



## Enhancing Nurses' Knowledge-related Prevention of Sudden Infant Death Syndrome

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### ABSTRACT

**Objective(s):** to enhance nurses' knowledge-related preventing sudden infant death syndrome by applying a nursing program based on updated recommendations of American Academy of Pediatric for a Safe Infant Sleeping Environment (2022).

**Methods:** A quasi-experimental study with two study groups (pre-test, post-test I, and post-test II) carried out at Children's Welfare Teaching Hospitals and The Central Teaching Hospital of Pediatrics in Baghdad City from September 14<sup>th</sup>, 2023 to February 21<sup>th</sup>, 2024. The study recruited fifty nurses, divided into two groups equally. The study used the validated Knowledge test instrument with (10) items (multiple choices). An Educational program is built according to American Academy of Pediatric update guidelines for sudden infant death syndrome. Version 26.0 of the Statistical Package of Social Sciences (SPSS) was used to analyze the research's data.

**Results:** The study results indicate that the majority of nurses had a poor level of knowledge (M=0.38) prior to the application of the program, while the post-test showed a good level of knowledge during posttest 1 (M=0.80) and posttest 2 (M=0.69) among nurses in the study group. Compared with the control group, nurses showed fair knowledge during the pretest (M = 0.45), posttest I (M = 0.37), and posttest II (M = 0.38), regarding the prevention of sudden infant death syndrome.

**Conclusion:** This study suggest that the nursing educational program yields tangible positive outcomes on improving nurses' knowledge-related prevention of sudden infant death syndrome.

**Recommendations:** The Iraqi Ministry of Health might benefit from adapting this guide on the prevention of sudden infant death syndrome as a training program for nurses to improve their knowledge of the prevention of sudden infant death syndrome and to conduct further studies on a large sample of nurses in order to disseminate better and apply evidence-based practice.

## فعالية البرنامج الإرشادي المخصص قبل العلاج الإشعاعي بقيادة الممرض لتعزيز مستوى وعي المرضى الذين يتلقون العلاج الإشعاعي للمرة الأولى

### المستخلص

**الاهداف:** تحسين معارف الممرضين المتعلقة بالوقاية من متلازمة موت الرضيع المفاجئ من خلال تطبيق برنامج ترميضي يعتمد على التوصيات الحديثة الصادرة في العام ٢٠٢٢ للأكاديمية الأمريكية للأطفال لبيئة نوم آمنة للرضع.

**المنهجية:** تصميم دراسة شبه تجريبية لمجموعتين دراسيتين (ما قبل الاختبار وما بعد الاختبار الأول وما بعد الاختبار الثاني) في مستشفى حماية الأطفال التعليمي ومستشفى الطفل المركزي التعليمي في مدينة بغداد. أجريت الدراسة بين ١٤ ايلول ٢٠٢٣ و ٢١ شباط ٢٠٢٤. ويبلغ حجم العينة ٥٠ ممرض، مقسمة إلى مجموعتين بالتساوي. تتألف أداة الدراسة من جزأين: الجزء الأول يتناول الخصائص الاجتماعية والديموغرافية للممرضين، في حين يتناول الجزء الثاني اختبار المعرفة الذي يتكون من (١٠) فقرات (خيارات متعددة). البرنامج التعليمي يعتمد على الدليل الوقائي المحدث من الأكاديمية الأمريكية للأطفال. تم تحليل بيانات الدراسة باستخدام النسخة 26.0 من المجموعة الإحصائية للعلوم الاجتماعية.

**النتائج:** تشير نتائج هذه الدراسة إلى أن مستوى معارف الممرضين كان ضعيفاً قبل تطبيق البرنامج ( $M=0.38$ )، في حين أظهر الاختبار البعدي مستوى جيداً من المعارف ( $M=0.69$ ) لدى الممرضين في مجموعة الدراسة. وبالمقارنة مع المجموعة الضابطة، أظهر الممرضين معرفة متوسطة أثناء الاختبار الأولي ( $M = 0.45$ )، والاختبار البعدي I ( $M = 0.37$ ) والاختبار البعدي II ( $M = 0.38$ ) فيما يتعلق بالوقاية من متلازمة موت الرضيع المفاجئ.

**الاستنتاجات:** تشير نتائج البحث إلى أن البرنامج التعليمي قد حقق نتائج إيجابية ملموسة في زيادة معارف الممرضات فيما يتعلق بالوقاية من متلازمة موت الرضيع المفاجئ كما يتضح من الاختبار القبلي والاختبار البعدي للبرنامج.

