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Knowledge of Pediatric Nurses Workers in The Respiratory Care Unit Towards Hospital Infection

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Abstract. Hospital-acquired infections represent a major public health concern due to their contribution to neonatal morbidity, mortality, prolonged hospitalization, and increased healthcare costs, particularly in respiratory care units (RCUs). Newborns in RCUs are highly susceptible to infection because of immature immune systems, frequent invasive procedures, and intensive contact with healthcare workers, making nurses' knowledge critical for infection prevention and control. In Iraq, data regarding pediatric nurses' knowledge of hospital infections in RCUs remain limited and incomplete, highlighting the need for systematic evaluation. This study aimed to evaluate the level of knowledge of pediatric nurses working in the respiratory care unit toward hospital infections and to examine its relationship with selected demographic characteristics. A descriptive cross-sectional study was conducted among 51 pediatric nurses at the Maternity and Children's Teaching Hospital in Al-Diwaniyah City. The findings indicated that more than half of the nurses demonstrated a moderate level of knowledge regarding hospital infections, while smaller proportions showed high or low knowledge levels. Statistically significant relationships were identified between nurses' knowledge scores and age, marital status, educational level, and length of public service, whereas no significant associations were found with gender, duration of work in the RCU, participation in training courses, or reading infection-related sources. This study provides current empirical evidence on pediatric nurses' knowledge of hospital infections in RCUs within the Iraqi healthcare context. The findings underscore the necessity of strengthening surveillance systems, targeted education, and continuous training programs to improve infection control practices in respiratory care units.

Highlights

1. More than half of pediatric nurses working in the respiratory care unit demonstrated a moderate level of knowledge regarding hospital-acquired infections.
2. Nurses' knowledge was significantly associated with age, marital status, educational level, and length of public service.
3. No significant relationship was found between knowledge levels and gender, RCU work duration, training participation, or reading infection-related sources.

Keywords: Respiratory Care Unit, hospital infection, health care workers

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1. Introduction

Hospital Infections are an important public health problem in developed and developing countries due to the economic consequences they create due to the significant morbidity and mortality in newborns. Hospital infections are defined as infections that develop in a hospital for a reason other than general infection in a patient admitted to the hospital. If the infection is not in the incubation period when the patient is admitted to the hospital, infections that occur in the hospital are considered as "hospital infections". Healthcare workers, patient companions and visitors in Respiratory Care Units (RCU) are the most important causes of hospital infections in newborns (1). Since most of the newborns in the respiratory care unit have underdeveloped immune systems, are frequently treated with antibiotics, and have invasive operations frequently, they are preterm and very susceptible to infection. Newborns in the Respiratory Care Unit are susceptible to infection due to the possibility of infection from invasive device use. (2).

Many infections are caused by pathogens transmitted through healthcare to newborns or from one newborn to another, from infected healthcare workers in the respiratory care unit who do not wash their hands or follow standard control measures among staff. These are among the most common ways infections are spread in hospitals (3).

Hospital infections can lead to increased infant mortality and morbidity rates, as well as longer hospital stays and increased overall costs. Nurses working in the Respiratory Care Unit must have knowledge and understanding of hospital-acquired infections, as well as the ability to effectively control and treat them. The nurse must also be knowledgeable about the various forms of hospital-acquired infections, pathogens and their most common routes of transmission, predisposing factors, how to recognize newborns at risk of infection, and prevention and control measures to reduce the incidence and prevalence of hospital-acquired infections within the unit (4, 5).

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In all healthcare facilities, but especially in the RCU, having adequately trained nursing staff is vital for infection control. In order to improve the quality of care provided, it is essential that nurses are educated and instructed in many practices and procedures related to infection control. Specific recommendations play an important role in reducing the incidence of hospital-acquired infections, and the education program for nurses should be accompanied by regular assessment of their knowledge, skills, and attitudes (6, 7).

