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Original Article

Nurses' Knowledge and Skills Regarding Pediatric Interagency Integrated Triage Tool in Pediatric Emergency Wards

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Abstract

Objective: To evaluate the level of nurses' knowledge and skills concerning the Pediatric Interagency Integrated Triage Tool (IITT) in pediatric emergency wards.

Methodology: A descriptive study was conducted in the pediatric emergency wards of hospitals in Mosul City from September 5, 2024, to December 25, 2024. The sample selection was carried out in collaboration with nursing departments. A total of 60 nurses working in pediatric emergency wards in Mosul City participated in the study.A structured questionnaire was constructed and administered to nurses, comprising three main sections. The first section focused on demographic information. The second section assessed nurses' knowledge of the Interagency Integrated Triage Tool (IITT) and included four subsections. The third section evaluated nurses' skills related to IITT, also divided into four subsections.The questionnaire's validity was confirmed through an expert review process., involving a panel of 20 specialists who assessed content clarity and relevance. A pilot study was conducted to assess the instrument's reliability from September 22, 2024, to September 26, 2024, with a randomly selected sample of 10 nurses from pediatric emergency wards. Reliability analysis using Cronbach's Alpha, performed via SPSS version 26, yielded values of 0.851 for the knowledge section and 0.810 for the skills section, indicating strong internal consistency.

Result: The statistical analysis revealed that the overall knowledge level of nurses regarding the Interagency Integrated Triage Tool (IITT) was inadequate, with 68.3% (41 nurses) classified at an unacceptable level. Similarly, the total skill level assessment indicated that 68.3% (41 nurses) had an unacceptable level of competency in utilizing the IITT. No significant relationships were found between nurses' knowledge levels and most demographic variables, except for gender ($p \leq 0.003$) and years of experience in the emergency room ($p \leq 0.044$). Additionally, a significant association was identified between training participation and skill levels ($p \leq 0.031$).

Recommendations: It is recommended to implement training courses and workshops for nurses working in pediatric emergency wards in Mosul hospitals to enhance their knowledge and skills regarding the Interagency Integrated Triage Tool (IITT).

Keywords: Nurses, knowledge, Skills, pediatric, Interagency Integrated Triage Tool

Introduction:

Triage is a fundamental process in pediatric emergency care, requiring nurses to rapidly assess and prioritize children based on the severity of their conditions. An effective triage system ensures timely medical intervention for critically ill patients, thereby improving pediatric outcomes and optimizing resource utilization. Given the increasing number of pediatric emergency cases and the constraints of healthcare resources, nurses' knowledge and skills in applying the Pediatric Interagency Integrated Triage Tool (IITT) are essential for the efficient management of emergency departments (EDs)(Simon Junior et al., 2022).Various triage systems have been developed, with high-income countries commonly utilizing five-tier models such as the Emergency Severity Index (ESI) and the Australasian Triage Scale (ATS). However, these models may not be suitable for low- and middle-income countries (LMICs) due to differences in healthcare infrastructure, workforce availability, and disease epidemiology. As a result, there is a growing recognition of the need for context-specific triage tools that address the unique challenges faced by these settings(Mitchell et al., 2024).Pediatric patients in emergency care require effective triage due to the variability of their symptoms and the potential for critical illness. They constitute a significant portion of emergency department visits, with symptoms ranging widely in severity and urgency. Nurses' proficiency in pediatric triage is crucial for the rapid identification of critically ill children, preventing adverse outcomes such as increased mortality rates. Pediatric triage systems, including the IITT, must emphasize high sensitivity to ensure the prompt recognition and treatment of severely ill patients(Ma et al., 2021).Efficient triage processes are critical in pediatric EDs due to the wide range of symptoms presented by children. Nurses' ability to utilize the IITT effectively is key to ensuring accurate and timely assessments. Understanding the effectiveness of this tool can enhance the speed and precision of triage, leading to prompt interventions and improved health outcomes for pediatric patients(Ibrahim, 2022).Despite the potential benefits of the IITT, evidence regarding nurses' knowledge and skills in applying this tool in pediatric emergency settings remains limited. Therefore, assessing nurses' understanding and utilization of IITT is essential to determine its reliability and practical applicability. This study aims to evaluate nurses' knowledge and skills regarding the IITT in pediatric emergency wards, providing valuable insights into its effectiveness in improving triage accuracy and patient care(de Souza et al., 2021).The selection of this study topic is driven by the urgent need to enhance emergency care systems, particularly in resource-limited settings. As the demand for pediatric emergency services continues to rise, nurses' expertise in triage plays a crucial role in improving patient outcomes, reducing waiting times, and optimizing healthcare resource allocation. By assessing nurses' understanding and application of the IITT, this study aims to generate insights that can inform healthcare policies and practices in Iraq and beyond. The findings could contribute to improved training programs for emergency nurses, ultimately enhancing the quality of pediatric emergency care and saving lives.