**التوصيات:** اعتماد الدليل الوقائي لمتلازمة موت الرضيع المفاجئ من قبل وزارة الصحة كبرنامج تدريبي للممرضين لتحسين معرفتهم فيما يتعلق بالوقاية من متلازمة موت الرضيع المفاجئ وإجراء مزيد من الدراسات على عينة كبيرة من الممرضين من أجل تعميم أفضل وأسلوب تطبيقي يعتمد على الممارسة القائمة على الأدلة.

**الكلمات المفتاحية:** ممرضين, معارف, الوقاية, متلازمة موت الرضيع المفاجئ.

### Introduction

Sudden infant death syndrome (SIDS) is the inexplicable death of infant within the aged of less than year old following a comprehensive case study that includes a full autopsy, a review of the medical records, and an investigation of the death site<sup>(1)</sup>. It's unclear what causes SIDS, however and according to previous studies, it is linked to inadequate physiologic reactions to hypoxemia, hypercarbia, and a variety of intrinsic and extrinsic variables<sup>(2,3)</sup>. SIDS is sometimes referred to as a "diagnosis of exclusion" since it is not identified until all other potential causes of death, such as asphyxia, infection, and other illnesses, have been eliminated<sup>(4)</sup>. The incidence of infant death was varying in developing countries. According to the Iraq Ministry of Health, the infant mortality rate in 2022 was 19.8/1000 live births, and in the governorate of Baghdad was 22/1000 live births<sup>(5)</sup>. Yemen having a rate of 34 per 1,000 live births, Qatar having a

rate of 7 per 1,000 live births, and the United Arab Emirates having a rate of 6 per 1,000 live births<sup>(6)</sup>. Before 4 weeks or after 6 months of age, SIDS is rare, and it occurs most frequently between 2 and 4 months. This is considered a critical period because the infant's ability to rouse from sleep is not yet mature<sup>(7)</sup>. However, infants who are male, premature, or have a low birth weight are at greater risk of dying from SIDS, as are infants whose mothers are impoverished or who use illicit drugs. Siblings of infants who have died of SIDS have a three- to five-fold greater risk of the condition, which is most prevalent in the winter<sup>(8)</sup>. Even though SIDS is among the leading causes of natural mortality in the first year of life, prevention remains difficult<sup>(9)</sup>.

The American Academy of Pediatrics (AAP) has developed guidelines for infants' sleeping positions and environments to lower the number of unexpected sleep-related baby deaths, such as SIDS<sup>(10)</sup>. The following recommendation is advised: sleep on a firm

surface, avoid putting soft objects in the crib, avoid sharing a bed, use a pacifier, keep the infant away from cigarette smoke, and continue breastfeeding. Furthermore, it is advised that medical professionals, nursing staff, and other caregivers encourage and act as role models for the guidelines on lowering the incidence of SIDS<sup>(4,10-13)</sup>. Previous research has demonstrated that parents follow and pay attention to medical professionals' guidance regarding safe sleep behaviors<sup>(14,15)</sup>. However, following the publication of the most updated recommendations, nurses have been less knowledgeable about the preventative measures that newborn nurses use to avoid SIDS<sup>(15)</sup>. Research has highlighted the need for improved knowledge among healthcare professionals themselves in order to reduce the number of SIDS cases<sup>(4,16-20)</sup>. Most of the knowledge about SIDS came from evidence of base practices by providing healthcare professionals with accurate and up-to-date information on safe sleep practices, nurses can better educate and support parents in establishing a secure sleeping environment for their babies<sup>(21)</sup>. Therefore, the aim of this study was to improve nurses' knowledge about prevention of sudden infant death syndrome.

## Methods

### Study Design and Setting

A quasi-experimental study design with two-study groups (pre-test, post-test I and post-test II) was conducted to measure the effects of educational program on nurses' knowledge. This study conducted at Children Welfare Teaching Hospitals and Central Teaching Hospital of Pediatric in Baghdad City, which are the larger hospitals that serve high number of children from Baghdad and other governorates. These hospitals were chosen for data collection making it easier to complete.

### Study Sample and Sampling

A non-probability sampling technique was used to include a sample of fifty NICU

nurses. Based on a Richard Geiger equivalent population proportion = 50%, error probability = 5%, confidence = 95%, and the standard score corresponding to the level of confidence = 1.96, the minimum required sample size would be 50 NICU nurses<sup>(22)</sup>. The estimated number of nurses working in the Children Welfare Teaching Hospital was 282, and in the Central Teaching Hospital of Pediatrics, it was 120.

