's total knowledge and total practice scores ($P < 0.001$). The study concluded that nurses who received health education through telenursing had more adherence to planned nursing care than nurses who only received traditional health education. Therefore, it was recommended that telenursing health education program should be developed for nurses caring for children after kasai operation. A standardized nursing care about biliary atresia and kasai operation booklets should be available at Surgical Intensive Care Unit. Also, an internet access should be available at Surgical Intensive Care Unit.

Key words: *Biliary Atresia – Kasai Operation– Telenursing - Traditional Health Education – Planned Nursing Care*

Introduction

Biliary atresia (BA) is an idiopathic neonatal liver disease characterized by inflammatory and fibrotic obliteration of intrahepatic and external biliary ducts. It causes neonatal jaundice, cirrhosis, and portal hypertension. The

etiology of biliary atresia (BA) is currently unknown. It may be associated with viral infection, environmental toxins like biliary atresia, immune responses, and genetic susceptibility. Biliary atresia

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(BA) is currently the main reason for liver transplantation in children, with a high incidence in East Asian countries (Fanyang et al., 2024).

Cholestasis is a common chronic childhood illness and is one of the leading causes that make children admitted to the National Liver Institute. They account for 70% of all cases admitted to pediatrics department. Biliary atresia (BA) constitutes more than one third of different etiologies of neonatal cholestasis (Shoier, 2017). According to a survey in Taiwan, there is approximately one patient with biliary atresia (BA) in every 5,000 live births. The diagnosis of biliary atresia (BA) mainly depends on intraoperative cholangiography (Fanyang et al., 2024).

Kasai portoenterostomy (KPE) is the first-line treatment for biliary atresia (BA), with the primary goal of re-establishing bile drainage. An early diagnosis of biliary atresia (BA) is very important for patients. Children diagnosed with biliary atresia (BA) who receive KPE within 90 days after birth are likely to have better jaundice clearance and native liver survival rates. In addition, some patients will still develop cirrhosis after kasai portoenterostomy (KPE) and need liver transplantation. The early identification of high-risk children in need of liver transplantation can help to improve the prognosis of patients. Simply and efficiently identifying high-risk patients who need liver transplantation has been the one of the main objectives of pediatric nursing care (Zhu et al., 2023). According to National Liver Institute documents, 27 cases of kasai

operation were performed in 2023 through mid-2024 (National Liver Institute 2024).

Newborns and infants are more susceptible and more likely to develop biliary atresia as a consequence of immaturity of the liver. There are many risk factors associated with increased risk for cholestasis such as young gestational age, low birth weight, increased sepsis episodes and long duration of parental nutrition. So, those children are in need for planned nursing care such as hand washing, promoting child rest, measuring vital signs, growth measurements, feeding, medication administration, prevention of dehydration and blood gases (El khoully, 2019).

In the field of health services, telenursing is a contemporary information and communication technology system that enables the provision of nursing care and services to remote areas. Telenursing can increase psychological general well-being in patients with chronic conditions. It is emerging as a promising solution leveraging technology to offer nursing and care services remotely. It can be provided via a mobile application, website, or telephone follow-up. Client can receive education independently at home, and their health conditions can subsequently be monitored by telephone two or three times per week (Heri and Elsy, 2024).

Planned nursing care is a formal process that correctly identifies existing needs and recognizes a client's potential needs or risks. Care plans provide a way

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of communication among nurses, their patients, and other healthcare providers to achieve healthcare outcomes. Without the nursing care planning process, the quality and consistency of patient care would be lost. Nursing care planning begins when the client is admitted to the agency and is continuously updated throughout in response to the client's changes in condition and evaluation of goal achievement. Planning and delivering individualized or patient-centered care is the basis for excellence in nursing practice (Mattvera, 2024). Nonadherence to planned nursing care may contribute to nosocomial infection, increase hospital stay and delay child progression. However, limited studies have been conducted to evaluate the effect of telenursing and health education on adherence to management. For this reason, this study was conducted to compare between the effects of telenursing versus traditional health education on nurse's adherence to planned nursing care for children after Kasai operation.

Purpose of the study

The purpose of the current study was to assess the effect of telenursing vs traditional health education on nurse's adherence to planned nursing care for children after Kasai operation.

Research Hypothesis

Nurses who receive health education through telenursing are expected to have higher adherence to planned nursing care than nurses who only received traditional health education

Definitions of Variables

- **Telenursing:** refers to the use of telecommunications and information technology to provide nursing care at a distance, which may help solve increasing shortages of nurses, reduce both travel distance and time, and keep patients out of the hospital (Samah and Sanaa 2017). In this study, data will be collected about care of children having kassai to identify points of weaknesses in nurse's knowledge and practices, telecommunications will be conducted with nurses to help each nurse to identify their points of strength and weaknesses and to establish an appropriate nursing care plan accompanied with exchange of written, illustrated, scientific videos.
- **Traditional health education:** Traditional health education for delivering health practices, approaches, knowledge and beliefs incorporating techniques and practices to maintain well-being, as well as to treat, diagnose or prevent illness (WHO, 2002). In this study, it is the provision of health education using lectures and practical demonstration for the care of children before and after kassai operation.
- **Planned nursing care:** It is related to the provision of standardized and evidence-based holistic care. Care planning is related to identifying problems and coming up with solutions to reduce or remove the problems (Hooks, Robin, 2016). In this study, it is recorded and proved scientific effective nursing interventions that are planned to be provided for expected nursing

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diagnosis in order to fulfill required health care needs

Methods

Research design: -

Two groups quasi-experimental design was utilized (pre, post and follow up for study groups I and II).

Research Settings: -

This study was conducted in Surgical Intensive Care Unit at National Liver Institute, Menoufia University. Surgical Intensive Care Unit is in the fourth floor. It included three rooms; the first room contained six beds for general hepatic cases such as whipple, resection, choledaical cyst, kassai or abdominal exploration for hepatic cases. The second room contained one bed for donor cases of liver transplant. The third room contained one bed for recipient cases of liver transplant. Each bed has one ventilator, one monitor, some syringe pumps, central suction and central oxygen line.

Sample: -

A purposive sample of 50 nurses caring for children performing kasai operation were selected from the previously mentioned setting. Nurses were divided into two study groups. Each group contained 25 nurses.

- Study group I: Nurses who received traditional health education.
- Study group II: Nurses who received telenursing education via whatsapp.

