Assessment of the Pediatric Nurses' Knowledge about the Nosocomial Infection in the Neonatal Intensive Care Unit of Baghdad Pediatric Teaching Hospitals

Adra'a Hussein shauq, MScN*
Eqbal Gahnim Mua'la, PhD**

الخلاصـــة:

الهـدف: تهدف الدراسة تقييم معارف الممرضين العاملين في وحدات العناية المركزة للأطفال حول الخمج المستشفوي في وحدة العناية المركزة لحديثي الولادة، وايجاد العلاقة بين هذه المعارف والصفات الديموغرافية للمرضين.

المنهجيّـة: دراسة وصفيه أجريت في وحدة العناية المركزة لحديثي الولادة في مستشفيات بغداد التعليمية للأطفال للمُدّة من نهاية شهر نيـسان ولغاية نهاية شهر كانون الأول ٢٠٠٨. عيّنة غرضيّة من (٢٨) ممرض ممن يعملون في وحدة العناية المركزة للأطفال حديثي الولادة. جُمعت البيانات بواسطة طريقة الإدخال الشخصي من خلال الاستمارة الاستبيانية. حُدّدت مصداقية الاستبانة من خلال مجموعـة مـن الخبـراء ذوي العلاقة بالدراسة، أمّا الثبات فقد حُدّد بواسطة الدراسة الاستطلاعيّة. حُللت البيانات باستخدام برنـامج (SPSS) وباسـتخدام التحليـل الوصـفي والاستدلالي.

النتائـج: أظهرت النتائج أنّ الممرضين العاملين في وحدات العناية المركزة للأطفال لديهم مستوى غير كافي من المعلومات في كل جوانب الخمج المستشفوي. أظهرت النتائج أنّ العمر، المستوى التعليمي، سنوات العمل في المستشفيات العامة، مستشفيات الأطفال، ووحدة العناية المركزة لحديثي الولادة للممرضين لها علاقة معنوية مع معلوماتهم حول الخمج المستشفوي. أمّا بالنسبة للدورات التعليميّة ومطالعة المصادر حول الخمج المستشفوي، فلم تظهر أيّة علاقة معنويّة.

التوصيات: أوصت الدراسة بإدخال جميع الممرضين بدورات تعليميّة حول الخمج المستشفوي. تشجيع استخدام موانع الانتقال (النظافة اليدويّـة، والمعدات الوقائيّة الشخصيّة) خاصة الإجراء البسيط الأكثر أهميّة "النظافة اليدويّة" لتقليل الخمج. العمل على دراسات تشمل جميـع الممرضـين في المستشفيات، خاصة وحدات العناية المركزة.

Abstract

Objectives: To assess the pediatric nurses' knowledge about the nosocomial infection (NI), and to find out the relationships between their knowledge about the nosocomial infection and demographic data.

Methodology: A descriptive study was carried out at neonatal intensive care units (NICUs) of Baghdad Pediatric Teaching Hospitals. It was started from the end of April to the end of October, 2008. A purposive sample of (28) pediatric nurses were selected. The data were collected by self-administered questionnaire. The validity of the questionnaire was determined through a panel of experts, while its reliability was determined through the pilot study. The data were analyzed by descriptive and inferential statistics through the package SPSS version (10.0).

Results: The findings indicated that the pediatric nurses who work at neonatal intensive care units have an inadequate level of knowledge about all aspects of the NI. Nurses' age, educational level, and their years of employment in the general hospitals, pediatric hospitals, and NICU have a significant association with their knowledge. However, nurses' educational courses and updating knowledge about the NI have no association with their knowledge.

Recommendation: The study recommends that all the pediatric nurses should be exposed to educational courses to raise their awareness about the NI. Encourage transmission barriers use (hand hygiene, personal protective equipment), especially the most important and simple procedures to reduce the NI "hand hygiene". Further studies should include other nurses in all hospitals, especially in the ICUs.