### The constructed Program

The findings of the first needs assessment show that 80% of nurses lack sufficient information about preventing SIDS. Following a review of the literature, the planned program was created using the most recent guidelines from the American Academy of Pediatrics (AAP) because these guidelines incorporate the latest research and expert consensus on the safest practices to reduce the risks of SIDS<sup>(12)</sup>. Therefore, by integrating the latest guidelines, the preventive guidelines can ensure they are providing the safest possible environment for infants, aligned with current scientific understanding and public health recommendations. The content of the guidelines detailed about the background and pathophysiology of SIDS first, then explained the causes, risk factors, and recommendations to reduce the risk of SIDS and other sleep-related infant deaths. The program includes the following steps. Step One: The researchers introduced themselves, obtained nursing staff approval, explained the study's aim, process, and roles, and conducted a pre-test. Step Two: The educational program regarding preventive guidelines for sudden infant death syndrome is designed and presented in four lectures throughout the four-day period. Every lecture took approximately 45 minutes, nurses were given fifteen to twenty minutes to complete their responses, and the number of staff attending the educational program was 25 nurses. Many educational methods, including

brainstorming, group discussions, demonstrations, posters, video films, and booklets, were employed in the application of the preventive bundle guidelines.

#### **Data Collection and the Study Instruments**

A written consent was obtained from all requisited nurses in the Hospitals. The data collection process begun from January 14, 2023, and continued until February 21, 2024. Data was collected through using Arabic version of the questionnaire. The study sample was divided into two groups before the educational program was put into the study group and the control group. The study group was engaged in a pre-test, educational program, post-test1, and post-test2, while the control group was enrolled in a pre-test, post-test1, and post-test2.

The study instrument was consisted of NICU nurses demographic including their age, sex, nursing qualification, marital status, number of years of NICU experience, and number of training sessions. The "self-administered knowledge assessment questionnaire," the second instrument, contained valid information from Bullock et al. (2004) that was pertinent to the study's objectives<sup>(23)</sup>. It consisted of 10 questions to assess nurses' knowledge for the prevention of SIDS. The back-back translation approach was used to translate the tool. Independent translators completed the translations. The original form was compared with the translations. A committee of nursing research professionals made revisions and modifications to the final translations.

The knowledge scale of the tool was graded using a three-point Likert scale, with the scores being I know (1), uncertain (0), and I don't know (0). After determining the range from the lowest and greatest score, the range score was divided into three levels and scored as follows: bad = 0-0.33, fair = 0.34–0.66, and good = 0.67–1. This method was used for calculating the knowledge score.

#### **Validity and Reliability of the Study instrument**

A panel of 13 experts with more than nine years of experience in their respective fields of expertise evaluates the program's and the study instruments' content validity through review. After careful evaluation of the feedback and recommendations from the experts, both the final instrument and program are now suitable for use as research instruments. The reliability of the questionnaire was employed by a test-retest method obtained through assessing five nurses working at the NICU, and the interval period was two weeks<sup>(24)</sup>. The results reveal that the questionnaire format is sufficiently dependable. through the computation of the alpha correlation coefficient ( $r = 0.740$ ).

#### **Ethical Considerations**

Prior to beginning this research, ethical permission is requested from the Scientific Research Ethics Committee of the College of Nursing. Then, written approvals were obtained from the nurses after reviewing a complete and clarity of the study to be carried out. Participants in the study have the option to discontinue participation at any time if they are uncomfortable or irritated with any of the questions on the questionnaire that was created as a research tool or the way the researcher is gathering data. They also agree to uphold the strict confidentiality of the data obtained from the study sample and promise to use it for scientific purposes related to the research only.

#### **Data Analysis**

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 26.0. Data were presented as percentages, mean and standard deviation values, Alpha Cronbach, and were subjected to a parametric chi-square test analysis. P-values less than 0.05 were considered statistically significant.

**Result**

**Table 1.** Demographic Characteristics of the Study and Control Groups (No.= 50)

No.	Characteristics	Study group		Control group		
		f	%	f	%	
1	<b>Age (Years)</b>	20 – less than 30	21	84	16	64
		30 – less than 40	3	12	6	24
		40 – less than 50	0	0	1	4
		50 and more	1	4	2	8
		<i>M ± SD</i>	<i>26.56 ± 6.6</i>		<i>30.48 ± 10.4</i>	
2	<b>Sex</b>	Male	3	12	3	12
		Female	22	88	22	88
3	<b>Qualification in nursing</b>	Secondary school	6	24	8	32
		Diploma	12	48	16	64
		Bachelor	7	28	1	4
4	<b>Marital status</b>	Single	14	56	14	56
		Married	11	44	11	44
5	<b>Years of experience in NICU</b>	Less than 5	20	80	14	56
		5 – less than 10	4	16	8	32
		10 – less than 15	0	0	1	4
		15 and more	1	4	4	8
6	<b>Participation in training course about SIDS</b>	None	23	92	24	96
		Inside country	2	8	1	4
		Outside country	0	0	0	0

No= Number, f= Frequency, %= Percentage.