Instruments: -

In order to achieve the purpose of the study, two instruments were utilized for data collection:

Instrument one: Knowledge about biliary atresia structured interview questionnaire.

It was developed to assess nurse's knowledge about biliary atresia (BA) and kasai operation. It was adopted from the Center for Disease Control and Prevention (2010). It consisted of four main parts:

- **Part one:** Social characteristics of studied nurses (age, gender, level of education, years of experience in nursing, years of experience in surgical intensive care unit and if any training course had been taken regards kasai operation).
- **Part two:** Nurse's knowledge about biliary atresia. It contained 12 multiple-choice questions (definition, causes, risk factors, role of genetics in the occurrence of BA, causative organism, symptoms, diagnostic evaluation, treatment, normal level of direct & indirect bilirubin and liver function test (SGOT& SGPT)).
- **Part three:** Nurse's knowledge about kasai operation. It contained 7 multiple-choice questions (definition, the appropriate time to perform the kasai operation, factors affecting the success of the kasai operation, possible complications of kasai operation, symptoms of cholangitis, symptoms of portal hypertension, symptoms of hepatopulmonary syndrome).
- **Part four:** Nurse's knowledge about nursing care for children performing kasai operation; It was divided into two subparts;
 - **Subpart one:** Multiple-choice questions about nursing care before

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kasai operation. It contained 10 questions about hand washing (reasons and ideal time for hand washing), growth measurements (the ideal time to weigh the child), child's vital signs (the best way to measure temperature, nursing care in case the child have high temperature), methods of giving medication (precautions must be followed when giving the medication), blood gases sample (the places for a blood gas sample and the normal levels of blood gases).

- **Subpart two:** Multiple-choice question about nursing care after kasai operation. It contained 17 multiple-choice question about Ideal child position, how to maintain an open airway, normal color of child stool after successful surgery and its documentation, suction(definition, causes, preparatory phase, normal pressure level, status of tube entry), nursing care of nasogastric tube, assessment of abdominal distention, nursing care to prevent dehydration & care for intravenous line, nursing care for kasai operation wound (time of dressing, drain care, equipment, warning signs of wound and documentation for wound care). See appendix.

Scoring system

Scoring system for each question; one score was provided for the correct answer and zero score the incorrect one. Meanwhile, if the total score was <60% level of knowledge was considered poor. Average level of knowledge ranged from 60-80 %. Meanwhile, level

of knowledge was considered good if knowledge level was more than 80

Reliability

Reliability of the study instruments were estimated among the participants by using test-retest method with two weeks apart between them. Then Cronbach' alpha was calculated between the two scores. It was 0.88 which indicates that the instruments were high reliable to meet the objectives of the study.

Validity

Validity is a measure of the degree of validity of the instrument. Test the validity of the instrument was conducted using Pearson Product Moment Correlations using SPSS. Based on the significant value obtained by the Sig (2-tailed) <0.05 and the internal consistency ($r=0.79$ - p -value=<0.001), so it can be concluded that items of the tool were valid.

Instrument Two:

An observational checklist for nurses' adherence to planned nursing intervention while caring for children after kasai operation. It was adopted from Centers for Disease Control and prevention (2010). It included 15 nursing procedure, which are; hand washing, promoting child's rest, measuring weight & height, measuring oxygen , measuring vital signs, administration of medication , feeding , suctioning technique and blood gases.

Total scoring system for observational checklist:-

The scoring system for observational checklist was two score for adequately

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done step, one score for the inadequately done step and zero for not done. If the level of practice was <60%, the procedure was considered not done. For nurses who obtained from 60-80 %, their level of practice was inadequately done. Adequately done was provided for nurses who achieved more than 80% of the total practice score.

Reliability

Reliability of the study instruments were estimated among the participants by using test-retest method with two weeks apart between them. Then Cronbach' alpha was calculated between the two scores. It was 0.91 which indicates that the instruments were high reliable to meet the objectives of the study.

Validity

Validity is a measure of the degree of validity of the instrument. Test the validity of the instrument was conducted using Pearson Product Moment Correlations using SPSS. Based on the significant value obtained by the Sig (2-tailed) <0.05 and the internal consistency ($r=0.84$ - $p\text{-value}=<0.001$), so it can be concluded that items of the tool were valid.

Validity of the tools:

Data collection instruments were reviewed by five experts in pediatrics (Two professors in Pediatric Nursing, two assistant professors in pediatric nursing and one professor in pediatric surgery). All necessary modifications were done.

Pilot study:

A pilot study was done on 5 nurses (10% of the sample size) caring for children after performing kasai operation before starting the data collection to test the applicability, practicability, consistency, clarity and the feasibility of the study instruments and to estimate the needed time to fill the instruments. Necessary modifications were done.

Ethical Considerations:

A written approval was obtained from Ethical and Research Committee of Faculty of Nursing, Menoufia University (16-12-2020). A written consent form was obtained from each nurse caring for children performing kasai operation. An initial interview with nurses caring for children performing kasai operation was done to inform them about the purpose and benefits of the study. Also, they were informed that the study was voluntary, harmless and they could withdraw from the study at any time without penalty. Nurses caring for children performing kasai operation were assured that their confidentiality and anonymity were respected through coding all data and putting it in a closed cabinet.

Data collection procedure:

An official permission to carry out the study was obtained from the director of the selected setting after submitting an official letter from the Dean of the Faculty of Nursing at Menoufia University explaining the purpose of the study and method of data collection. Data was collected over a period of 6 months starting from 1st of February 2024 to the end of July 2024. A simple random sample was done to assign the

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nurses into two groups (Study group I who received traditional health education about kasai operation and study group II who received telenursing education).

For study group I: nurses were divided into smaller groups (5 groups). Each group contained 5 nurses. The researcher started by introducing herself, discussing the importance of the study, its purpose and methods of data collection to nurses. They were informed about ethical considerations. Nurses knowledge questionnaire (instrument one) was distributed between nurses for pretest. Accordingly a booklet was developed for nurses about biliary atresia and kassai operation. Assessment of nurses' adherence to the planned nursing intervention while caring for children performing kasai operation was done using instrument two (pretest).

Health education was provided for each group about BA, kassai operation and planned nursing care after kassai operation. Each nurse received 3 sessions. First session was about knowledge related to BA and kassai operation. It lasted for 45 minutes. While second session was about planned nursing care for children after kasai operation. It lasted for one hour. Third session was about planned nursing care for children after kasai operation. It lasted for one hour.