Recently, hospital infections in the RCU have become a major health problem in Iraqi hospitals (8). This situation is linked to deficiencies in the social and health systems, which are exacerbated by economic and country problems as a whole. In addition, the large number of newborn patients and the inexperience of primary health care personnel, especially in the neonatal intensive care units of hospitals, inadequate infection control practices, procedures and infection control policies, guidelines and the lack of trained professionals also increase the magnitude of the problem (5).

This study was conducted to evaluate the knowledge of pediatric nurses working in the respiratory care units at Maternity and Chıldren's Teaching Hospıtal in The Al-Dıwanıyah City about hospital infections. This study is based on the fact that the nurses who are in most contact with newborns in Respiratory Care Units are the ones who need to be informed about the importance of hospital infections in the RCU and that statistics on hospital infections in the RCU in Iraq are not available or are incomplete.

2. Methodology

A descriptive cross-sectional study design was used to achieve the early stated objectives.A study was carried out in the Respiratory Care Unit at Maternity and Chıldren's Teaching Hospıtal in The Al-Dıwanıyah City,Iraq. The study was conducted for the period from (May 5th, 2023 to April 20th, 2024).This study selected non-probability purposive samples of subjects from Women and Children Teaching Hospital, each was interviewed (face-to-face). patients participated in the study. A total of 58 pediatric nurses working both day and night shifts in the RCU of Maternity and Children’s Teaching Hospital constitute the population of the study.

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seven nurses were excluded from the study according Criteria for Exclusion.Therefore, a total of 51 nurses participated in the research. The sample represents 93% of the total number of pediatric nurses working in the RCU.

The study instrument is a questionnaire designed according to the study objectives . The questionnaire has been designed and develpmend by the researchers after reviewing related literatures and previous studies. It is composed of two parts which include

Part I: Demographic Data Form:

A personal information form consisting of nine questions examining participants' characteristics such as gender, age, marital status, and education level (nursing high school, Nursing Institute, Faculty of Nursing, Master of Nursing) was developed by the researchers based on the literature.

Part II: Information Form on Hospital Infections of Pediatric nurses Working in the Respiratory Care Unit

Through the researchers review of the study conducted by Adra`a (2008), related to an pediatric nurse's knowledge about the nosocomial infection in neonatal intensive care unit of Baghdad pediatric teaching hospitals,questionnaires. This part is comprised a total of 42 questions,all of which were in the format of multiple-choice divided into 5 Domain:

First domain : Contains general information about nosocomial infections in the respiratory care unit, consisting of 8 questions.

Second domain: consisting of 6 questions, includes the causes of nosocomial infections in the respiratory care unit.

Third domain: Consisting of 6 questions, the sources of infection in the hospital in the respiratory care unit.

Fourth domain: consisting of 7 questions, includes the transmission methods of hospital infections in the respiratory care unit.

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Fifth domain: consisting of 15 questions, includes standard precautions for the control of hospital infections in the RCU.

Criteria for Inclusion in the Study

• Nurses working in the respiratory care unit.

• Nurses working morning, evening and night shifts.

Criteria for Exclusion from the Study

• Nurses less than one year's experience

• Nurses who participated in the preliminary implementation of the study

• Nurses who did not complete the survey and did not agree to participate in the study

Before the research, the survey form was applied by the researcher to 5 pediatric nurses working in a RCU in another city in Iraq, and it was observed that the survey was understandable in its current form and was sufficient for the data intended to be collected in the research, and it was decided to use the survey form in this form.

In this study, the level of knowlege for each nurse was measured using the number of correct answers. The rating score for correct answers was (2), while erroneous responses were given a score of (1). The duration of this knowledge test was approximately 15 to 25 minutes.

The data was collected between 12.8.2023/27.8.2023 under the supervision of the researcher in rooms suitable for filling out the survey on the specified days. The SPSS (Statistical Package of Social Sciences) version 25, was used to analyze the collected data of the study.