Table (1) shows that the mean age for nurses in the study group was  $26.56 \pm 6.6$  years and for nurses in the control group was  $30.48 \pm 10.4$  years. The majority of nurses in both study and control groups were female with same percentages (88%). Less than half of nurses held diploma in nursing in the study group (48%) and in the control group was (64%). More than half (56%) of nurses was equal in both study and control groups were single. The years of experience in neonatal intensive care unit indicate that 80% of nurses in the study group and 56% of nurses in the control group have

less than 5 years of experience. Regarding participation in training courses, only two nurses in the study group (8%) and only one in the control group (4%) are participated in training course.

**Table 2.** Nurses’ Knowledge about Prevention of Sudden Infant Death Syndrome among Study and Control Groups (No.= 50)

No.	Prevention of Sudden Infant Death Syndrome	Study Group (N=25)						Control Group (N=25)					
		Pre-test		Post-test 1		Post-test 2		Pre-test		Post-test 1		Post-test 2	
		M	Eval.	M	Eval.	M	Eval.	M	Eval.	M	Eval.	M	Eval.
1	The infant sleeping lying on his back from the correct sleeping positions recommended by the American Academy of pediatric	.36	Fair	.88	Good	.72	Good	.36	Fair	.44	Fair	.32	Poor
2	Removing pillows and covers away from the infant's sleeping area prevents SIDS	.48	Fair	.84	Good	.68	Good	.60	Fair	.48	Fair	.52	Fair
3	Using a pacifier at nap time and bedtime reduces the risk of SIDS	.24	Poor	.84	Good	.60	Good	.28	Poor	.20	Poor	.24	Poor
4	Lying on the stomach under parental supervision facilitates growth and reduces the risk of positional plagiocephaly	.44	Fair	.80	Good	.68	Good	.60	Fair	.48	Fair	.48	Fair
5	Sleeping on an inelastic surface that protects the baby from SIDS	.32	Poor	.76	Good	.64	Good	.48	Fair	.32	Poor	.36	Fair
6	Breastfeeding reduces the incidence of SIDS	.40	Fair	.80	Good	.76	Good	.44	Fair	.36	Fair	.39	Fair
7	Independence of the infant in his bed during the first six months of life reduces the incidence of SIDS	.44	Fair	.80	Good	.72	Good	.40	Fair	.36	Fair	.40	Fair
8	Administering vaccines prevents SIDS	.60	Fair	.80	Good	.72	Good	.56	Fair	.56	Fair	.44	Fair
9	Placing the baby to sleep on a firm sleep surface, such as on a safety-approved crib mattress covered by a fitted sheet, reduces the risk of SIDS	.32	Poor	.72	Good	.76	Good	.48	Fair	.32	Poor	.40	Fair
10	Sleeping an infant in a separate bed at same room with his parents, reduces the incidence of SIDS	.20	Poor	.84	Good	.68	Good	.32	Poor	.24	Poor	.28	Poor
<b>Total average</b>		<b>.38</b>	<b>Fair</b>	<b>.80</b>	<b>Good</b>	<b>.69</b>	<b>Good</b>	<b>.45</b>	<b>Fair</b>	<b>.37</b>	<b>Fair</b>	<b>.38</b>	<b>Fair</b>

N= number, M= Mean, Eval: Evaluation, Poor= 0 – 0.33, Fair= 0.34– 0.66, Good= 0.67–1.

Table (2) illustrates that nurses in the study group had fair level of knowledge during pretest (total average= .38) while their knowledge was improved and showed a good level during the posttest I (total average= .80) and posttest II (total average= .69). Nurses in the control group showed a fair

level of knowledge during the three times of test: pre (total average= .45), post I (total average= .37), and post II (total average= .38).

**Table 3.** Nurses’ Knowledge about Prevention of Sudden Infant Death Syndrome in the Study Group (N=25) post Educational Program

Descriptive		Source	Type III Sum of Squares	df	Mean Square	F	P-value	
Knowledge	Mean (SD)							
Pretest	11.80 (5.809)	Time	Sphericity Assumed	3294.107	2	1647.053	120.904	.000
			Greenhouse-Geisser	<b>3294.107</b>	<b>1.438</b>	<b>2290.005</b>	<b>120.904</b>	<b>.000</b>
Huynh-Feldt	3294.107		1.505	2188.345	120.904	.000		
Lower-bound	3294.107		1.000	3294.107	120.904	.000		
Posttest I	27.48 (3.151)	Error (Time)	Sphericity Assumed	653.893	48	13.623		
Posttest II	23.28 (3.995)		Greenhouse-Geisser	653.893	34.523	18.941		
			Huynh-Feldt	653.893	36.127	18.100		
			Lower-bound	653.893	24.000	27.246		

SD= Standard Deviation, df= Degree of Freedom, f= F-statistics, P-value=0.000.