For study group II: the researcher collected their phone numbers. A WhatsApp group was developed by the researcher. It involved the researcher and all members of the study group 2. The researcher identified herself, purpose of the study and their ethical

considerations rights. Nurses knowledge questionnaire (instrument one) was distributed between nurses for pretest using a google form. The link was uploaded to the WhatsApp group (pretest). Assessment of nurses' adherence to the planned nursing intervention while caring for children performing kasai operation was done using instrument two (pretest).

Video conference was done via zoom meeting. The researcher conducted 3 sessions online. First session involved explanation of knowledge about biliary atresia and kasai operation. Second session involved nurses' practices regarding care while caring for children having kasai operation (promoting rest, hand washing, measuring growth measurements (weight and height), measuring oxygen saturation, measuring vital signs (temperature, pulse and respiration). It lasted for 60 minutes.

Third session was about nurses' adherence to planned nursing care while caring for children performing kasai operation. It was administration of medication (oral medication, intramuscular injection, intravenous injection), feeding (Nasogastric feeding and Bottle feeding) suctioning technique and blood gases. It lasted for 60 minutes. A recorded video of standardized nursing care after kasai operation was uploaded into the WhatsApp group.

- Posttest was conducted one week after providing planned nursing care for children in group I and II.
- Follow up was conducted after 3 months. The same data collection instruments were used.

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Data Analysis:-

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0 (Armonk, NY: IBM Corp). Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution. Quantitative data were described using mean and standard deviation. Significance of the obtained results was judged at the 5% level of Significance. Paired t-test used for normally distributed quantitative variables, to compare between two periods. Pearson coefficient used to correlate between two normally distributed quantitative variables. McNemar and Marginal Homogeneity test were used to analyze the significance between the different stages.

Results:

Table 1: represented characteristics of studied nurses. Regarding gender, it was clear that approximately half of the studied nurses (52%) were males in the telenursing group compared to forty percent in the traditional group. As regards years of experience, about less than half (44%) of the traditional group had 1-3 years of experience compared to approximately one third (36%) in the telenursing group. For educational level, more than two thirds of studied nurses in the telenursing group had technical nursing institute compared to about two third in the traditional group. Also, approximately all of studied nurses in both groups had no training courses related to care of biliary atresia.

Table 2: clarified studied nurse's knowledge about biliary atresia on pre, post and follow-up tests. It was obvious that nurses in the telenursing group had higher level of knowledge about biliary atresia on post and follow-up tests than nurses in the traditional group. So, there was a statistical significant difference between pre and posttest for the telenursing group regards causes of biliary atresia and normal level of direct bilirubin. Also, there was a statistically significant difference between posttest between the telenursing and the traditional group in relation to treatment of biliary atresia ($p < .001$).

Table 3: showed studied nurse's knowledge about kasai operation on pre and post and follow-up tests. It was obvious that nurses in the telenursing group had higher level of knowledge about kasai operation on post and follow-up tests than nurses in the traditional group. The table cleared that there was a statistical significant difference between pre and posttest for the telenursing group regards definition and time of kasai operation. Meanwhile, there was a highly statistical significant difference between the telenursing and the traditional group on follow-up test regards definition of kasai operation ($p < .001$).

figure 1: illustrated mean score of studied nurses' knowledge on pre, post and follow-up tests. It was found that there was a highly statistically significant difference regarding nurses' knowledge in the telenursing group on post and follow up test compared to pretest (44.36 ± 1.89 , 43.36 ± 5.04 VS

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16.88 ± 5.88). So, there was a highly statistical significant difference between pre, post and follow-up test for the telenursing group. Also, there was a highly statistically significant difference between the telenursing and the traditional group on posttest (p<.001.)

Figure 2: illustrated level of studied nurse's knowledge on pre, post and follow-up tests. It was clear that there was a highly statistical significance deference regards good knowledge at follow-up test for the telenursing group. Also, that there was a highly statistical significance deference between the telenursing and the traditional group on posttest.

figure 3: clarified mean and standard deviation of appraising studied nurses' practice on pre, post and follow up tests. It was showed that nurses in the telegroup had higher mean score at post and follow up test than nurses in the

traditional group. Therefore, there was very highly statistically significant difference (p<.001.)

figure 4: showed level of studied nurses' practice on pre, post and follow up tests. This table showed that the 88.0% and 100.0% of studied nurses in the tele group had adequately done on post and follow up test compare to 0.0% on pre intervention. While in the traditional group 0.0% and 44.0% of nurses on post and follow up test had adequately done. So, there was a highly statistical significant difference between two groups on posttest (p<.001.)

figure 5 &6: represented pearson correlation between total knowledge and practice for the studied nurses in tele nursing and traditional groups. The table clarified that there were positive correlation between nurse's total knowledge and total practice scores (P<0.001).

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Table (1): characteristics of studied nurses

Characteristics	Telenursing Group (N=25)		Traditional Group (N=25)		X2	P-value
	No.	%	No.	%		
1-Age <i>Mean ± SD</i>	26.96 ±3.75		27.36±4.03		0.390 ^{ns}	0.679
2- Gender					.076 ^{ns}	.963
• Male	13	52.0%	10	40.0%		
• Female	12	48.0%	15	60.0%		
3-Educational Level					1.14 ^{ns}	.565
• Technical Institute	18	72.0%	16	64.0%		
• Bachelor's Degree	5	20.0%	8	32.0%		
• Postgraduate Studies	2	8.0%	1	4.0%		
4-Years of Experience.					.363 ^{ns}	.948
• 3 Years	6	24.0%	7	28.0%		
• 3-6 Years	9	36.0%	10	40.0%		
• 6-9 Years	6	24.0%	5	20.0%		
• 9 Years and Above	4	16.0%	3	12.0%		
5-Years of Experience in Surgical Intensive Care Unit.					.992 ^{ns}	.803
• 3 years	9	36.0%	11	44.0%		
• 3-6 years	8	32.0%	9	36.0%		
• 6-9 years	6	24.0%	4	16.0%		
• 9 years and above	2	8.0%	1	4.0%		
6- Has a Training Course Been Taken on Biliary Atresia.					2.08 ^{ns}	.149
• Yes	0	0.0%	2	8.0%		
• No	25	100.0%	23	92.0%		