Administrative Arrangements and Ethical Considerations

After receiving ethical approval for the conduct of the study the researcher completed the study, including the aims and methodology (survey) of the study. and then the permission was sent to Maternity and Children's Teaching Hospital in The Al-Diwaniyah City to ensure agreement and cooperation .

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The researcher obtained verbal informed consent from all nurses. Before participation, the purpose of the study was explained to the participants by the researchers, and the participants were told that their participation in this study was voluntary and that they could withdraw from this study at any time.

Results of the Study

This section includes the findings of the study conducted to evaluate the knowledge of Pediatric nurses workers in respiratory care units at Maternity and Children's Teaching Hospital about hospital infections.

Table 1: Sociodemographic characteristics of Pediatric nurses workers in respiratory care unit

Demographic data		**Freq.**	**%**
Age M±SD= (31.92+3.53)	20-29	18	35,3
	30-39	32	62,7
	40-49	1	2,0
Gender	Male	8	15,7
	Female	43	84,3
Marital Status	Married	18	35,3
	Single	33	64,7
Educational level	Nursing high school graduate	13	25,5
	Nursing institute graduate	26	51
	A graduate of the College of Nursing	12	23,5
General Service Duration	1-5	34	66,7
	6-10	11	21,6
	11-15	6	11,8
Duration of work in children's hospitals	1-5	30	58,8
	6-10	15	29,4
	11-15	6	11,8
Working period in the RCU	1-5	31	60,8
	6-10	20	39,2
Have you ever participated in training courses on nosocomial infection?	Yes	3	5,9
	No	48	94,1
Do you read sources about nosocomial infections?	Yes	5	9,8
	No	46	90,2

% = Percent; Freq.= Frequency

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84.3% of the pediatric nurses participating in the research were female, 62.7% were between the ages of 30-39, 64.7% were single, and 51% were nursing institute graduates. 66.7% of the nurses have served in the hospital for 1-5 years, and 58.8% have served in the children's hospital for 1-5 years. 60.8% of nurses have been working in the RCU for 1-5 years. Additionally, it was determined that 94.1% of the nurses did not receive any training on hospital infections and 90.2% did not update their knowledge on hospital infections (Table 1).

Table 2: knowledge of pediatric Pediatric nurses working in the RCU regarding basic questions about hospital infections.

Items	Information Status						Mean	Std. Deviation	Assessment
	Low		Fair		High				
	Freq.	%	Freq.	%	Freq.	%			
general information about hospital infection in the RCU	14	27,5	21	41,2	16	31,4	1,49	0,335	Fair
Pathological factors that cause hospital infection in the RCU	15	29,4	16	31,4	20	39,2	1,42	0,352	Fair
Sources of hospital infection in the RCU	12	23,5	14	27,5	25	49	1,55	0,356	Fair
Methods of transmission of hospital infection in the RCU	14	27,5	11	21,6	26	51	1,56	0,355	Fair
Standard precautions for controlling hospital infection in the RCU	10	19,6	27	52,9	14	27,5	1,48	0, 315	Fair

High (mean 1.68-2), Fair (mean 1.34-1.67), Low (mean 1-1.33), cutt off point (0.33), Freq. = Frequency

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Table 2 shows the evaluation of the knowledge of Pediatric nurses workers in respiratory care unit regarding basic questions about hospital infections. The average values in the test are 1.49, 1.42, 1.55, 1.56, 1.48, respectively, and their levels are at a medium level.

Table 3: General evaluation of the knowledge of Pediatric nurses workers in respiratory care unit about hospital infection in the RCU.

	Information Status						Mean	Std. Deviation	Assessment
	Low		Fair		High				
	N	%	n	%	n	%			
General Evaluation of Nurses' Knowledge	10	19,6	29	56,9	12	23,5	1,50	0,308	Fair

High (mean 1.68-2), Fair (mean 1.34-1.67), Low (mean 1-1.33), cutt off point (0.33), n = Number

In Table 3, it was determined that the general evaluation of the knowledge of Pediatric nurses workers in respiratory care unit about hospital infection in the RCU was at a moderate level (Mean = 1.50).