Table (3) shows that the educational program has a significant impact on the study group's nurses' knowledge, as demonstrated by the large Eta squared, which indicates a large size effect (.834) and the high significance associated with p-value=0.000. The descriptive statistics clearly show a discernible increase in the mean score for nurses' knowledge during posttests I and II, indicating the efficacy of the educational program.

**Table 4.** Nurses Knowledge about Prevention of Sudden Infant Death Syndrome in Control Group (N=25)

Descriptive		Source	Type III Sum of Squares	df	Mean Square	F	P-value	
Knowledge	Mean (SD)							
Pretest	12.64 (4.091)	Time	Sphericity Assumed	1.307	2	.653	.167	.846
			Greenhouse-Geisser	1.307	1.571	.832	.167	.795
Posttest I	12.44 (3.927)		Huynh-Feldt	1.307	1.662	.786	.167	.807
Posttest II	12.32 (2.897)		Lower-bound	1.307	1.000	1.307	.167	.686
		Error (Time)	Sphericity Assumed	187.360	48	3.903		
			Greenhouse-Geisser	187.360	37.713	4.968		
			Huynh-Feldt	187.360	39.896	4.696		
Lower-bound	187.360		24.000	7.807				

SD= Standard Deviation, df= Degree of Freedom, f= F-statistics, P-value= .007, probability value, Sig= Significance, H. S= High Significant.

Table (4) demonstrates that the "Greenhouse-Geisser" adjustment has not been associated with any significance, and the p value= .007, suggests a tiny size effect. The mean score of nurses' knowledge in the control group during the pretest, posttest I, and posttest II does not clearly differ, according to the descriptive analysis.

## Discussion

Sudden infant death syndrome is the leading cause of death among healthy born babies worldwide with unclear causes. The risk of this disease can be minimized by performing some simple active intervention. The study found that the majority of nurses were female in both groups. This finding is similar to the results of study conducted by Yıldız in Turkey found that the majority of NICU nurses were female<sup>(15)</sup>. Concerning the nurses' age, the current study found that more than half of the nurses were aged between 20 and 30 years old. This finding is similar to Elwasefy and others' study indicated that the majority of nurses were aged between "20 and < 30" years old<sup>(25)</sup>. In addition, according to the current study, more than half of the nurses in both groups were single, which is higher than the average number of participants who were married. This result contradicted to a study findings conducted by Kadhom et al. in Iraq found that more than half of nurses were married<sup>(26)</sup>. Concerning their education, most of nurses held diploma in nursing. This finding is contraindicated by a study conducted by Yıldız, found that half of nurses have a bachelor's degree<sup>(15)</sup>. In regards to participants' NICU experiences, they ranged from a maximum of one to five years of experiences in the nursing field. This result is corroborated by Alhaib et al., revealed that most nurses (62%) have fewer than five years of experience in the nursing field<sup>(27)</sup>. In terms of training courses, it is clear from the results that the majority of respondents in the two groups did not participate in training courses. These results correlate to the results reported by Elwasefy and others, revealed that most of them (86.7%) did not attend educational lectures about sudden infant death syndrome prevention<sup>(25)</sup>. This finding is also supported by another studies from Iraq, which found that most nurses did not attend training sessions<sup>(28-30)</sup>.

Nurses in the study group demonstrated to have a fair level of knowledge during the pre-test period but a good level of knowledge after post-tests I and II, according to the results of the assessment of nurses' knowledge regarding SIDS prevention, which indicated

that educational program was effective for improving their understanding of SIDS prevention. This finding was supported by Elwasefy et al. study,<sup>(25)</sup> showed that nurses gain a good level of knowledge related to updated recommendations about SIDS prevention. Also, the result of the current study was consistent with other studies findings that the study groups had a high degree of knowledge following the posttest<sup>(31)</sup>. Conversely, the nurses in the control group demonstrated that all items related to their knowledge of how to prevent sudden infant death syndrome were not modified statistically significantly between the three periods (pretest, post-test I and II). This finding is consistent with a study conducted in Iraq, which evaluated the effect of the educational program on nurses' knowledge and found no noticeable variations in the control group's knowledge over the course of three periods.<sup>(32)</sup>

Gaining knowledge about the prevention of sudden infant death syndrome might be attributed to the fact that nurses attending to related educational programs improve their knowledge. A Spanish study by Jullien et al., confirmed that preventing SIDS in infants requires a safe sleep environment, including supine position, firm surfaces, no soft objects, loose bedding, head coverings, overheating, and room-sharing without bed-sharing. Breastfeeding on demand and pacifier use are recommended<sup>(33)</sup>. In addition, according to a study by Kleemann et al., 36% of SIDS cases had profuse sweating at the time of death, suggesting that hyperthermia may be a factor in certain SIDS deaths<sup>(34)</sup>.

