



Effectiveness of an Educational Program on Nurses' Knowledge regarding International Pediatric Early Warning Scoring System in Pediatric Wards

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ABSTRACT

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Background: The International Pediatric Early Warning Scoring System (IPEWS) is a clinical scoring tool designed to assist healthcare teams in identifying early signs of illness in hospitalized children.

Objectives: To evaluate the effectiveness of an educational program on nurses' knowledge regarding the international pediatric early warning scoring system in pediatric wards in Mosul City.

Methodology: A quasi-experimental study (one study group) was applied at pediatric teaching hospitals in Mosul City from 7 September 2025 to 15 April 2026. A simple random sample of (30) nurses from three different hospitals, 30 nurses, 10 nurses from each hospital. The program lectures contained four lectures, two lectures each week. The questionnaire contained two parts. The program lectures and questionnaire tool validity by a panel of (20) experts.

Results: The total knowledge results in pre-tests of 73.3% (22) at an unacceptable level, while post-test 1 is 46.7% (14) at an excellent level, but post-test 2 is 73.3% (22) at a good level. It was analyzed using a paired samples t-test that the sample results of pre-post1, pre-post2, and post1-post2 in knowledge have a highly significant difference at $P. \text{value} \leq 0.05$.

Conclusion: Nurses' knowledge regarding IPEWS was unacceptable level during the pre-test phase, improved to an excellent level in Post-test 1 following implementation of the educational program, and remained at a good level during Post-test 2. These findings indicate that the educational program was effective in improving and sustaining nurses' knowledge regarding the International Pediatric Early Warning Scoring System.

Keywords: Educational Program, Nurses, knowledge, International pediatric early warning scoring system.

INTRODUCTION

The International Pediatric Early Warning Scoring System (IPEWS) is a clinical scoring tool designed to assist healthcare teams in identifying early signs of illness in hospitalized children. It assigns scores to vital signs and behavioral indicators such as respiratory rate, heart rate, temperature, circulation, and level of consciousness. Rising scores signals possible deterioration, prompting close monitoring or urgent review. IPEWS provides a

standardized framework for timely intervention, enhances safety, and enables clinicians to act before conditions become critical ⁽¹⁾.

The concept of IPEWS emerged from the recognition that children present unique physiological challenges compared to adults. Early warning systems initially developed for adults, such as the Modified Early Warning Score (MEWS), were insufficient for pediatric patients. In the early 2000s,

scientists, including Monaghan and colleagues, developed PEWS to address these pediatric-specific needs. Since its introduction, PEWS has undergone several modifications and adaptations, leading to the development of different versions used across healthcare settings worldwide ⁽²⁾.

Clinical application of this system in a wide range of pediatric care settings: It is routinely used in general pediatric wards, emergency departments (ED), and pediatric intensive care units (PICU) and is currently being investigated in specialized pediatric wards and prehospital care. Various versions of simplified IPEWS have been successfully developed to fit low-resource hospitals with simple parameters, proving that the system is adaptable and can be used in healthcare systems ⁽³⁾.

It has been demonstrated that the IPEWS system can predict severe deterioration hours before it occurs in these settings, that IPEWS factors accurately identify children who are at risk of complications like respiratory failure, cardiac arrest, or unexpected admission to intensive care units, and that IPEWS factors are effective at identifying children at risk and enabling nurses and frontline staff to take prompt action, which improves teamwork and patient outcomes ⁽⁴⁾.

One of the key strengths of the IPEWS system is its standardized and structured methodology; through objective scores, bedside nurses are better at escalating care and communicating their concerns, which minimizes variability among caregivers and creates trust among multidisciplinary teams. This consistency has been identified to increase collaboration, improve communication, and ultimately patient care. This consistency would create a culture of safety in pediatric units ⁽⁵⁾.

Despite its advantages, IPEWS system revolve around the potential for false positives, which can lead to clinical resource depletion and the phenomenon of 'alarm fatigue' among staff, potentially weakening the response to genuinely critical cases. Furthermore, the method is criticized

for its strong reliance on the accuracy of hand measurements, rendering it subject to human mistake in scoring ⁽⁶⁾.