Table 4: The relationship between the general evaluation of the knowledge levels of Pediatric nurses workers in respiratory care unit and their demographic data.

Demographic data	Information Status			Chi-Square Tests	
	Low	Fair	High	F	P Value
	Freq. (%)	Freq. (%)	Freq. (%)		
Age					
20-29	0 (0)	11 (61,11)	7 (38,88)		
30-39	10 (31,25)	17 (53,12)	5 (15,62)	12,6	**0,013**
40-49	0 (0)	1 (100)	0 (0)		
Gender					
Male	3 (37,5)	5 (62,5)	0 (0)	5,4	0,066
Female	7 (16,27)	24 (55,81)	12 (27,90)		
Marital Status					
Married	10 (30,30)	17 (51,51)	6 (18,18)	10,5	**0,006**

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Single	0 (0)	12 (66,66)	6 (33,33)		
Educational level					
Nursing high school graduate	2 (15,38)	9 (69,23)	2 (15,38)		
Nursing institute graduate	7 (26,92)	17 (65,38)	2 (7,69)	15,6	**0,004**
A graduate of the College of Nursing	1 (8,33)	3 (25)	8 (66,66)		
General Service Duration					
1-5	5 (14,7)	21 (61,76)	8 (23,52)		
6-10	1 (9)	8 (72,72)	2 (18,18)	13,1	**0,011**
11-15	4 (66,66)	0 (0)	2 (33,33)		
Duration of work in children's hospitals					
1-5	6 (20)	17 (56,66)	7 (23,33)	4,3	0,356
6-10	2 (13,33)	8 (53,33)	5 (33,33)		
11-15	2 (33,33)	4 (66,66)	0 (0)		
Working period in the RCU					
1-5	7 (22,58)	16 (51,61)	8 (25,8)	0,9	0,630
6-10	3 (15)	13 (65)	4 (20)		
Have you ever participated in training courses on nosocomial infection?					
Yes	10 (20,83)	27 (56,25)	11 (22,91)	1,3	0,502
No	0 (0)	2 (66,66)	1 (33,33)		
Do you read sources about nosocomial infections?					
Yes	10 (21,73)	26 (56,52)	10 (21,73)	2,6	0,271
No	0 (0)	3 (60)	2 (40)		
Total	**10 (100)**	**29 (100)**	**12 (100)**	**51 (100)**	

Table 5 shows the relationship between the general evaluation of the knowledge levels of Pediatric nurses workers in RCU and their demographic data. A statistically significant relationship was found between the test scores of health care workers in RCU and their age ($p = 0.013$), marital status ($p = 0.006$), education level ($p = 0.004$) and length of public service ($p = 0.011$). However, other results show that there is no relationship between the knowledge of health care workers and other demographic data ($p > 0.05$).

5. Discussion

In this part, the findings obtained from the research conducted to evaluate the knowledge of Pediatric nurses workers at RCU in Maternity and Children's Teaching Hospital in The Al-Diwaniyah City about hospital infections are discussed with the relevant literature.