Regarding the effectiveness of the educational program, data analysis shows that the program increased nurses' knowledge among the study group. There was a significant rise in the mean score on nurses' knowledge during post-tests I and II demonstrates the effectiveness of the educational program. The results demonstrate no variations in the mean score of nurses' knowledge in the control group during pretest, post-test I, and II. These results supported by the Grazel et al., study indicated that there was an enhancement in nursing knowledge



after the implementation of the "American Academy of Pediatrics Recommendations to Reduce Sudden Infant Death Syndrome Risk in Neonatal Intensive Care Units"<sup>(10)</sup>. Similarly, Elwasefy and colleagues illustrated the benefit of training programs to increase nurses' knowledge concerning the deterrence of sudden infant death syndrome and gave the interpretation that they could learn more preventive guidelines and gain more from them if they received training in this area<sup>(25)</sup>. This is attributed to the fact that the program gave nurses the opportunity to practice and use their newly acquired knowledge of prevention guidelines, in addition to providing them with up-to-date knowledge about the sudden infant death syndrome. However, the lack of nurses' knowledge during the pre-test, post-test I, and II might suggest that the control group did not receive any additional training or intervention that would have increased their level of knowledge in this area during the routine care. This emphasizes the importance of giving nurses ongoing education and training in order to maintain up-to-date knowledge and skills. Moreover, Mahmoud et al., demonstrated that the most effective ways to increase knowledge levels are through educational program<sup>(35)</sup>. This may be due to the sample's dedication, the usage of modern instructional methods like PowerPoint, or the effectiveness of discussions regarding raising knowledge levels. In addition, nurses in the current study were engaged in the program and actively participate in it. This study also employs contemporary teaching techniques and emphasizes discussion methods.

### Conclusion

This study empowers the effectiveness of program to enhance nurses' knowledge about the prevention of sudden infant death syndrome after posttest 1 and 2. The educational program is productive and delivered the intended enhancement in nursing knowledge by increasing awareness and contributing to a greater comprehension of the prevention of SIDS, they can better recognize potential cases and provide compassionate care. This not only enhances

clinical practice but also contributes to a broader field of knowledge.

### Recommendation

The study recommended that the program should be adapted by the Ministry of Health, as training program for nurses to improve their knowledge regarding prevention of sudden infant death syndrome. Also recommended further studies on safe practices of SIDS of nurses based on an evidence base practice.

### References

1. Vincent A, Chu NT, Shah A, Avanthika C, Jhaveri S, Singh K, Limaye OM, Boddu H. Sudden Infant Death Syndrome: Risk Factors and Newer Risk Reduction Strategies. *Cureus*. 2023 Jun 17;15(6): e40572. doi: 10.7759/cureus.40572. PMID: 37465778; PMCID: PMC10351748.
2. Cole R, Young J, Kearney L, Thompson JMD. Awareness of infant safe sleep messages and associated care practices: findings from an Australian cohort of families with young infants. *BMJ Paediatr Open*. 2021 Feb 24;5(1): e000972. doi: 10.1136/bmjpo-2020-000972. PMID: 33718628; PMCID: PMC7908297.
3. Hirai AH, Kortsmitt K, Kaplan L, Reiney E, Warner L, Parks SE, Perkins M, Koso-Thomas M, D'Angelo DV, Shapiro-Mendoza CK. Prevalence and Factors Associated with Safe Infant Sleep Practices. *Pediatrics*. 2019 Nov;144(5): e20191286. doi: 10.1542/peds.2019-1286. Epub 2019 Oct 21. PMID: 31636142; PMCID: PMC10935590.
4. Newberry JA. Creating a Safe Sleep Environment for the Infant: What the Pediatric Nurse Needs to Know. *J Pediatr Nurs*. 2019 Jan-Feb; 44:119-122. doi: 10.1016/j.pedn.2018.12.001. Epub 2018 Dec 15. PMID: 30683277.
5. Annual Statistical Report. Iraq Ministry of Health; 2022 p. 67.
6. Hamadneh SM, Kassab M, Eaton A, Wilkinson A, Creedy DK. Sudden