The issue was chosen because, despite its well acknowledged effectiveness, Iraqi hospitals have not yet adopted the International Pediatric Early Warning System. It has been noted that most pediatric wards lack a consistent process for recording vital signs and a systematic monitoring system. Additionally, this study may be the first of its sort at the national level given the paucity of research on this subject in Iraq. The necessity for a systematic early warning system is shown by these gaps in surveillance and documentation. Thus, the assessment of IPEWS efficacy is a crucial measure that can be implemented to increase the work of pediatric nurses and decrease the morbidity and mortality rate of children in the Iraqi healthcare system.

Research question: What is the effectiveness of the educational program on nurses' knowledge regarding the International Pediatric Early Warning Scoring System in pediatric wards?.

AIMS OF THE STUDY

1. To assess nurses' knowledge regarding the International Pediatric Early Warning Scoring System in pediatric teaching hospitals in Mosul City.
2. To evaluate the effectiveness of an educational program on nurses' knowledge regarding the International Pediatric Early Warning Scoring System in pediatric teaching hospitals in Mosul City.
3. To identify the relationship between nurses' socio-demographic characteristics and their knowledge regarding the International Pediatric Early Warning Scoring System.

METHODOLOGY

Design of the study: A quasi-experimental study (one study group) was carried out at medical ward of pediatric teaching hospitals in Mosul city to evaluate the effectiveness of educational program on nurses'

knowledge regarding international pediatric early warning system from 7 September 2025 to 15 April 2026.

Sample of the study: the selection of the sample was using the probability (simple random) sample that change to was chosen by random assignment and random selection for the current study. The total study sample consisted of (30) nurses from three hospitals: (10) nurses working in the Alsalam Teaching Hospital, (10) nurses working in the Al-Kansaa Teaching Hospital and (10) nurses working in Ibn Al-Atheer Teaching Hospital from Mosul City.

Study Instrument: The program lectures and questionnaire were constructed and provided for nurses to evaluate the effect of the instructional program on nurse's knowledge regarding international pediatric early warning scoring system. The program lectures contained four lectures, two lectures each week, and the questionnaire was contained two parts, first part concerns demographic information, while another part contained, the nurses' knowledge regarding international pediatric early warning scoring system and contained five sections.

Scoring: The estimate evaluation of the nurses' knowledge is failure = (0-1) answer knowledge score, not acceptable = (2) answer knowledge score, acceptable = (3) answer knowledge score, good = (4) answer knowledge score, Excellent = (5) answer knowledge score. But the estimate for total knowledge is failure = (0-5) answer knowledge score, not acceptable = (6-10) answer knowledge score, acceptable = (11-15) answer knowledge score, good = (16-20) answer knowledge score, excellent = (21-25) answer knowledge score.

Validity of the study: The validity of the program lectures and questionnaire instrument was established through (20) panel of experts whom specified the content clarity, relevancy, and adequacy.

Reliability of the study: To evaluate statistically the reliability of questionnaire instruments, the pilot study was carried out during the period from 2 till 10 of

December / 2025. Randomly (8) nurses from Ibn Al-Atheer teaching hospital in Mosul City (this sample was excluded from the original study sample). The Pearson's coefficient of correlation result is ($r = 0.856$) and are significant at $p \leq 0.05$ level was used to estimate the scale (test – retest) by using SPSS version 26.

Implementation of the program: The implementation of the program for the International pediatric early warning scoring system in children was introduced as follows:

1. The application of program during the period from 14/December/2025 to 24 /March/ 2026.
2. The first step is a pretest that is generally applied to study group. Each nurse took 20-25 minutes that held under the supervision of the researcher by using MCQ during the period from 14 to 16 December 2025. The researcher gave the booklet to each nurse after completed pretest.
3. The second step application of program lectures through four lectures, all lectures given in the hall of Ibn Athir Teaching Hospital which were two lectures for each week during the period from 28 December 2025 up to 7 January 2026.
4. The third step is a post-test¹ that is generally applied to study group after (10) days from the last previous lecture. Each nurse took 20-25 minutes that held under the supervision of the researcher by using MCQ during the period from 14 to 16 January 2026.
5. The fourth step is post-test 2, that is generally applied to study group after two months of the last previous post-test 1. Each nurse took 20-25 minutes that held under the supervision of the researcher by using MCQ during period of post-test 2 was from 22 to 24 March 2026.