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**Table (2): Studied Nurse's Knowledge about Biliary atresia on Pre, Post and Follow-up Tests
(N=50).**

Nurse's knowledge	Tele Nursing Group (N=25)						Traditional Group (N=25)						X ²	X ² ₃
	Pre		Post		Follow-up		Pre		Post		Follow-up		P2	P2
	No	%	No	%	No	%	No	%	No	%	No	%		
1- Definition of Biliary Atresia.														
• Wrong answer	20	80.0	8	32.0	12	48.0	20	80.0	15	60.0	16	64.0	3.94 s .047	1.29ns .254
• Correct answer	5	20.0	17	68.0	13	52.0	5	20.0	10	40.0	9	36.0		
X²₁ P1	^a 11.68 s .001				^b 1.33 ns .248		^a 2.38 s .123				^b .085 ns .771			
2- Causes of Biliary Atresia.														
• Wrong answer	13	52.0	0	0.0	0	0.0	12	48.0	2	8.0	0	0.0	2.08ns .149	NA
• Correct answer	12	48.0	25	100.0	25	100.0	13	52.0	23	92.0	25	100.0		
X²₁ P1	^a 17.56 Hs .000				^b NA		^a 9.92 s .002				^b 2.08 ns .149			
3- Factors that Lead to the Occurrence of Biliary Atresia.														
• Wrong answer	10	40.0	0	0.0	0	0.0	10	40.0	2	8.0	0	0.0	2.08 ns .149	NA
• Correct answer	15	60.0	25	100.0	25	100.0	15	60.0	23	92.0	25	100.0		
X²₁ P1	^a 12.5HS .000				^b .000 HS		^a 7.01 s .008				^b 2.08 ns .149			
4- Do Genetic Factors Have any Role in the Occurrence of Biliary Atresia.														
• Wrong answer	16	64.0	16	64.0	16	64.0	16	64.0	8	32.0	8	32.0	.397 ns .529	.397 ns .529
• Correct answer	9	36.0	9	36.0	9	36.0	9	36.0	17	68.0	17	68.0		
X²₁ P1	^a 8.11s .004				^b .000 ns 1.000		^a 5.12 s .024				^b .000 ns 1.000			
5- Types of Infections Causes of Biliary Atresia.														
• Wrong answer	20	80.0	16	64.0	3	12.0	21	84.0	7	28.0	3	12.0	.104 ns .747	.000 ns 1.000
• Correct answer	5	20.0	9	36.0	22	88.0	4	16.0	18	72.0	22	88.0		
X²₁ P1	^a 15.70 HS .000				^b 1.22 ns .269		^a 15.90 Hs .000				^b 2.00 ns .157			
6- Symptoms of Biliary Atresia.														
• Wrong answer	22	88.0	0	0.0	0	0.0	18	72.0	2	8.0	0	0.0	2.08 ns .149	NA
• Correct answer	3	12.0	25	100.0	25	100.0	7	28.0	23	92.0	25	100.0		
X²₁ P1	^a 39.28 HS .000				^b NA		^a 21.33 Hs .000				^b 2.08 ns .149			

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**Cont. Table (2): Studied Nurse's Knowledge about Biliary Atresia on Pre, Post and Follow-up
Tests (N=50).**

Nurse's knowledge	Tele Nursing Group (N=25)						Traditional Group (N=25)						X ²	X ³
	Pre		Post		Follow-up		Pre		Post		Follow-up		P2	P2
	No	%	No	%	No	%	No	%	No	%	No	%		
7- Diagnoses of Biliary Atresia.														
• Wrong answer	21	84.0	2	8.0	1	4.0	16	64.0	0	0.0	1	4.0	2.08 ns .149	.000 ns 1.000
• Correct answer	4	16.0	23	92.0	24	96.0	9	36.0	25	100.0	24	96.0		
X ² ₁ P1	a 29.06 HS .000				b.355 ns .552		a 23.52 HS .000				b 1.02 ns .312			
8- Treatment of Biliary Atresia.														
• Wrong answer	20	80.0	1	4.0	7	28.0	18	72.0	20	80.0	4	16.0	3.03 s .082	1.049 ns .306
• Correct answer	5	20.0	24	96.0	18	72.0	7	28.0	5	20.0	21	84.0		
X ² ₁ P1	a 29.63 HS .000				b 5.35 s .021		a 13.60 HS .000				b.136 ns .713			
9- Normal Level of Direct Bilirubin.														
• Wrong answer	18	72.0	4	16.0	5	20.0	16	64.0	2	8.0	2	8.0	.758 ns .384	1.49 ns .221
• Correct answer	7	28.0	21	84.0	20	80.0	9	36.0	23	92.0	23	92.0		
X ² ₁ P1	a 15.90 HS .000				b .136 ns .713		a 17.01 HS .000				b .000 ns 1.000			
10- Normal Level of Indirect Bilirubin.														
• Wrong answer	18	72.0	3	12.0	7	28.0	7	28.0	7	28.0	3	12.0	2.00 ns .157	2.00 ns .157
• Correct answer	7	28.0	22	88.0	18	72.0	18	72.0	18	72.0	22	88.0		
X ² ₁ P1	a 18.47 HS .000				b 2.00 ns .157		a 8.01 s .005				b 2.00 ns .157			
11- Normal Level of SGOT.														
• Wrong answer	14	56.0	3	12.0	7	28.0	16	64.0	7	28.0	4	16.0	2.00 ns .157	1.04 ns .306
• Correct answer	11	44.0	22	88.0	18	72.0	9	36.0	18	72.0	21	84.0		
X ² ₁ P1	a 10.78 s .001				b 2.00 ns .157		a 6.52 s .011				b 1.049 ns .306			
12- Normal Level of SGPT.														
Wrong answer	14	56.0	2	8.0	7	28.0	19	76.0	9	36.0	5	20.0	5.71 ns .017	.439 ns .508
Correct answer	11	44.0	23	92.0	18	72.0	6	24.0	16	64.0	20	80.0		
X ² ₁ P1	a 13.23 HS .000				b 3.38 s .066		a 8.11 s .004				b 1.58 ns .208			

Note:

X²₁^a: Comparison between pre and post intervention. X²₁^b: Comparison between post and follow-up

X²₂: comparison between Tele nursing and Traditional group on post intervention.

X²₃: comparison between Tele nursing and Traditional group on follow up.