- Unexpected Infant Death. Springer eBooks. 2020 Jan 1;1–14.
- 7.M. Qasim M, Abdulkader Alrabaty A. Infant Sleep Practice and Sleep Environment in Erbil City. Iraqi Postgraduate Medical Journal [Internet]. 2017 Sep 28 [cited 2024 Apr 9];16(3):298–303. Available from: [https://ipmj.org/article\\_146017.html](https://ipmj.org/article_146017.html)
  - 8.Keens TG, Stastny PF. Sudden Infant Death Syndrome☆ [Internet]. Benson JB, editor. Science Direct. Oxford: Elsevier; 2020 [cited 2024 Jan10].p.296–304.Availablefrom: <https://www.sciencedirect.com/science/article/abs/pii/B9780128093245214223?via%3Dihub>
  9. Glinge C, Rossetti S, Oestergaard LB, Stampe NK, Lyng TH, Skals R, Winkel BG, Lodder EM, Bezzina CR, Gislason G, Banner J, Behr ER, Torp-Pedersen C, Jabbari R, Tfelt-Hansen J. Risk of Sudden Infant Death Syndrome Among Siblings of Children Who Died of Sudden Infant Death Syndrome in Denmark. JAMA Netw Open. 2023 Jan 3;6(1): e2252724. doi:10.1001/jamanetworkopen.2022.52724. PMID: 36696110; PMCID: PMC10187488.
  10. Moon RY, Carlin RF, Hand I; TASK FORCE ON SUDDEN INFANT DEATH SYNDROME AND THE COMMITTEE ON FETUS AND NEWBORN. Sleep-Related Infant Deaths: Updated 2022 Recommendations for Reducing Infant Deaths in the Sleep Environment. Pediatrics. 2022 Jul 1;150(1): e2022057990. doi: 10.1542/peds.2022-057990. PMID: 35726558.
  11. Grazel R, Phalen AG, Polomano RC. Implementation of the American Academy of Pediatrics recommendations to reduce sudden infant death syndrome risk in neonatal intensive care units: An evaluation of nursing knowledge and practice. Adv Neonatal Care. 2010 Dec;10(6):332-42. doi: 10.1097/ANC.0b013e3181f36ea0. PMID: 21102179.
  12. McMullen SL, Fioravanti ID, Brown K, Carey MG. Safe Sleep for Hospitalized Infants. MCN Am J Matern Child Nurs. 2016 Jan-Feb;41(1):43-50. doi: 10.1097/NMC.0000000000000205. PMID: 26658535.
  13. Shaikh SK, Chamberlain L, Nazareth-Pidgeon KM, Boggan JC. Quality improvement initiative to improve infant safe sleep practices in the newborn nursery. BMJ Open Qual. 2022 Aug;11(3): e001834. doi: 10.1136/bmjopen-2022-001834. PMID: 35922090; PMCID: PMC9352977.
  14. Barsman SG, Dowling DA, Damato EG, Czeck P. Neonatal nurses' beliefs, knowledge, and practices in relation to sudden infant death syndrome risk-reduction recommendations. Adv Neonatal Care. 2015 Jun;15(3):209-19. doi: 10.1097/ANC.0000000000000160. PMID: 25882389.
  15. Yıldız İ. What Do the Midwives and Nurses Know About Safe Sleep? Türk Uyku Tıbbı Derg. 2021;8(1):43–8. <https://doi.org/10.4274/jtsm.galenos.2021.02411>
  16. Paditz E, Wiater A, Ipsiroglu O, Quante M, Müller-Hagedorn S, Hoch B, et al. Aktuelle Entwicklungen in der Schlafforschung und Schlafmedizin – eine Einschätzung der AG „Pädiatrie“. Somnologie. 2022;26(3):174–8. <https://doi.org/10.1007/s11818-022-00383-3>
  17. Cowgill B. Back to the Breast: An Historical Overview of the Perceived Connections Between Sudden Infant Death Syndrome and Breastfeeding. J Hum Lact. 2020 May;36(2):310-317. doi: 10.1177/0890334420906837. Epub 2020 Mar 6. PMID: 32142401.
  18. Dengler B, Wolanin M, Cezary Stawikowski, Zielonka B, Aleksandra Osińska, Wolanin I, et al. Sudden infant death syndrome (SIDS) - How to reduce the risk? Journal of Education, Health