Data collection:

The data were collected from pediatric teaching hospitals in Mosul City. The total study sample was selected from three hospitals: the Alsalam Teaching Hospital, Al-Kansaa Teaching Hospital and Ibn Al-Atheer Teaching Hospital from

Mosul City during the period from 14/December/2025 to 24 /March/ 2026.

Ethical Approval

The initial approval was acquired from the Collegiate Committee for Medical Research Ethics at the University of Mosul, under the Code: CCMRE-Nur-26-9 at: 16 February 2026. Subsequently, the ethical committee of Nineveh Health Directorate granted their consent. Finally, the Teaching Hospitals in Mosul City provided their endorsement.

RESULTS

The table (1) offers the variables of demographic at total the study group sample which 46.7 % (14) of the total sample at age (20-29) years. 56.7 % (17) of total sample are female gender. 43.3% (13) of total sample had a bachelor's degree. 43.3% (13) of the total sample having years about (1-5) of the general years of experience. 50.0% (15) of total sample have (1-3) year of the period in the current unit. 33.3% (10) nurses were from each Mosul teaching Hospital. Lastly, 100.0% (30) of total sample do not have any courses training related to International Pediatric Early Warning System.

The table (2) demonstrations the statistical nurses' knowledge results for study group regarding IPEWS, which show the nurses' knowledge of the theoretical basis of system and its importance in improving health care in pre-test are 50.0 % (15) most of them are at unacceptable level while in post-test1 are 50.0% (15) most of them are on excellent level, while in post-test 2 are 46.7% (11) most of them are on good level. Nurses' knowledge in assessing, documenting and interpreting respiratory system findings within the IPEWS system in the pre-test 53.3 % (16) most of them at unacceptable level", while post-test1 are 46.7% (14) most of them are on an excellent level and post-test2 are 33.3% (10) the majority were at good and Acceptable level. Nurses' knowledge in assessing, documenting and interpreting cardiovascular and temperature findings within the IPEWS system in the pre-test are 56.7%

(17) most of them are at fail level, while in post-test1 are 43.3% (13) most of them are on excellent level, but in post-test2 are 40.0% (12) most of them are on good level.

Nurses' knowledge assessing and documenting levels of consciousness and other additional factors within the IPEWS system in pre-tests are 56.7% (17) among them are at fail level, while in post-test1 are 56.7% (17) the majority were at good level, and in post-test2 are 40.0% (12) the majority were at good level.

Table (3) revealed the statistical total knowledge results for study group regarding IPEWS, shows that results in pre-test are 73.3% (22) most among them are at unacceptable level, while post-test1 are 46.7% (14) most among them are at excellent level, but post-test2 are 73.3% (22) most among them are at good level.

Table (4) demonstrations the relationship between the total knowledge of the study group, measurable by the Pre, Post1, and Post2-Test, in relation to the IPEWS, there was analyzed using a paired samples t-test, that the sample results of pre-post1, pre-post2, and post1-post2 in knowledge a high significant relationship at P. value ≤ 0.05 .

The table (5) demonstrates statistical repeated measure Analysis of Variance (ANOVA) for knowledge of the study group regarding the children; there are high significant relationships for samples' knowledge at P.value ≤ 0.05 .

Table (6) statistical Pairwise Comparison (ANOVA), that the knowledge of pretest, posttest1, and posttest2 regarding IPEWS reveal highly significant relationships for study samples' knowledge at P.value ≤ 0.05 .

The table (7) presents the statistical relationship between demographic variables with outcome results of study group nurses at P.value ≤ 0.05 . The outcome for knowledge at pre-test clarifies non-significant through demographic of variables, while the post-test1 result shows significant years of service at P.value level (0.022) only through

demographic of variables, then and post-test2 result shows significant educational level at P.value level (0.016) only through demographic of variables.