HS: Means highly statistical significance. S: Means statistical significance. Ns: no statistical significance.

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**Table (3): Studied Nurse's Knowledge about Kasai Operation on Pre, Post and Follow-up Tests
(N=50).**

Nurse's knowledge	Tele Nursing Group (N=25)						Traditional Group (N=25)						X ²	X ³
	Pre		Post		Follow-up		Pre		Post		Follow-up		P2	P2
	No	%	No	%	No	%	No	%	No	%	No	%		
1-Definition of Kasai operation.														
• Wrong answer	4	16.084.0	0	0.0	0	0.0	5	20.0	3	12.0	0	0.0	3.19 s .074	.000 HS
• Correct answer	21		25	100.0	25	100.0	20	80.0	22	88.0	25	100.0		
X ² P1	a 4.34 s .037				b NA		a .595 ns .440				b 3.19 s .074			
2- Appropriate Time to Perform Kasai Operation.														
• Wrong answer	21	84.0	10	40.0	4	16.084.0	19	76.0	6	24.076.0	7	28.0	1.47 ns .225	1.04 ns .306
• Correct answer	4	16.0	15	60.0	21		6	24.0	19		18	72.0		
X ² P1	a 10.27 s .001				b 3.57 s .059		a 13.52 HS .000				b .104 ns .747			
3-Factors for the Success of Kasai Operation.														
• Wrong answer	14	56.0	1	4.0	0	0.0	10	40.0	3	12.0	0	0.0	1.08 ns .297	NA
• Correct answer	11	44.0	24	96.0	25	100.0	15	60.0	22	88.0	25	100.0		
X ² P1	a 16.09 Hs .000				b 1.02 ns .312		a 5.09 s .024				b 3.19 s .074			
4- Complications of Kasai Operation.														
• Wrong answer	1510	60.040.0	0	0.0	2	8.0	1114	44.056.0	4	16.084.0	2	8.0	4.34 s .037	.000 ns 1.000
• Correct answer			25	100.0	23	92.0			21		23	92.0		
X ² P1	a 21.42 Hs .000				b 2.08 ns .149		a 4.66 s .031				b .758 ns .384			
5-Symptoms of Cholangitis.														
• Wrong answer	12	48.0	0	0.0		0.0	8	32.0	3	12.0	0	0.0	3.191 s .07	NA
• Correct answer	13	52.0	25	100.0		100.0	17	68.0	22	88.0	25	100.0		
X ² P1	a 15.78 HS .000				b NA		a 2.91 s .088				b 3.19 s .074			
6-Symptoms of Portal Hypertension.														
• Wrong answer	12	48.0	0	0.0	0	0.0	8	32.0	3	12.0	0	0.0	1.08 ns .297	1.02 ns .312
• Correct answer	13	52.0	25	100.0	25	100.0	17	68.0	22	88.0	25	100.0		
X ² P1	a 16.09 Hs .000				b NA		a 3.94 s .047							
7- Symptoms of Hepatopulmonary Syndrome.														
• Wrong answer	14	56.0	0	0.0	0	0.0	10	40.0	3	12.0	0	0.0	3.19 s .074	NA
• Correct answer	11	44.0	25	100.0	25	100.0	15	60.0	22	88.0	25	100.0		
X ² P1	a 19.44 HS .000				b NA		a 5.09 s .024				b 3.19 s .074			

Note: X²^a: Comparison between pre and post intervention. X²^b: Comparison between post and follow-up
X²₂: comparison between Tele nursing and Traditional group on post intervention.
X²₃: comparison between Tele nursing and Traditional group on follow up..
HS: Means highly statistical significance. S: Means statistical significance. ns: no statistical significance.

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Figure (1): Mean Score of Studied Nurses' Knowledge on Pre, Post and Follow up Tests.

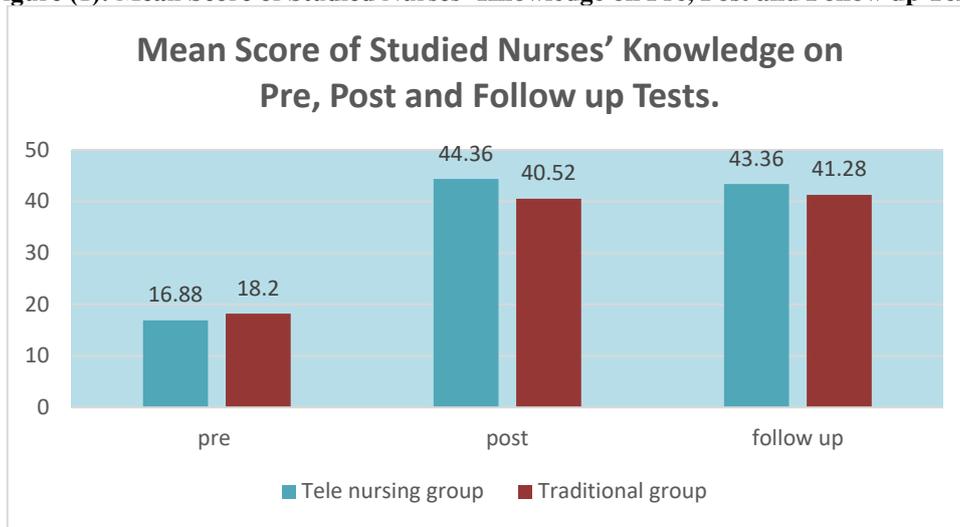


Figure (2): Level of Studied Nurse's Knowledge on Pre, Post and Follow up Tests (N=50).