Key words: Pediatric Nurse, Nosocomial Infection

Introduction:

Most of neonates in Neonatal Intensive Care Unit(s) (NICUs) are premature and highly susceptible for infection due to their immature immune functions, frequent use of antimicrobial substances, and frequent invasive procedures. The use of invasive devices can easily cause infection [(1)]. Therefore, neonates in NICUs are at risk for infection due to the previous causes. Many infections in the hospitals are caused by pathogens transmitted from infected Health Care Workers (HCWs) to neonates, or from one newborn to another by way of HCWs in NICU who have not washed their hands between the newborns, or they do not

*Assistant Instructor, Pediatric Nursing Department, College of Nursing, University of Baghdad
** Professor, Head of Pediatric Nursing Department, College of Nursing, University of Baghdad

practice standard control measures as well. Nosocomial or hospital-acquired infection occurs when there is an interaction among the infected patients, health care personnel, equipments, and bacteria [3]. Nosocomial infection is derived from two Greek words "nosos" = "disease" and "komeion" = "to take care of", this term is used specifically to indicate something originating or taking place in the hospital [4]. Infections acquired in the hospital are an important cause of morbidity and mortality in high risk neonates who receive intensive care. It is a frequent complication for patients who receive frequent invasive techniques in NICU and have long hospitalization. NI is constituting an important health problem throughout the world and affects both developed and developing countries; it results in high morbidity and mortality, greater use of antibiotics, prolonged stays in the hospital and consequently increases hospital costs [5].

Methodology:

A purposive "non-probability" sample of (28) pediatric nurses (females and males) was selected from Baghdad Pediatric Teaching Hospitals (Children Welfare Pediatric Teaching Hospital, Child's Center Pediatric Teaching Hospital, and Ibn Al-beldi Maternal and Child Teaching Hospital). Data were collecting from the end of April to the end of October, 2008. A self-administered questionnaire was used for data collection. The questionnaire format consists from two parts; the first part is related to the nurses' demographic data such as age, gender, marital status, level of education, training courses, updating knowledge, years of employment in general hospitals and in pediatric hospitals, and years of experience in NICU, and the second part is related to the nurses' knowledge about the NI, which includes five main sections (general information, infectious agents, sources of infection, modes of transmission, and the standard infection control precautions). The overall number of items was (45). The questionnaire format answer was designed on the base of multiple choices. The score of the knowledge was good or bad, the good level when the answers were more than 50% of the total questionnaire items, and the bad level when the answers were less than 50% of the total items.

The validity and reliability of the questionnaire were determined and the data were analyzed through the application of descriptive and inferential data analysis through using the package SPSS version (10.0).

Results:

The study showed that (28.6%, 25%) of the sample were in the age group (40-44), and (25-29) years respectively. Most of the sample (82.1%) was females, (57.1%) married, (35.7%) graduated from secondary nursing schools, the majority (92.9%) has no educational courses about the NI, most of them (89.3%) do not update their knowledge about the NI, the mean of the years of employment in the general hospital as a nurse was (3.64±1.66) years, while in the pediatric hospital as a pediatric nurse was (3±1.44) years, and in the NICU of pediatric hospitals as neonatal nurse was (2.46±1.4) years.

Table 1. Association between nurses' age and their knowledge related to (general information, infectious agents, and sources of infection, modes of transmission, and the SICPs)

Age (years)	General information		Infectious agents		Sources of infection		Modes of transmission		SICPs	
	Good answers		Good answers		Good answers		Good answers		Good answers	
	No.	%	No.	%	No.	%	No.	%	No.	%
20-24	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
25-29	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
30-34	0	0.0	0	0.0	3	100.0	0	0.0	0	0.0
35-39	2	66.7	3	100.0	3	100.0	0	0.0	0	0.0
40-44	8	100.0	8	100.0	8	100.0	4	50.0	7	87.5
45-49	3	100.0	3	100.0	3	100.0	3	100.0	3	100.0
≥ 50	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0
total	14	50.0	15	53.6	18	64.3	8	28.6	11	39.3
x^2=25.3 df=6 P =0.0001			x^2=28 df=6 P =0.0001		x^2=28 df=6 P =0.001		Fisher's Exact test P =0.002		Fisher's Exact test P = 0.001	

No.= number, %= percent, P=Probability level at P- value at ≤ 0.05, SICPs=Standard Infection Control Precautions

This table shows a highly significant association between nurses' age and their knowledge of all the aspects of the NI.