DISCUSSION:

The Statistical Results of The Demographic Variables for Sample in The Study:

The International Pediatric Early Warning System is what Table 1 is about. It shows the demographics of the people who took part in the research. The International Pediatric Early Warning System research found that most of the people in the study were nurses who were just starting out. The International Pediatric Early Warning System study found that most of the people in the study were nurses who were just starting out. The International Pediatric Early Warning System study had female nurses than male nurses. When it comes to education the International Pediatric Early Warning System study found that most of the nurses had a bachelor's degree. The nurses who took part in the International Pediatric Early Warning System study did not have a lot of experience working as nurses. The International Pediatric Early Warning System study had nurses from hospitals so it was a good mix of people. None of the nurses had taken a class about the International Pediatric Early Warning System before so they did not know much about it. These results agree with a study conducted by Saber and Khudhair (2021) Nurses' Knowledge toward Measuring Vital Signs for Children in Medical Wards at Ibn Al-Atheer Pediatric Teaching Hospital in Mosul City, that demonstrated in their study about (50 %) of the age group (20 – 29 years). In relation to the gender that 52.5 % of the nurses are female in the study sample hold a bachelor's degree. and most of them (77.5%) have (1 -9) years of experience in the ward (7). Regarding educational level supporting the outcomes of this study M. Ameen and H. Bakr (2022) which found that 46.7% had a Bachelor degree (8).

Statistical Result for Nurses' Knowledge of Study Group Regarding International Pediatric Early Warning Score:

The International Pediatric Early Warning System is what Table 2 is about. It shows what the nurses knew about the International Pediatric Early Warning System. The International Pediatric Early Warning System study found that the nurses did not know much about the International Pediatric Early Warning System at first. The International Pediatric Early Warning System study found that the nurses knew more about the International Pediatric Early Warning System after they took a class about it. The nurses knew more about the International Pediatric Early Warning System after the class than they did before. The International Pediatric Early Warning System study found that the nurses still knew more about the International Pediatric Early Warning System after some time had passed. They had forgotten a little bit. The International Pediatric Early Warning System study also looked at how the nurses could check patients breathing and write down what they found. The International Pediatric Early Warning System study found that the nurses were not very good at this at first. The International Pediatric Early Warning System study found that the nurses were much better at checking patients breathing and writing down what they found after they took the class.

The International Pediatric Early Warning System study found that the nurses were still better at this after some time had passed. They had gotten a little bit worse. The nurses also got better at checking patients' temperature and heart rate after they took the class. The International Pediatric Early Warning System study found that the nurses did not know much about this at first. The International Pediatric Early Warning System study found that the nurses knew about checking patients' temperature and heart rate after they took the class.

The International Pediatric Early Warning System study found that the nurses still knew more

about this after some time had passed. They had forgotten a little bit. The International Pediatric Early Warning System study found that the nurses got better at checking patients consciousness levels and other important health signs. The International Pediatric Early Warning System study found that the nurses were not very good at this at first. The International Pediatric Early Warning System study found that the nurses were much better at this after they took the class. The International Pediatric Early Warning System study found that the nurses were still better at this after some time had passed. The findings are in line with a study by Sridhar et al. (2020) that examined the "Implementation of a Pediatric Early Warning Score to Improve Communication and Nursing Empowerment in a Rural District Hospital in Rwanda". The pre-test results showed that the mean knowledge score was 66%, indicating an acceptable level of baseline knowledge among nurses prior to the implementation of the educational program, and the mean increased to 81% after the intervention, confirming the necessity for training ⁽⁹⁾.

Also, the findings are in line with Musa and Mirza's (2024) study on the "evaluation of Short Training Program on Nurse's Knowledge and Practice Regarding Vital Signs Measurement at the Heevi Teaching Hospital in Duhok", the results showed that nurses' knowledge scores had significantly improved; just 10% of nurses had a high level of familiarity on the pretest. However, this percentage rose to 53.3% after 30 days of the program (Post-test), suggesting that the educational intervention was successful in raising nurses' knowledge and encouraging long-term understanding ⁽¹⁰⁾.