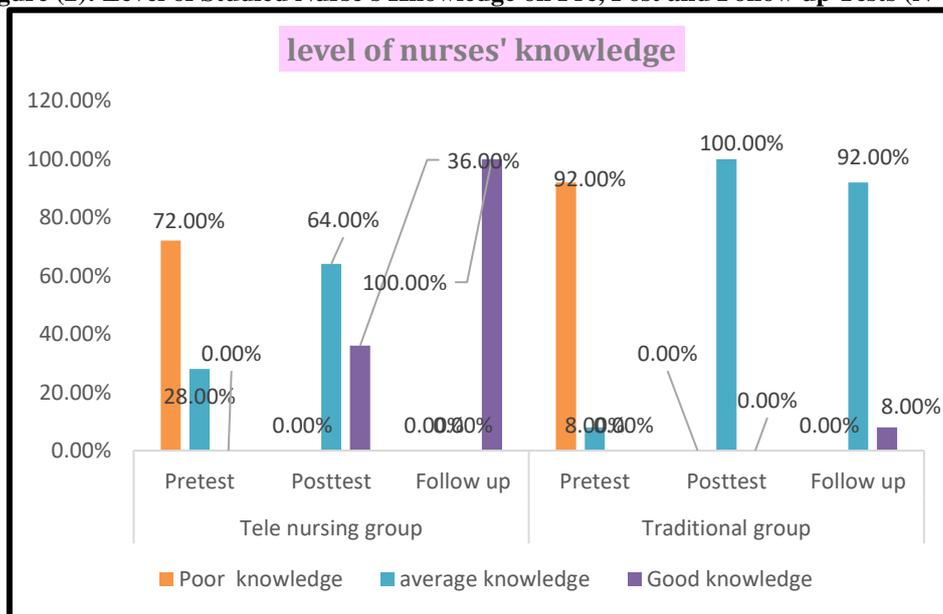
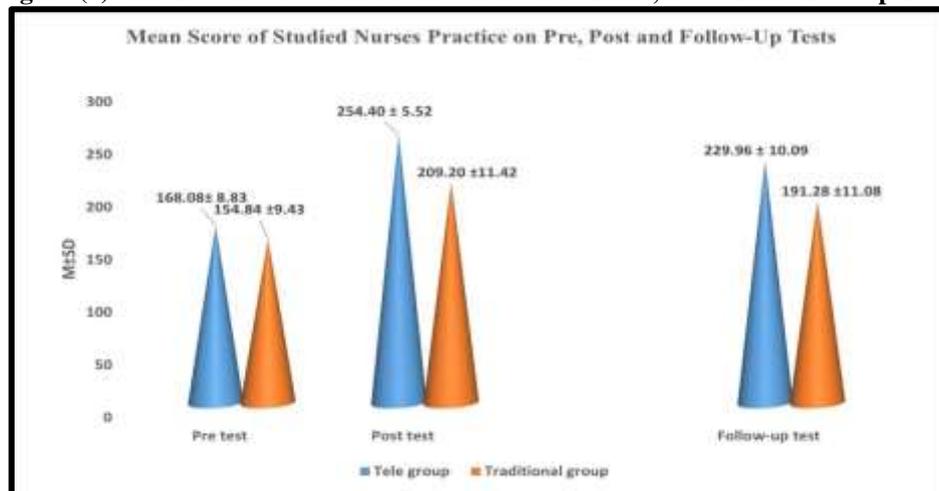


Figure (3): Mean Score of Studied Nurses Practice on Pre, Post and Follow-Up Tests.



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Figure (4): Level of Studied Nurse's Practice on Pre, Post and Follow-Up Tests.

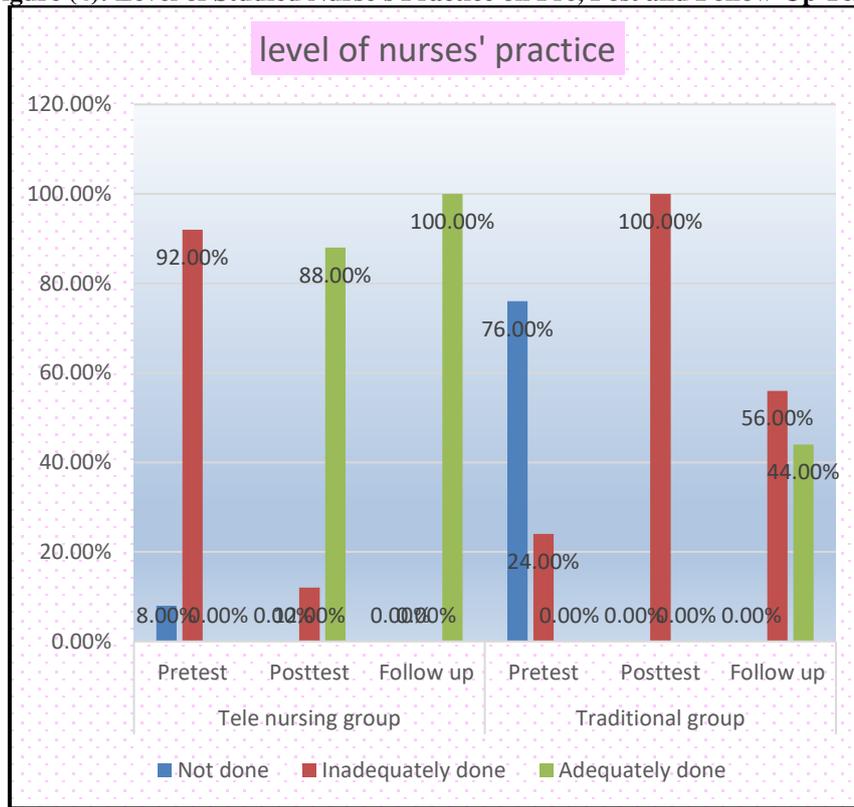
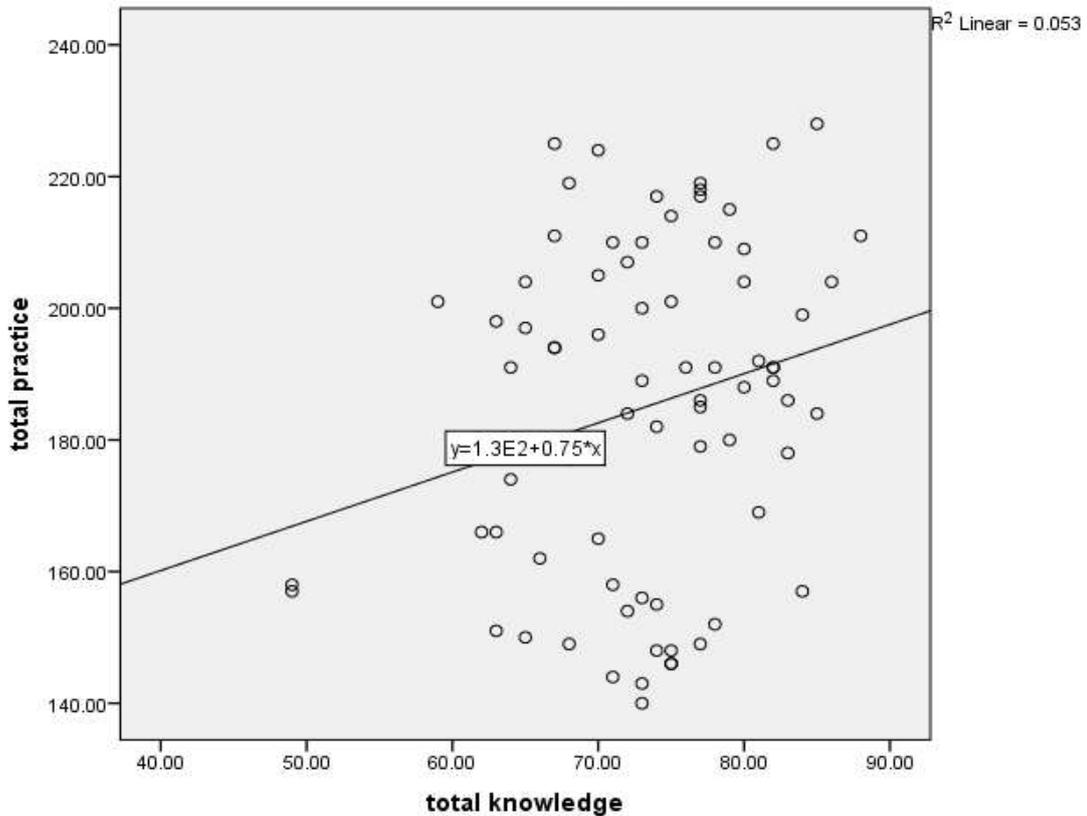
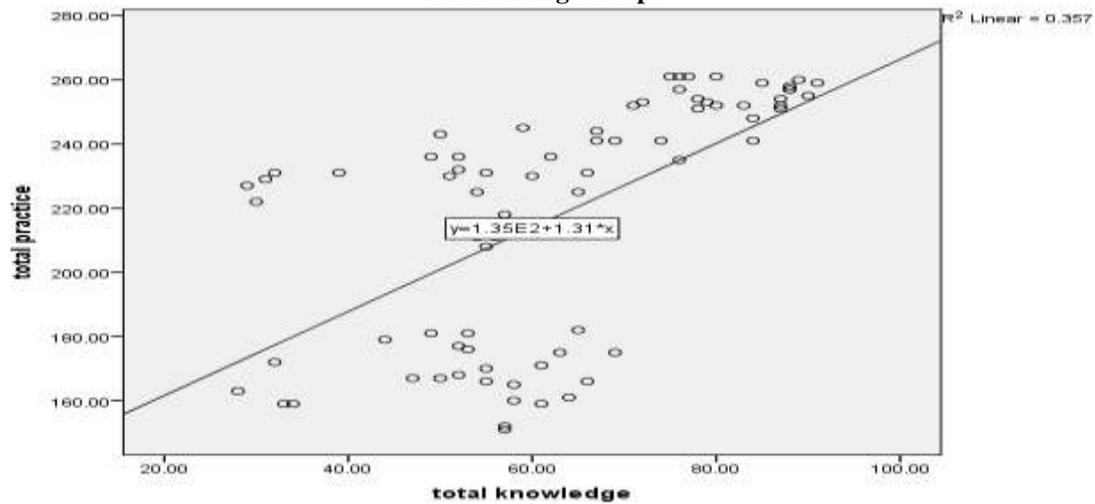