Table 2. Association between nurses' gender and their knowledge related to (general information, infectious agents, sources of infection, modes of transmissions, and SICPs)

Gender	General information		Infectious agents		Sources of infection		Modes of transmission		SICPs	
	Good answers		Good answers		Good answers		Good answers		Good answers	
	No.	%	No.	%	No.	%	No.	%	No.	%
Female	9	39.1	10	43.5	13	56.5	5	100.0	6	26.1
Male	5	100.0	5	100.0	5	100.0	8	28.6	5	100.0
Total	14	50.0	15	53.6	18	64.3	3	13.0	11	39.3
df=6.08, $\chi 2$=0.014, P=1			df=5.2, $\chi 2$=0.02, P=1		df=3.3, $\chi 2$=0.06, P=1		Fisher's Exact test P =0.001		Fisher's Exact test P =0.005	

No.= number, %= percent, P=Probability level at P- value at ≤ 0.05, SICPs=Standard Infection Control Precautions

This table shows a highly significant association between nurses' gender and their knowledge about all the aspects of the NI, except that of the sources of infection, where there is no association.

Table 3. Association between nurses' marital status and their knowledge related to (general, information, infectious agents, and sources of infection, modes of transmission, and the SICPs)

Marital Status	General information		Infectious agents		Sources of infection		Modes of transmission		SICPs	
	Good answers		Good answers		Good answers		Good answers		Good answers	
	No.	%	No.	%	No.	%	No.	%	No.	%
Married	2	12.5	3	18.8	6	37.5	0	0.0	0	0.0
Single	9	100.0	9	100.0	9	100.0	5	55.6	8	88.9
Divorce	2	100.0	2	100.0	2	100.0	2	100.0	2	100.0
Widow	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0
Total	14	50.0	15	53.6	18	64.3	8	28.6	11	39.3
$\chi^{2=21}$, df=3, P=0.0001			x^2=18.2 df =3 P =0.0001		x^2=1.6 df=3 P =0.009		x^2=17 df=3 P =0.001		x^2=24.2 df=3 P =0.001	

No.= number, %= percent, P=Probability level at P- value at ≤ 0.05, SICPs=Standard Infection Control Precautions

This table shows a highly significant association between nurses' marital status and their knowledge about all the aspects of the NI.

Table 4. Association between the nurses' level of education and their knowledge related to (general information, infectious agents, and sources of infection, modes of transmission, and the SICPs)

Level of Education	General information		Infectious agents		Sources of infection		Modes of transmission		SICPs	
	Good answers		Good answers		Good answers		Good answers		Good answers	
	No	%	No	%	No.	%	No.	%	No.	%
Short courses in Nursing	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Primary Nursing School	0	0.0	0	0.0	1	14.3	0	0.0	0	0.0
Secondary Nursing School	7	70.0	8	80.0	10	100.0	1	10.0	4	40.1
Nursing Institute	6	100.0	6	100.0	6	100.0	6	100.0	6	100.0
Nsg. college	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0
Total	14	50.0	15	53.6	18	64.3	8	28.6	11	39.3
χ^2=19.6, df=4, P=0.001			x^2=21.5 DF=4 P=0.001		x^2=24.2 DF=4 P=0.001		Fisher's Exact test P=0.001		Fisher's Exact test P=0.001	

No.= number, %= percent, P=Probability level at P- value at ≤ 0.05, SICPs=Standard Infection Control Precautions

Table (4) shows a highly significant association between the nurses' level of education and their knowledge about all the aspects of the NI.

Table 5. Association between nurses' educational courses and their knowledge about (general information, infectious agents, sources of infection, modes of transmissions, and the SICPs)

Educational Courses	General information		Infectious agents		Sources of infection		Modes of transmission		SICPs	
	Good answers		Good answers		Good answers		Good answers		Good answers	
	No	%	No.	%	No.	%	No.	%	No.	%
Yes	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
No	14	53.8	15	57.7	18	69.2	8	33.3	11	42.7
Total	14	50.0	15	53.6	18	64.3	8	28.6	11	39.3
x^2= 2.15 df =1 P =0.14			x^2=2.4 df=1 P =0.1		x^2=3.9 df= 1 P =0.04		Fisher's Exact test P =0.2		Fisher's Exact test P =0.2	

No.= Number, P=Probability level at P- value at ≤ 0.05, SICPs=Standard Infection Control Precautions, %=Percent

Table (5) shows that there is no significant association between nurses' educational courses about the NI and their knowledge of all the aspects of the NI except for the sources of infection.