Statistical Result for Total Knowledge level of Study Group Regarding the International Pediatric Early Warning Score:

Table 3 is about the International Pediatric Early Warning System. It shows how much the nurses knew about the International Pediatric Early

Warning System overall. The International Pediatric Early Warning System study found that the nurses did not know much about the International Pediatric Early Warning System at first. The International Pediatric Early Warning System study found that the nurses knew more about the International Pediatric Early Warning System after they took the class. The International Pediatric Early Warning System study found that the nurses still knew more about the International Pediatric Early Warning System after some time had passed. They had forgotten a little bit. This result is consistent with a study conducted in Egypt by Ebraheim et al. (2023) "Early Warning Score (EWS) Education: its Effect on Nurses' Performance Regarding Identification and Response to Clinical Deterioration", which found a notable improvement in both practice and knowledge. After the intervention, total good knowledge about EWS went from 0% to 54%, and satisfactory practice in EWS calculation increased from 0% to 47.4% ⁽¹¹⁾.

The Study Group knowledge was analyzed using a t-test at pre-test, post-test1, and post-test2, focusing on the International Pediatric Early Warning Score:

Table 4 is about the International Pediatric Early Warning System. It shows how the nurses' knowledge of the International Pediatric Early Warning System changed over time. The International Pediatric Early Warning System study found that the nurses knew more about the International Pediatric Early Warning System after they took the class. The International Pediatric Early Warning System study found that the nurses still knew more about the International Pediatric Early Warning System after some time had passed. This result is consistent with a study conducted Burgos et al. (2025) (conducted a study on "Evaluation of vital signs through a mobile application in patients with heart failure", the study's comparison of the experimental group's pretest and post-test

performance scores using a paired "t" test reveals a significant improvement in vital sign measurement ⁽¹²⁾.

Statistical Repeated Measures Analysis of Variance (ANOVA) for Knowledge of the Study Group Regarding the International Pediatric Early Warning Score:

Table 5 is about the International Pediatric Early Warning System. It shows how the nurses' knowledge of the International Pediatric Early Warning System changed over time. The International Pediatric Early Warning System study found that the nurses knew more about the International Pediatric Early Warning System after they took the class. The International Pediatric Early Warning System study found that the nurses still knew more about the International Pediatric Early Warning System after some time had passed. These results are consistent with a study by Olowo et al. (2025) titled "Effect of an Educational Intervention on Nurses' Knowledge Regarding Use of Modified Early Warning Score in Recognition of Critical Illness." The results showed that the experimental group had significantly greater differences at the p. value 0.005 level, which is a statistically acceptable level of significance ⁽¹³⁾.

Statistical (Pairwise Comparison) ANOVA for Total Knowledge of pretest and posttest1 Regarding the International Pediatric Early Warning Scoring:

Table 6 is about the International Pediatric Early Warning System. It shows how the nurses' knowledge of the International Pediatric Early Warning System changed over time. The International Pediatric Early Warning System study found that the nurses knew more about the International Pediatric Early Warning System after they took the class. The International Pediatric Early Warning System study found that the nurses still knew more about the International Pediatric Early Warning System after some time had passed. This

result is consistent with a study carried out by Mohebbi et al. (2023) titled Effectiveness of Outcome-Based Paediatric Triage Education on Knowledge and Decision Making of Nursing Students in Guilan: A Quasi-Experimental Study. The results showed statistically significant results using ANOVA between pretest and posttest 1 with a p-value of 0.017 for knowledge improvement, indicating the beneficial effects of the educational intervention on nursing students' knowledge ⁽¹⁴⁾.

The Statistical Relationship between Demographic Variables with Outcome Results of Study Group Nurses:

Table 7 is, about the International Pediatric Early Warning System. It shows how the nurses demographic characteristics affected their knowledge of the International Pediatric Early Warning System. The International Pediatric Early Warning System study found that the nurses demographic characteristics did not affect their knowledge of the International Pediatric Early Warning System at first. The International Pediatric Early Warning System study found that the nurses demographic characteristics did affect their knowledge of the International Pediatric Early Warning System after they took the class. The International Pediatric Early Warning System study found that the nurses who had experience working as nurses did better on the test after the class. The International Pediatric Early Warning System study found that the nurses who had education did better on the test after some time had passed. This result is compatible with a study that was carried out in The Kingdom of Saudi Arabia, by Mohamed et al., (2024) who found no significant relationships between nurses' knowledge and most demographic variables. However, a significant relationship was observed between the nurses' years of experience and their proficiency in Evidence-Based Practice (EBP) with no other significant relationships identified at the $p \leq 0.05$ level ⁽¹⁵⁾.