Research question: What is the level of nurses' knowledge and skills regarding the Pediatric Interagency Integrated Triage Tool (IITT) in pediatric emergency wards?

Objectives of the Study:

1. To assess nurses' knowledge levels regarding the Pediatric Interagency Integrated Triage Tool (IITT) in Mosul hospitals.
2. To measure nurses' skill levels regarding the Pediatric Interagency Integrated Triage Tool (IITT) in Mosul hospitals.
3. To explore the relationships of nurses between socio-demographic variables and nurses'

knowledge and skills regarding the Pediatric Interagency Integrated Triage Tool (IITT) in Mosul hospitals.

Material and Methods:

Design of the study: A descriptive study was conducted at pediatric teaching hospitals in Mosul City to assess nurses' knowledge levels and skills regarding the Interagency Integrated Triage Tool (IITT) from September 5, 2024, to March 25, 2025.

Sample of the study: The study utilized a simple random sampling method. selecting a sample of 60 nurses from the pediatric emergency departments in 5 teaching hospitals for pediatric in the city of Mosul.

Study tool: A structured questionnaire was developed to assess nurses' competencies (knowledge and skills) regarding the IITT. The questionnaire consisted of three parts: The first part collected demographic information. The second part evaluated nurses' knowledge regarding the IITT, divided into four sections. The third part assessed nurses' skills related to the IITT, also containing four sections. The competency levels for each section were categorized as follows: Failure: 0-1 correct answers, not Acceptable: 2 correct answers, acceptable: 3 correct answers, good: 4 correct answers, excellent: 5 correct answers. For total knowledge and skill scores: Failure: 0-4 correct answers, not Acceptable: 5-8 correct answers, acceptable: 9-12 correct answers, good: 13-16 correct answers, excellent: 17-20 correct answers.

Validity of the study: The questionnaire's validity was confirmed by a panel of experts who evaluated its content for clarity, relevance, and adequacy.

Reliability of the study: To evaluate the reliability of the questionnaire, a pilot study was conducted from September 22 to 26, 2024, with 10 nurses randomly selected from the pediatric emergency departments of Mosul hospitals. These nurses were excluded from the final study sample. Reliability was assessed using Cronbach's Alpha, calculated through SPSS version 26.

Data collection: Data were collected from the pediatric emergency departments of Mosul hospitals, with the study sample consisting of 60 nurses working at Al-Khansaa Teaching Hospital, Ibn Al-Atheer Teaching Hospital, Ibn Sina Teaching Hospital, Al-Salam Teaching Hospital, and General Mosul Hospital. Data collection occurred between August 4, 2024 and March 25, 2025.

The Result:

Table (1): The Demographic Characteristics of the Study Respondents

	The Demographic Variables	Items	The sample	
			F.	%
1.	Age	(21-30) yrs	31	51.7
		(31-40) yrs	26	43.3
		(41-50) yrs	3	5.0
2.	Gender	Male	45	75.0
		Female	15	25.0
3.	Level of education	Secondary degree	13	21.7
		Diploma degree	18	30.0
		Bachler degree	29	48.3
4.	General years of experience	(1-5) years	30	50.0
		(6-10) years	18	30.0
		(11-15) years	7	11.7
		(16-20) years	2	3.3

		(21-25) years	3	5.0
5.	Period of work in ER	(1-3) year	34	56.7
		(4-6) year	17	28.3
		(7-9) years	7	11.7
		(10-12) years	2	3.3
6.	Training courses	Yes	3	5.0
		No	57	95.0
	Total		**60**	**100.0%**

F. =Frequency, %=Percentage

Table (2): Statistical Knowledge Results for Nurses regarding pediatric Interagency Integrated Triage Tool