Figure (5): Pearson Correlation between Total Knowledge and Practice for Studied Nurses in the Traditional Group.



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Figure (6): Pearson Correlation between Total Knowledge and Practice for the Studied Nurses in Tele Nursing Group.



Discussion

Biliary atresia (BA) is a progressive fibroinflammatory disease affecting both the extrahepatic and intrahepatic bile ducts, potentially leading to chronic cholestasis and biliary cirrhosis. Surgical treatment for biliary atresia is called the Kasai operation. The success rate of the management of BA is very dependent on the age of the patient at the time of surgery. However, infants with BA were often diagnosed late because of the lack of parents' and primary healthcare providers' knowledge regarding BA. Therefore, there is an intense need to assess and increase the nurse's knowledge and practice regarding planned nursing care for children after Kasai operation (Sansan Feng, 2024).

In relation to the studied nurse's knowledge about biliary atresia, the result showed that nurses in the telenursing group had a higher level of knowledge about biliary atresia on post and follow-up tests than nurses in the traditional group. This result is in line with Lianti et al., (2020) in their

study about "Analysis of Knowledge Regarding Biliary Atresia among Healthcare Providers and Laypersons in East Jakarta after Educational Intervention". The study revealed that there was a significant increase in the median values between pre and posttest knowledge scores in both the healthcare provider and layperson groups.

Also, this result is in agreement with Prihaningtyas, (2024) who conducted a study about "Primary Healthcare Providers' Knowledge on the Early Detection of Biliary Atresia". The study concluded that educating healthcare providers about prolonged jaundice requires improvement. This could be attributed to the effectiveness of the used innovative teaching methods during implementation of the planned nursing care.

Regarding the studied nurse's knowledge about Kasai operation, the result showed that nurses in the telenursing group had a higher level of knowledge about Kasai operation on post and follow-up tests than nurses in the traditional group. This result was

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consistent with Alireza (2019) who conducted a study about "The Effectiveness of Web-Based and Face-to-Face Continuing Education Methods on Nurses' Knowledge about AIDS". The findings showed that there was a statistical significant difference between the pre and posttest scores within each group. This finding could be attributed to the clarity and simplicity of the planned nursing care which in turn helped the nurses to improve their knowledge about kasai operation.

Regarding mean score of studied nurses' knowledge, it was found that there was a highly statistically significant difference between nurses' knowledge in the telenursing group on post and follow-up test compared to pretest. This result was consistent with Shahla et al., (2022) in their study about "Assessing Virtual Education on Nurses' Perception and Knowledge of Developmental Care Of Preterm Infants". Their results showed that the mean knowledge score in the control group before and after the intervention was not statistically significant. Meanwhile, in the intervention group there was a statistically significant difference between the mean knowledge score before and after the intervention.

Besides, this result came in agreement with 1"JalaliHYPERLINK \l "Aff1" et al., (2022) who conducted a study about "Assessing Virtual Education on Nurses' Perception and Knowledge of Developmental Care Of Preterm Infants". The study revealed that the mean knowledge score in the control group before and after the intervention

was not statistically significant, while in the intervention group there was a statistically significant difference between the mean knowledge score before and after the intervention.