CONCLUSIONS:

The findings of the present study revealed that the majority of nurses were females aged between 20 and 29 years, held a bachelor's degree, had less than five years of professional experience, and had not previously attended training courses related to the International Pediatric Early Warning Scoring System (IPEWS).

The study demonstrated that nurses' knowledge regarding IPEWS was at an unacceptable level during the pre-test phase, improved to an excellent level in Post-test 1 following implementation of the educational program, and remained at a good level during Post-test 2. These findings indicate that the educational program was effective in improving and sustaining nurses' knowledge regarding the International Pediatric Early Warning Scoring System.

Statistical analysis showed highly significant differences between pre-test, Post-test 1, and Post-test 2 scores, confirming the positive impact of the educational intervention on nurses' knowledge. In addition, no statistically significant relationships were found between most demographic variables and nurses' knowledge outcomes. However, years of service showed a significant relationship during Post-test 1, while educational level showed a significant relationship during Post-test 2.

Overall, the educational program had a positive and significant effect on enhancing nurses' knowledge regarding the International Pediatric Early Warning Scoring System in pediatric teaching hospitals.

RECOMMENDATIONS:

1. Special programs, training courses and workshops regarding international pediatric early warning systems can be designed and implemented in all hospitals departments to enhance the nurse's knowledge in about to this major issue.
2. Increasing the number of nurses, especially those who hold Bachelor degree in nursing to work at

pediatric teaching hospitals for their ability and background.

Conflicts of Interest: The authors declare that there are no conflicts of interest related to this study.

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TABLES:

Table (1): The Statistical Results of The Demographic Variables for Sample in The Study

Demographic Variables	Items	F.	%
Age	(20-29)	14	46.7
	(30-39)	9	30.0
	(40-49)	7	23.3
Sex	Male	13	43.3
	Female	17	56.7
Level of education	Secondary degree	11	36.7
	Diploma degree	6	20.0
	Bachelor's degree	13	43.3
General years of experience	(1-5) years	13	43.3
	(6-10) years	4	13.3
	(11-15) years	8	26.7
	(16-20) years	5	16.7
	(21-25) years	0	0.0
The period in the current unit	(1-3) year	15	50.0
	(4-6) years	5	16.7
	(7-9) years	5	16.7
	(10-12) years	5	16.7
	AL Khansaa hospital	10	33.3
	Ibn Al Atheer hospital	10	33.3
	Alsalam hospital	10	33.3
Training courses	No	30	100.0
	Yes	0	0.0

F. =Frequency, %=Percentage.

Table (2): Statistical Result for Nurses' Knowledge Regarding IPEWS Across Study Phases

Nurses' knowledge domains	Estimate	Pre-test		Post-test 1		Post-test 2	
		F.	%	F.	%	F.	%
The theoretical basis of the system and its importance in improving healthcare	Fail	10	33.3	0	0.0	0	0.0
	Unacceptable	15	50.0	1	3.3	3	10.0
	Acceptable	4	13.3	3	10.0	10	33.3
	Good	1	3.3	11	36.7	11	36.7
	Excellent	0	0.0	15	50.0	6	20.0
Assessing, documenting and interpreting respiratory system findings within the IPEWS system.	Fail	9	30.0	0	0.0	0	0.0
	Unacceptable	16	53.3	4	13.3	5	16.7
	Acceptable	3	10.0	4	13.3	10	33.3
	Good	2	6.7	8	26.7	10	33.3
	Excellent	0	0.0	14	46.7	5	16.7
Assessing, documenting and interpreting cardiovascular and temperature findings within the IPEWS system.	Fail	7	23.3	1	3.3	0	0.0
	Unacceptable	17	56.7	3	10.0	3	10.0
	Acceptable	4	13.3	6	20.0	9	30.0
	Good	2	6.7	7	23.3	12	40.0
	Excellent	0	0.0	13	43.3	6	20.0