Table 6. Association between updating nurses' knowledge about the NI and their knowledge related to (general information, infectious agents, and sources of infection, modes of transmissions, and the SICPs)

Updating knowledge	General information		Infectious agents		Sources of infection		Modes of transmission		SICPs	
	Good answers		Good answers		Good answers		Good answers		Good answers	
	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
No	14	58.3	15	62.5	18	75.0	8	33.3	11	42.3
Total	14	50.0	15	53.6	18	64.3	8	28.6	11	39.3
x^2=4.6 df=1 P=0.03			x^2=5.3 df=1 P=0.02		x^2=4.8 df=1 P=0.004		Fisher's Exact test P =0.2		Fisher's Exact test P =0.2	

No.= Number, P=Probability level at P- value at ≤ 0.05, SICPs=Standard Infection Control Precautions, %=Percent

This table shows a significant association between the nurses' updating knowledge about the NI and their knowledge of all the aspects of the NI, except that of the (modes of transmission of NI and the SICPs) where there is no significant association.

Table 7. Association between nurses` years of employment in hospitals and their knowledge related to (general information, infectious agents, and the sources of infection)

Years of employment in the hospitals	General information			Infectious agents			Sources of infection			Modes of transmission			SICPs		
	Good answers			Good answers			Good answers			Good answers			Good answers		
	No.	mean	SD	No.	mean	SD	No.	mean	SD	No.	mean	SD	No.	mean	SD
Nurse*	14	5.07	1.07	15	4.9	1.16	18	4.56	1.38	8	5.6	0.9	11	5.4	0.8
Pediatric nurse**	14	4.0	1.46	15	3.8	1.5	18	3.56	1.54	8	4.7	1.5	11	4.3	1.5
Neonatal nurse***	14	3.07	1.77	15	3.0	1.7	18	2.83	1.61	8	3.8	2.0	11	3.3	1.9

No.= Number, SD=Standard Deviation, SICPs=Standard Infection Control Precautions

This table shows a highly significant association between "the years of employment in the general hospitals as a nurse" and "the years of employment in pediatric hospitals as a pediatric nurse" with their knowledge of all the aspects of the NI. Moreover, there is a highly significant association between "the years of experiences in the NICU of pediatric hospitals as neonatal nurse" and their knowledge of all the aspects of the NI, except that of the sources of infection.

Discussion:

In this study, the results reflect that there is a highly significant association between the nurses' age and their knowledge of all the aspects of NI (Table 1). When nurses' age increased, their good answers increased too. This may have happened, because the years of employment in the hospitals and their contact with other patients have increased their knowledge. A study to assess knowledge of health care workers (HCWs) about the Universal Precautions in Mazandaran Province shows that the good answers of HCWs increased with their age [6].

The study also showed that there is a significant association between the nurses' gender and their knowledge about all the aspects of the NI, except for the sources of infection (Table, 2). The reason for this result may be related to that the nurses did not know the most common sources of infection in the NICU and did not consider the nursing staff could be one of the sources of infection. The results indicated that the male nurses have mostly the good answers, while the female nurses have less number of the good answers in all aspects of the NI. This means that the level of knowledge differs according to their gender. This result may be due to the number of male nurses was very few (5), or the males were more in contact with other HCWs which may increases their knowledge, or the social responsibility of the Iraqi females is very heavy, especially majority of the sample was female [6].

The findings showed that there is a highly significant association between the nurses' marital status and their knowledge about all the aspects of the NI (Table 3). The single nurses have mostly the good answers, while the married nurses have less number of the good answers. This means that the marital status has an effect on the nurses' knowledge, this effect may be related to the marital responsibility, and especially the majority of them were female. There are no relative studies to support this finding.

Table (4) showed that there is a highly significant association between the nurses' educational level and their knowledge about all the aspects of the NI. When the nurses increased their level of education, their knowledge increased too. This results pointed out that the nurses who graduated from secondary nursing schools, nursing institutes, and nursing colleges have mostly the good answers in all the aspects of the NI, and their good answers increased with their level of education, while the nurses who were graduated from primary nursing schools and short courses in nursing have bad answers in all the aspects of the NI [6, 7,

and 8).

Unfortunately the findings showed that there is no significant association between the nurses' educational courses in the NI and their knowledge about all the aspects of the NI, except for the sources of infection (table, 5). The nurses who have the educational courses in the NI are very few (2) only, and they have bad answers in all the aspects of the NI. This result may be due to the fact that the nurses who have the educational courses were very few (2), or they have the training course (6) years ago, or the curriculum in that course has not been implemented effectively [9, 10].