	Knowledge	**Estimate**	**F.**	**%**
1.	Nurses' knowledge of the theoretical basis of triage and its importance in improving health care.	Fail	12	20.0
		Non acceptable	28	46.7
		Acceptable	16	26.7
		Good	3	5.0
		Excellent	1	1.7
2.	Nurses' knowledge of the Interagency Integrated Triage Tool structure and how to use it.	Fail	18	30.0
		Non acceptable	23	38.3
		Acceptable	16	26.7
		Good	3	5.0
		Excellent	0	0.0
3.	Nurses' knowledge of determining the pediatric classification for each color (red, yellow, green).	Fail	30	50.0
		Non acceptable	23	38.3
		Acceptable	7	11.7
		Good	0	0.0
		Excellent	0	0.0
4.	Nurses' knowledge of vital signs in triage and how to interpret them	Fail	32	53.3
		Non acceptable	24	40.0
		Acceptable	4	6.7
		Good	0	0.0
		Excellent	0	0.0
	The Total		**60**	**100.0**

"Knowledge scores were categorized as follows: **Failure** (0–1), **non-acceptable** (2), **Acceptable** (3), **Good** (4), and **Excellent** (5). F represents frequency, and % denotes percentage."

Table (3): Statistical Results of Nurses' Skills Regarding Pediatric Interagency Integrated Triage Tool

	Skills	Estimate	F.	%
1.	Nurses' skills in understanding the theoretical basis of triage and its importance in improving health care.	Fail	29	48.3
		Non acceptable	21	35.0
		Acceptable	10	16.67
		Good	0	0.0
		Excellent	0	0.0
2.	Nurses' skills on how to correctly apply the Interagency Integrated Triage Tool in children.	Fail	30	50.0
		Non acceptable	28	46.7
		Acceptable	2	3.3
		Good	0	0.0
		Excellent	0	0.0
3.	Nurses' skills about being able to determine the correct criteria for a particular patient's condition in children.	Fail	30	50.0
		Non acceptable	24	40.0
		Acceptable	6	10.0
		Good	0	0.0
		Excellent	0	0.0
4.	Nurses' skills in being able to accurately measure and interpret vital signs in children.	Fail	36	60.0
		Non acceptable	19	31.7
		Acceptable	5	8.3
		Good	0	0.0
		Excellent	0	0.0
	The Total		**60**	**100.0**

"Knowledge scores were categorized as follows: **Failure** (0–1), **non-acceptable** (2), **Acceptable** (3), **Good** (4), and **Excellent** (5). F represents frequency, and % denotes percentage."

Table (4): Statistical Summary of Nurses' Total Knowledge and Skills Regarding the Pediatric Interagency Integrated Triage Tool (IITT)

	Items	Estimate	F.	%
1.	Knowledge	Fail	6	10.0
		Non acceptable	41	68.3
		Acceptable	13	21.7
		Good	0	00.0
		Excellent	0	00.0
2.	Skills	Fail	14	23.3
		Not Acceptable	41	68.3
		Acceptable	5	8.3
		Good	0	00.0
		Excellent	0	00.0
	The Total		**60**	**100.0**

"Knowledge scores were categorized as follows: **Failure** (0–1), **non-acceptable** (2), **Acceptable** (3), **Good** (4), and **Excellent** (5). F represents frequency, and % denotes percentage."