Assessing and documenting levels of consciousness and other additional factors within the IPEWS system.	Fail	8	26.7	0	0.0	0	0.0
	Unacceptable	17	56.7	2	6.7	3	10.0
	Acceptable	5	16.7	3	10.0	9	30.0
	Good	0	0.0	8	26.7	12	40.0
	Excellent	0	0.0	17	56.7	6	20.0

The knowledge scores were categorized as follows: Failed (0–1), Unacceptable (2), Acceptable (3), Good (4), and Excellent (5). Data were presented using frequency (F) and percentage (%).

Table (3): Statistical Result for Total Knowledge level of Study Group Regarding the International Pediatric Early Warning Score

Estimate	Pre-test		Post-test 1		Post-test 2	
	F.	%	F.	%	F.	%
Fail	4	13.3	0	0.0	0	0.0
Unacceptable	22	73.3	0	0.0	0	0.0
Acceptable	4	13.3	4	13.3	5	16.7
Good	0	0.0	12	40.0	22	73.3
Excellent	0	0.0	14	46.7	3	10.0

The knowledge scores were categorized as follows: Failed (0–1), Unacceptable (2), Acceptable (3), Good (4), and Excellent (5). Data were presented using frequency (F) and percentage (%).

Table (4): The Study Group knowledge was analyzed using a t-test at pre-test, post-test1, and post-test2, focusing on the International Pediatric Early Warning Score

Test	Mean	Std. D.	T	P.value	Sig.
Pretest - Posttest 1	-2.433	0.774	-17.223	0.000	HS
Pretest - Posttest 2	-1.667	0.661	-13.813	0.000	HS
Posttest 1 - Posttest 2	0.767	0.774	5.426	0.000	HS

Standard Deviation is represented by Std. D., t-test is represented by t, and S + Sig indicates significance at with a p-value below or equal to 0.05 and HS is Highly Significant.

Table (5): Statistical Repeated Measures Analysis of Variance (ANOVA) for Knowledge of the Study Group Regarding the International Pediatric Early Warning Score

Study Group	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	137.734	2	68.867	175.831	0.000
Within Groups	21.684	58	0.374		
Total	159.418	60			

df= degree of freedom, F= Calculator F Sig. =Significant at P.value ≤ 0.05 level.

Table (6): Statistical (Pairwise Comparison) ANOVA for Total Knowledge of pretest and posttest1 Regarding the International Pediatric Early Warning Scoring

		Sum of Squares	df	Mean Square	F	Sig.
Pretest – Posttest1	Between Groups	81.667	1	81.667	208.97	0.000
	Within Groups	22.667	58	0.391		
	Total	104.333	59			
Pretest – Posttest2	Between Groups	56.067	1	56.067	204.95	0.000
	Within Groups	15.867	58	0.274		
	Total	71.933	59			
Pretest1 – Posttest2	Between Groups	2.400	1	2.400	6.178	0.016
	Within Groups	22.533	58	0.389		
	Total	24.933	59			

df stands for degree of freedom, while F refers to a calculator. The user's text is a single letter "F". Sig. Significance is indicated when the statistical value is equal to or less than 0.05.

Table (7): The Statistical Relationship between Demographic Variables with Outcome Results of Study Group Nurses

The Demographic Variables	Pre-Test		Post-Test 1		Post-Test 2	
	P. value	Sig	P. value	Sig.	P. value	Sig.
Age	0.348	NS	610.0	NS	0.061	NS
Sex	0.493	NS	0.736	NS	0.432	NS
Educational level	0.447	NS	0.155	NS	0.016	S
Years of service	0.071	NS	220.0	S	0.063	NS
Hospital Name	0.191	NS	0.198	NS	0.434	NS
Work in pediatric wards	560.0	NS	160.0	NS	270.0	NS

The correlation is of statistical significance with a p-value of < 0.05.