- and Sport. 2023 May 5;27(1):19–26. <https://doi.org/10.12775/JEHS.2023.27.01.002>.
19. Mohammed Alzubaidi MJ, Abdullah AM, Hashem FSA, Ali AH. Mothers Knowledge Toward Correct Infant Sleep Practices and Sudden Infant Death Syndrome in Al-Najaf Province. *Pak J Med Health Sci.* 2022 Nov 30;16(11):642–5.
  20. Polavarapu M, Klonoff-Cohen H, Joshi D, Kumar P, An R, Rosenblatt K. Development of a Risk Score to Predict Sudden Infant Death Syndrome. *Int J Environ Res Public Health.* 2022 Aug 18;19(16):10270. doi: 10.3390/ijerph191610270. PMID: 36011906; PMCID: PMC9407916.
  21. kuhlmann stephanie, Ahlers-Schmidt CR. The Use of the Child Fatality Review Committee to Contribute to a Longitudinal Quality Improvement Project on Safe Sleep - PubMed [Internet]. 2018 [cited 2023 Dec 10]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30026249/>
  22. Sample Size Calculator [Internet]. [cited 2024 May 30]. Available from: <https://www.calculator.net/sample-size-calculator.html>
  23. Bullock LF, Mickey K, Green J, Heine A. Are nurses acting as role models for the prevention of SIDS. *MCN Am J Matern Child Nurs.* 2004 May-Jun;29(3):172-7. doi: 10.1097/00005721-200405000-00008. PMID: 15123974.
  24. Bolarinwa OA. Principles and methods of validity and reliability testing of questionnaires used in social and health science researches. *Niger Postgrad Med J.* 2015 Oct-Dec;22(4):195-201. doi: 10.4103/1117-1936.173959. PMID: 26776330.
  25. Elwasefy SA. Effect of Preventive Updating Guidelines on Improving Nurses' Knowledge and Practice Toward Sudden Infant Death Syndrome in Neonatal Intensive Care Unit. *Int J Nurs Didact.* 2019 Jun 30;09(06):21–30. <https://doi.org/10.15520/ijnd.v9i06.2613>
  26. Kadhom HA, Ali RM. Effectiveness of education program on Nurses' Knowledge about Practices toward Hydatidiform Mole Pregnancy in Baghdad Teaching Hospitals. *Pak Heart J.* 2023 May 16;56(2):63–8.
  27. Huda Wasfi R. ALhaib, Zaid W. Ajil. Nurses' Knowledge Regarding Discharge Plan for Children with Congenital Heart Diseases. *Migrat. Lett.* [Internet]. 2023 Jul 28 [cited 2024 May 12];20(S2):505-14. <https://doi.org/10.59670/ml.v20iS2.3708>
  28. Abees A, Mohammed W. Effectiveness of an Educational Program on Nursing Staffs' Knowledge about Uses of Steroids and Their Side Effects in Al-Diwaniya Teaching hospital. *Iraqi Natl J Nurs Spec.* 2020 Dec 30;33(2):76–84. doi: <https://doi.org/10.58897/injns.v33i2.418>
  29. Jassm A, Aziz A. Effectiveness of Health Educational Program on Nurses' Knowledge toward Children Pneumonia in Al-Amara City Hospitals. *Iraqi Natl J Nurs Spec.* 2020 Jun 30;33(1):44–52. doi: <https://doi.org/10.58897/injns.v33i1.400>
  30. Salam HA, Aziz A. Effectiveness of Health Education Program on Health Care Providers' Knowledge toward Immunization of Children at Primary Health Care Centers in Kirkuk City. *Iraqi Natl J Nurs Spec* [Internet]. 2020 Jun 30 [cited 2024 Jan 22];33(1). Available from: <https://injns.uobaghdad.edu.iq/index.php/INJNS/article/view/408>. DOI: <https://doi.org/10.58897/injns.v33i1.408>.
  31. Ali A, Al-mosawi K. Effectiveness of Health Educational Program on Nurses' Knowledge About Communication Skills with Children at Welfare Children Teaching Hospital in Baghdad City. *Iraqi Natl J Nurs Spec.* 2019 Dec 30;32(2):67–74.

32. Owaid AM, Aziz AR. Effectiveness of an Educational Program on the Nurses' Children with Cardiac Disorders. *Pak Heart J.* 2023 May 9;56(2):284–90.
33. Jullien S. Sudden infant death syndrome prevention. *BMC Pediatr.* 2021 Sep 8;21(Suppl 1):320. doi: 10.1186/s12887-021-02536-z. PMID: 34496779; PMCID: PMC8424793.
34. Duncan JR, Byard RW. Sudden Infant Death Syndrome: An Overview. In: Duncan JR, Byard RW, editors. *SIDS Sudden Infant and Early Childhood Death: The Past, the Present and the Future* [Internet]. Adelaide (AU): University of Adelaide Press; 2018 [cited 2023 Sep 22]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK513399/>
35. Mahmoud HA. Effect of Educational Program on Nurses' Knowledge and Practices Regarding Preterm Infants' Pain Response and No Pharmacological Strategies 2022.