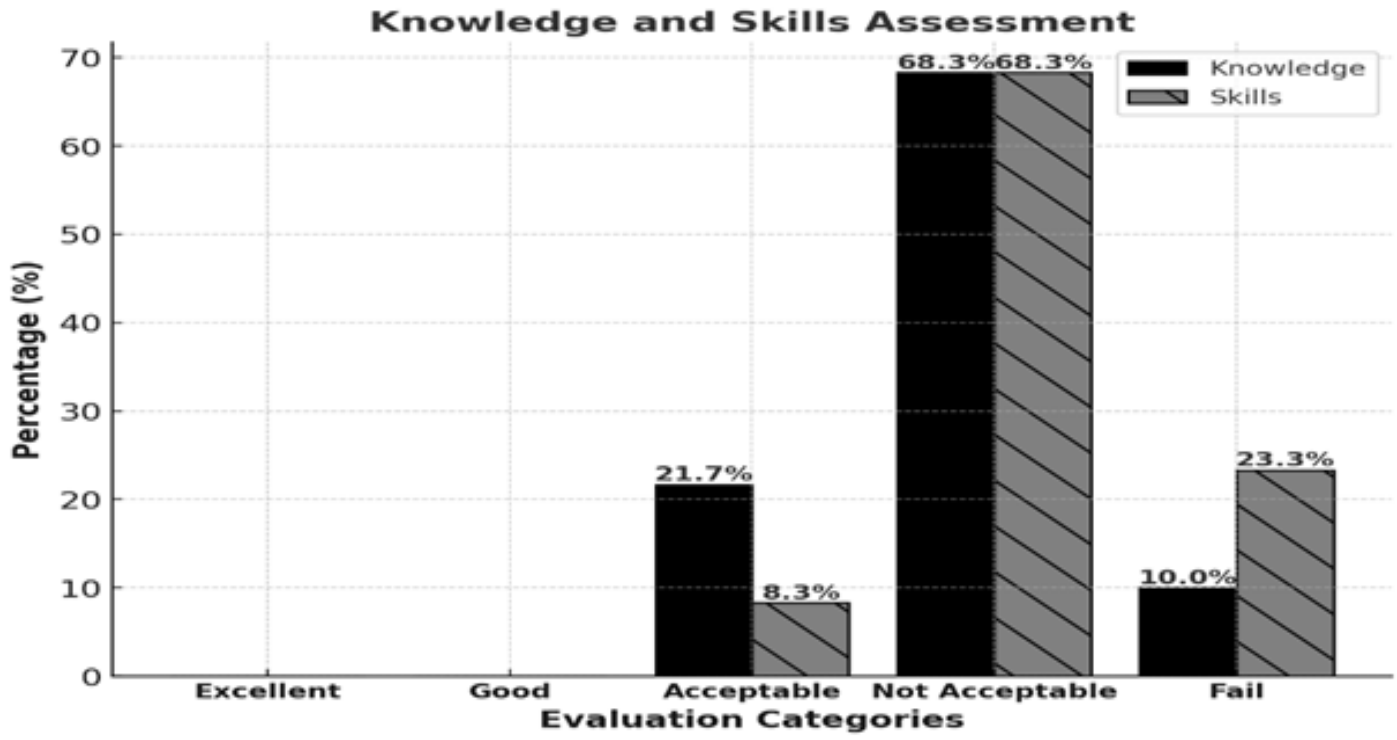

Table (5): Statistical Analysis of the Relationship Between Nurses' Demographic Variables and Their Knowledge and Skills Results

	The Demographic Variables	Knowledge		Skills	
		P.value	Sig.	P.value	Sig.
1.	Age	0.217	NS	0.389	NS
2.	Gender	0.003	S	0.256	NS
3.	Level of education	0.176	NS	0.412	NS
4.	General years of experience	0.294	NS	0.338	NS
5.	Period of work in ER	0.044	S	0.221	NS
6.	Training courses	0.267	NS	0.031	S

Relationship is significant at P.value ≤ 0.05 level

The Discussion

Part (1): The Demographic Variables of the Respondents in the Study the demographic characteristics of the study sample as show in table (1), that 51.7 % (31) of the sample at age (21-30), 75 % (45) of the sample are male, 48.3% (n=29) held a bachelor's degree, while 50.0% (n=30) had a general employment period of 1–5 years. Additionally, 56.7% (n=34) had 1–3 years of experience working in the emergency department, and 95.0% (n=57) had not received any training courses related to the study subject. These results agree with a study conducted by **Waheed, N. H., and Abdulwahhab, M. M. (2022)** Nurses' Knowledge and Practices concerning Physiotherapy Protocol at Intensive Care Units in AL-Nasiriyah City that demonstrated in their study about (88.8 %) of the age group (20 – 30 years). In relation to the educational level that 60% of the nurses in the study sample hold a bachelor's degree. and most of them (78.7%) have (1 -5) years of experience in the ward (Waheed, N. H., & Abdulwahhab, M. M. 2022).Regarding gender, a significant proportion of participants were male, with 75.0% (45) supporting the outcomes of this study **(Hussein & Hassan, 2019)** which found that 63.3% of the sample were males and 36.7% were female. From the researcher's perspective, the observed gender distribution in the sample is expected, given the employment practices in Mosul's hospitals. revealed that 95% emergency nurses were reported to be working without formal training in triage the fact that agree with findings of A cross-sectional study done in Tanzania which found out that 78 % had no triage training.

Part (2):

1. **Statistical Knowledge Results for Nurses regarding pediatric Interagency Integrated Triage Tool**

The statistical knowledge results for nurse's in concerning the Interagency Integrated Triage Tool as show in table (2), that Nurses' knowledge regarding the theoretical basis of triage and its importance in improving health care are 46.7% (28) of them at Non acceptable level. Nurses' knowledge regarding the Interagency Integrated Triage Tool structure and how to use it are 38.3% (23) of them at Non acceptable level. Nurses' knowledge regarding determining the pediatric classification for each color (red, yellow,

green) are 50.0% (30) of them at Fail level. The Nurses' knowledge regarding vital signs in triage and how to interpret them are 53.3% (32) of them at Fail level. These results agree with**(AL-Moutiwty & AL-Wily, 2023)**. represents the statistical results on nurses' knowledge of the care bundle guideline indicate that 53.3% (n = 32) had a non-acceptable level of knowledge regarding infection prevention and control. Additionally, 56.7% (n = 34) demonstrated an acceptable level of knowledge about ventilator-associated pneumonia, while 50% (n = 30) had a non-acceptable level of knowledge concerning catheter-associated bloodstream infections.(AL-Moutiwty & AL-Wily, 2023)