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The results of the study showed that pediatric nurses' knowledge about hospital infection in the respiratory care unit was at an average value of 1.50 points (Table 4.3). These findings from the current study are consistent with Gulia et al. (2022) found that more than two-thirds (70%) of nurses in respiratory care units in hospitals in India had a moderate knowledge score about hospital infection (10). In another study conducted by Al-Jubouri (2014) in hospitals in the city of Baghdad, it was revealed that more than two-thirds (69%) of nurses had insufficient knowledge about hospital infection (11). Nearly half of hospital infections can be prevented if necessary precautions are taken by healthcare professionals and especially nurses. Since nosocomial infections cause an increase in morbidity and mortality, prolonged hospital stay, and increased costs, the level of knowledge of healthcare professionals is decisive. Therefore, it is important that nurses have a high level of knowledge. The study shows that there is a highly significant relationship between the nurses' age and their knowledge of all aspects of nosocomial infection ($p<0.013$). While the answers of nurses over 30 years old are mostly good, the answers of nurses under 30 years old are mostly bad. As a result, as the age of nurses increased, the correct answers also increased, which means that the level of knowledge increased with age. This may be because the years they worked in hospitals and their contact with other patients increased their knowledge level. These results are consistent with Motamed et al. (2006) in the study they conducted to evaluate the knowledge of healthcare professionals about universal precautions in Mazandaran Province. They stated that the correct answers in their study were related to age (12,13).

The findings showed that there was a significant relationship between the marital status of the nurses and their knowledge about all aspects of hospital infection ($p<0.006$) (Table 4.4). In this study, single nurses had mostly correct answers, while married nurses had fewer correct answers. This means that marital status has an impact on nurses' knowledge, this impact may be related to marital responsibility, and especially that the majority of those taking this responsibility are women.

Study findings showed that there was a highly significant relationship between the education level of nurses and their knowledge about all aspects of hospital infection ($p<0.004$) (Table

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4.4). As nurses' education levels increase, their knowledge also increases. These results showed that nurses who graduated from nursing institutes and nursing faculties had mostly correct answers in all dimensions of nosocomial infection, and their correct answers increased with their education level, while nurses who graduated from high school level nursing schools had incorrect answers in all dimensions of nosocomial infection. Motamed et al. (2006); Alsaidi (2006) in his study evaluating the knowledge of nurses about children with bacterial meningitis in Baghdad; In Al-Jaza'iri's (2007) study, where he evaluated the knowledge of nurses about children with cleft lip and palate in Baghdad, it was documented that the level of knowledge increases as the level of education increases. These studies support the result of our study (12 ,14, 15).

The findings showed that there was a highly significant relationship between nurses' length of public service and their knowledge about all aspects of nosocomial infection ($p<0.011$) (Table 4.4). Years of working in hospitals may have affected nurses' knowledge and increased their experience in dealing with and preventing infection. These results are consistent with those of (Abdullah et al ., 2024). and Al-Jaza'iri (2007) showing that there is a positive relationship between nurses' knowledge levels and their working years (16,15).

However, the majority of nurses have mostly correct answers regarding all aspects of nosocomial infection, although they do not update their knowledge; This suggests that nurses' knowledge may be due to their level of education, working hours at the workplace, and information exchange with other healthcare professionals.

6. Conclusions

- Pediatric nurses have moderate knowledge of all aspects of nosocomial infection.
- This study showed that there is a significant relationship between nurses' general knowledge levels and some demographic data (age, education level, marital status, duration of public service) ($p<0.05$).
- There was no statistically significant relationship between the nurses' general knowledge and some demographic data (gender, length of time working in a children's hospital,

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length of time working in the RCU, attending training courses, reading sources on nosocomial infections) ($p>0.05$).

Recommendations

- In the control of in-hospital infections, a surveillance method should be applied, which makes significant contributions to detecting infected patients, determining the frequency of infection, and revealing the factors that cause infection.
- It is recommended that the Iraqi Ministry of Health establish the Iraqi Centers for Disease Control and Prevention to undertake this task.
- In various departments of a hospital, it is recommended that nurses use both theoretical and practical knowledge of basic prophylactic techniques on nosocomial infections (including their different types, control methods and prevention procedures) to demonstrate their knowledge of this important problem (nosocomial infections).
- It is recommended to increase the number of Pediatric nurses working in the Neonatal Intensive Care Unit, especially those with a bachelor's degree in nursing due to their qualifications and experience.
- It is recommended that additional research be conducted on nosocomial infections by other researchers or the Ministry of Health in order to educate nurses working in other departments of the hospital and other hospitals.

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