Table (6) indicated that there is a significant association between the nurses' updating knowledge and their knowledge about all the aspects of the NI, except that of the modes of transmission and the SICPs. The nurses who were updating their knowledge were only (2) and they have bad answers related to the all aspects of the NI. This result may be attributed to the lack of updating knowledge, or they have not really updated their knowledge. However, majority of the nurses did not update their knowledge and they have mostly the good answers in all the aspects of the NI, which may indicate that their knowledge may come from workplace and contact with other HCWs, but they did not know the most common modes of transmission and the preventive measures to reduce the NI [4].

Table (7) showed that there is a highly significant association between the nurses' years of employment in the general hospitals as nurses, and in the pediatric hospitals as pediatric nurses and their knowledge about all the aspects of the NI. The years of employment in the hospitals may have affected nurses' knowledge and increased their experiences in dealing with infection and how to prevent it [6, 7, and 8]. In relation to the nurses' years of experience in the NICU of pediatric hospital as neonatal nurses and their knowledge about all the aspects of the NI, there is a highly significant association, except for the sources of infection. This result may be related to that they did not know the common sources of infection in the NICU and did not consider themselves as a source of infection. The years of experience in the NICU increased the nurses' dealing with the neonates and how to prevent an infection. The range of nurses' experience in the NICU was (6 months to 28 years) and most of the sample has less than five years of experience in that area. This may be an enough period to increase their knowledge, but it may not be enough to some nurses to increase their knowledge about the sources of infection [6, 7].

Refrences:

1. Jeong, I.; Jeong, J.; and Ok Chio, E.: Nosocomial Infection in a Newborn Intensive Care Unit (NICUI) South Korea, **BMC Infectious Diseases**, 2006, 6 (103): P.P.103-5, available on http://www.biomedicalcenter.com, access at 8/12/2007.

2. Smith, S.; Duell, D.; and Martin, B.: Clinical Nursing Skills: Basic to Advanced Skills, 6th ed., USA: Saddle River, 2004, P.P.382-83.

3. Wong, D. and Hockenberry, M.: Nursing Care of Infants and Children, 7th ed., London: Mosby, 2003: P.P.1132-35.

4. Center of Disease Control and Prevention (CDC): Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Health Care Setting 2007, 2007: P.P.12-18, 88-100, available on http:// www.cdc.gov, access at 8/11/2007.

5. Raka, L.; Zoutman, D.; Mulliqi, G.; Krasniqi, S.; Raka, N.; Dedushaj, I., and Others: Prevalence of Nosocomial Infections in High-risk Units in the University Clinical Center of Kosova, **Infection Control And Hospital Epidemiology**, 2006, 27 (4): P.P.11-12.

6. Motamed, N.; Baba Mahmoodi, F.; Khalilian, A. and Nozari, N.: Knowledge and Practice of Health Care Workers and Medical Students towards Universal Precautions in Hospitals in Mazandaran Province, **Eastern Mediterranean Health Journal**, 2006, 12 (5): P.P.654-55, 558-59.

7. Al-Sa'idi, K.: Assessment of Nurses' Knowledge toward Child with Bacterial Meningitis at Pediatric Teaching hospitals in Baghdad City, Master Thesis, Pediatric Nurses, College of Nursing, University of Baghdad, 2006.

8. Al-Jaza'iri, M.: Assessment of Nurses' Knowledge Concerning Children with Cleft Lip and Cleft Palate at Pediatric Teaching and Non teaching Hospitals in Baghdad, Master Thesis, Pediatric Nurses, College of Nursing, University of Baghdad, 2007.

9. Al-Doori, N.: Knowledge and Practices of Pediatric Nurses' toward Respiratory Tract Infections at Teaching and Non teaching Hospitals, Master Thesis, Pediatric Nurses, College of Nursing, University of Baghdad, 1996.

10. Hassan, A.; Moftah, F. and Alaa El-Din, S.: Assessment of An educational Training Program for Nurses Working in Maternal and Child Health (MCH) Centers in Assiut City Regarding Infection Control, Assiut University. **Environ. Res**, 2004, 7 (2): P.P.92-93, 100-102.