2. Statistical Skills Results for Nurses in pediatric Interagency Integrated Triage Tool

The statistical skills results for nurse's regarding the Interagency Integrated Triage Tool as show in table (3), that Nurses' skills in understanding the theoretical basis of triage and its importance in improving health care are 48.3% (29) of them at fail level, Nurses' skills on how to correctly apply the Interagency Integrated Triage Tool in children are 50.0% (30) of them at fail level , Nurses' skills about being able to determine the correct criteria for a particular patient's condition in children are 50.0% (30) of them at fail level , Nurses' skills in understanding the theoretical basis of triage and its importance in improving health care are 60.0 % (36) of them at fail level. This results agree with**(Ahmed & Radha, 2020)** that presents the statistical skills results for nurse's in concerning the oxygen administration methods for pediatric. That the facemask procedure is 69.2% (36) of them at fail level, the nasal cannula procedure in the pre-test, 50.0% (n=26) of nurses demonstrated a non-acceptable level of knowledge. Specifically, 46.2% (n=24) had a non-acceptable level regarding the tracheostomy procedure, 71.2% (n=37) regarding the continuous positive airway pressure (CPAP) procedure, and 59.6% (n=31) were at the failure level concerning oxygen flow and its complications (Ahmed & Radha, 2020).

3. Statistical Summary of Nurses' Total Knowledge and Skills Results Regarding pediatric Interagency Integrated Triage Tool

As shown in Table 4, the statistical results for nurses' total knowledge and skills regarding the Interagency Integrated Triage Tool (IITT) were as follows: 68.3% (41) of nurses had total knowledge at an unacceptable level. These results are consistent with findings from a study in Addis-Ababa, Ethiopia, which reported 58.1% of nurses had poor knowledge regarding triage in emergency centers**(Bahre et al., 2024).**

Similarly, 68.3% (41) of nurses had total skills at an unacceptable level. This is in line with a study by **Shehab, M. S., et al. (2017)** in Egypt, which found that 80.8% of nurses had unsatisfactory skills in triage (Shehab, M. S., et al. 2017).

Part (3): Statistical Analysis of the Relationship Between Nurses' Demographic Variables and Their Knowledge and Skills Results

As shown in Table 5, the statistical analysis revealed no significant relationships between nurses' knowledge and skills results and most demographic variables. However, there were significant relationships between gender and knowledge results ($p = 0.003$). Period of working in the ER and knowledge results ($p = 0.044$). Training courses and nurses' skills ($p = 0.031$).

These findings align with those of **AlMarzooq (2020)**, who found no significant relationships between nurses' knowledge and most demographic variables in a study conducted in King Fahad Hospital (KFHU) and Dammam Medical Center (DMC). However, a significant relationship was observed between knowledge results and experience in the ER ($p = 0.023$), with no other significant relationships identified at the $p \leq 0.05$ level (AlMarzooq, 2020).

The Conclusion:

1. The demographic characteristics of the study sample reveal that most participants are aged between 21 and 30 years, male, hold a bachelor's degree, have 1-5 years of general

employment experience, and 1-3 years of experience in the ER, with no prior training courses related to the study subject.

2. Nurses working in the pediatric department of Mosul hospitals lack appropriate and adequate knowledge regarding the Pediatric Interagency Integrated Triage Tool (IITT).
3. Nurses in the pediatric department of Mosul hospitals lack appropriate and adequate skills regarding the Pediatric Interagency Integrated Triage Tool (IITT).
4. There is no significant correlation between nurses' knowledge, skills, and most demographic characteristics, except for gender and period of work in the ER with knowledge and training courses with skills.

The Recommendations:

1. It is recommended that the Ministry of Health and the Nineveh Health Directorate enhance training programs and workshops for nurses in the pediatric departments of Mosul hospitals, with a specific emphasis on the Pediatric Interagency Integrated Triage Tool (IITT).
2. Head nurses in the pediatric department should display educational posters in the nurses' office related to the Pediatric Interagency Integrated Triage Tool (IITT) to increase nurses' knowledge and skills.

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