Also, such finding was supported by Abd Elaziz et al., (2021) who conducted a study about "Effect of Video-Assisted Teaching Intervention on Nurses' Knowledge and Practice Regarding Arterial Blood Gases Sampling for Ventilated Children at Pediatric Intensive Care Units". The study revealed that there was a significant improvement in nurses' total knowledge regarding arterial blood gases sampling after video-assisted teaching intervention.

Furthermore, this result came in agreement with Mohamed & Mahmoud (2021) who conducted study about Effect of "Telenursing Intervention Program on Mothers' Knowledge about Postoperative Care for One Day Surgery Children". This could be due to improved nurse's awareness and skills about importance of application of the planned nursing care. So, nurses can use telenursing as an effective and efficient educational media to improve their knowledge and practice while caring for children after performing kasai operation.

Concerning level of studied nurse's knowledge on pre, post and follow-up tests, it was clear that approximately all studied nurses in the telenursing group had good knowledge level on posttest. This came in agreement with Khraisat et al., (2023) who conducted a study about "Telenursing Implications for Future Education and Practice: Nursing Students' Perspectives and Knowledge

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from a Course on Child Health". The results showed a positive perception toward telenursing practice.

In addition, this came in agreement with Wang et al., (2024) who conducted a study about "Continuous Nursing for Infants with Congenital Talipes Equinovarus Undergoing Ponseti Therapy and Telehealth Education for their Parents Via We Chat: A Single Center Retrospective Study". This study found that continuous nursing and telehealth education via We Chat group during Ponsetis treatment of children with Congenital Talipes Equinovarus can effectively reduce complications, reduce the care burden of parents and improve the quality of life of parents.

Furthermore, this finding came in line with El-Husseiny et al., (2020) who conducted a study about "Effect of Mobile-Based Education versus Booklet-Based Education on Mothers' Knowledge and Practice towards their Children with Bronchial Asthma". The study revealed that mobile-based education groups showed an improvement in their total level scores of knowledge and practice one month after mobile-based education versus booklet-based education implementation compared to booklet-based education groups, with highly significant differences.

Besides, this result came in agreement with Beni et al., (2022) who conducted a study about "Comparison of Face-to-Face Education and Multimedia Software Education on Adjustment of Patients with Intestinal Ostomy a Randomized Controlled Trial". The findings of this study indicated that

multimedia education was associated with higher levels of adjustment when compared to face-to-face teaching.

Meanwhile, this result came in line with Jacob and Araújo (2020) who conducted study about "Nursing Training Program in Children's Hearing Health: A Proposal for Interactive Tele-Education". The study concluded that effectiveness of the nursing training program in the area of children's hearing health using interactive tele-education could be proven, since there was an improvement in performance in all domains evaluated.

Also, this came in agreement with Athena (2022) who conducted a study about "Nurse-led Telehealth Intervention for Rehabilitation (Telerehabilitation) Among Community-Dwelling Patients with Chronic Diseases". The study revealed that telephone follow-ups were the most commonly used telerehabilitation delivery approach. This could be due to availability, clarity and regulation of innovative telenursing teaching strategies (e.g. chatting, group discussion and multimedia education) on enhancing nurses' knowledge about biliary atresia, kasai operation and planned nursing care for children after performing kasai operation.

Concerning mean and standard deviation of studied nurses' practice, the study showed that nurses in the telegroup had higher mean score on post and follow-up tests than nurses in the traditional group. This could revealed that they had better practice. Such finding was supported by Abd Elaziz et al., (2021) who conducted a

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study about Effect of Video-Assisted Teaching Intervention on Nurses' Knowledge and Practice Regarding Arterial Blood Gases Sampling for Ventilated Children at Pediatric Intensive Care Units. This could be mean that video assisted teaching enhanced nurses' ability to provide better standardized care for children after performing kasai operation.

In relation to level of studied nurses' practice, the study showed that the majority of studied nurses in the tele group had more adequately done practices on post and follow-up test than pretest. The study came in line with Bayomi & Mohamed (2022) who conducted a study about Effect of Self –Learning Package on Nurses' Knowledge and Practice Regarding Arterial Blood Gases Analysis for Critically Ill Patients. Although nurses had unsatisfactory practice on pretest, their practice was improved on post and follow-up tests. This result could be related to effective demonstration and re-demonstration and availability of videos about nursing practice.

Regarding pearson correlation between total knowledge and practice for studied nurses, the study clarified that there were positive statistical significant correlation between nurse's total knowledge and total practice scores. This came in line with Bayomi & Mohamed (2022) who conducted a study about Effect of Self –Learning Package on Nurses' Knowledge and Practice Regarding Arterial Blood Gases Analysis for Critically Ill Patients. Also it came in line with Wenjun et al., (2021) who conducted a study about Intensive care nurses'

knowledge and practice of evidence-based recommendations for endotracheal suctioning.

Besides, Dan et al., (2024) who conducted a study about Effectiveness of the Information-Knowledge-Attitude-Practice Nursing Mode in Improving the Prognosis of Patients after Spontaneous Pneumothorax Single-Hole Thoracoscopy, which revealed that nurses who received education through telenursing demonstrate better compared outcomes. Furthermore El-Husseiny et al., (2020) who conducted a study about Effect of Mobile-Based Education versus Booklet-Based Education on Mothers' Knowledge and Practice towards their Children with Bronchial Asthma, revealed the same findings. This result could be related to effective demonstration and re-demonstration and availability of videos about nursing practice.

On the other hand, the study contradicted with Afandi & Ludin (2020) who conducted a study about ICU Nurses' Perceived Knowledge, Attitude, and Practice on Endotracheal Suctioning, and declared a weak negligible positive relationship between knowledge and practice. A negligible correlation was also observed between attitude and practice. This could be attributed to the influence of higher level of knowledge on the higher practice.

Conclusion

Nurses who received health education through telenursing had higher adherence to planned nursing care than

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nurses who only received traditional health education.

Recommendations

Telenursing health education program should be developed for nurses who caring for children performing kasai operation. A standardized nursing care about biliary atresia and kasai operation booklets should be available at Surgical Intensive Care Unit. Planned nursing care for biliary atresia and kasai operation should be a part of continuous nursing education program at National Liver. Application of the present study on a large sample is required to ensure the generalizability of the results.

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