

Assessment of Nursing Performance Regarding Hospital Acquired Infection

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Abstract

Background: Hospitalized children are a particularly vulnerable population. This is due to the many invasive procedures and frequent antibiotic use, which put the patient children at risk for infection and promote the emergence of multidrug-resistant organisms. **Aim:** This study aims to assess nursing performance regarding Hospital Acquired Infections (HAI). **Design:** A descriptive study was used. **Setting:** The study was conducted at Neonatal and Pediatric Intensive Care Units, Pediatric Medical and Surgical Units affiliated to Ain Shams University Specialized Hospital. **Subjects:** A convenient sample of eighty nurses from the previously mentioned settings. **Data collection:** Two tools, first tool was an interview questionnaire form composed of two parts; **Part 1:** About demographic characteristics of nurses. **Part 2:** Knowledge of nurses regarding HAI. The second tool was observation checklist that consists of two parts Part 1: Assess performance of nurses regarding infection control and Part 2: To assess their performance regarding the infrastructure of the involved units. **Results:** The study indicated that the studied nurses had unsatisfactory knowledge about HAI. In addition, more than half of them had incompetent performance regarding HAI and the related infrastructure of the study units, **Conclusion:** This study concluded that nurses had unsatisfactory level of knowledge and incompetent performance regarding HAI **Recommendations:** The study recommended continuous training programs and strict observation of nurses' performance are required for the correction of poor practices by the infection control team, in addition to utilization of infection control standard precautions.

Key words: Nursing, performance, Hospital Acquired Infection

Introduction

Hospital- Acquired Infections (HAIs) previously called (nosocomial infection) refer to infections associated with health care delivery in any setting (such as: hospitals, long-term care facilities, community, and ambulatory setting). An HAI is defined as a localized or systemic infection that results from adverse reaction to the presence of an infectious agent (s) or its toxin (s), for which

there is no evidence of infection on admission to a health care facility (*Gómez-Vallejo et al., 2016*).

In addition, HAIs are caused by viral, bacterial, and fungal pathogens; the most common types are Blood Stream Infection (BSI), Pneumonia (e.g., Ventilator-Associated Pneumonia (VAP), Urinary Tract Infection (UTI), and Surgical Site Infection (SSI) (*Dramowski et al., 2016*).

Hospital acquired infections occur up to 48 hours after hospital admission, up to 3 days after discharge, up to 30 days after an operation in a healthcare facility when a child was admitted for reasons other than the infection (*Rahmqvist et al., 2016*).

Moreover, HAIs are one of the major causes of mortality and morbidity in the Neonatal Intensive Care Units (NICUs). The HAI is an infection occurs during hospitalization that was not present or in incubation at the time of admission that has an impact on the healthcare system as it increases the use of medical resources, duration of hospitalization, as well as increased cost of treatment. These are major public health problems worldwide, but particularly in developing countries (*Riaz and Jamal, 2016*).

Infection prevention and control issues are generally similar for adults and children. However, youth and immature immune systems make children more susceptible to infections; the pathogens and most common HAI sites differ from those in adults. Close contact with patients, siblings and family, uncontrolled body fluids, and play areas create unique opportunities for the spread of infection (*Fleischmann et al., 2016*).

The nurse is the member of the healthcare team who leads the rest of the team in practicing prevention strategies to protect the patient from infection (*Benson and Powers, 2011*).

Nurses perform some basic strategies resulting in positive patient outcomes include the practice and promotion of hand hygiene, consistent use of aseptic technique, cleaning and disinfection practices, use of standard precautions, and patient assessment, in addition to the use of safety devices, removal of unnecessary invasive devices, and use of bundle strategies for infection prevention, are the best ways to prevent HAI (*Potter et al., 2016*).

Significant of Study

Hospital-acquired infections are an important medical morbidity facing an already vulnerable group of children and infants. The epidemiology and strategies that can reduce these infections are well known; however, implementation of strategies that can influence the occurrence of HAI within the pediatric health care setting require a concerted team effort by all individuals who participate in the care of these infants. Each care provider must understand his or her role in preventing HAI and have a willingness to modify behavior such that comply with recognized infection-control practices even the most basic care practices (*World Health Organization [WHO], 2013*).

The incidence of infections varies widely among NICUs. It occurs at an incidence of around 30% in the developing countries, it is estimated to cause 40% of all neonatal deaths, depending on environmental factors and differences in clinical practice premature neonates, very sick children and children have had surgery, are more vulnerable than other people (*Mohammed and El Seifi, 2014*).

Aim of the Study

This study aimed to:

- Assess nursing performance regarding Hospital-Acquired Infections (HAIs).

Research question:

- What is the nursing performance regarding hospital acquired infection?

Subjects and Methods

I. Research Design:

A descriptive design was used to conduct this study.

Study setting:

The study was conducted in (Neonatal and Pediatric Intensive Care Units, Pediatric Medical and Surgical Units at Ain Shams University Specialized Hospital affiliated to Ain Shams University.

Subjects:

A convenient sample of all the available nurses working in the above mentioned setting over 6 months.

Technical Design

Tools of data collection

Data were collected by using of the following two tools.

- I. Interview Questionnaire Form): This tool was adopted from the National Guidelines for Infection control of the *Ministry of Health and Population in Egypt, (2008)* to assess nurses' Knowledge about the following:

Part I: It was concerned with demographic characteristic of nurses such as their (age, gender, educational qualifications, years of experience, and attending educational training courses,

Part II: It was constructed to assess nurse's knowledge regarding Hospital-Acquired Infections HAI:

Such as (definition, microbes causes, types, causes, susceptibility for HAI), contaminated gloves), types of personal protective equipment, indication of take off the gloves, dealing with contaminated gloves.

Scoring system:

The right answers were scored one, and those wrong were scored zero. These scores were summed up and converted into a percentage.

- Score from 0 to <65 referred to unsatisfactory knowledge.
- Score from 65 and more referred to satisfactory knowledge.

- II. Observational Checklist: This tool was as adopted from the National Guidelines for Infection control of the *Ministry of Health and Population in Egypt, (2008)* to evaluate nurses' performance. It consists of two parts

Part I: Observation checklist to assess nursing performance regarding HAI such as practice regarding (hand hygiene, personal protective equipment, injection practice and sharps safety, maintenance of urinary catheter, ventilator, respiratory maintenance, handling of specimen.

Part II: Observation checklist to assess nursing performance regarding infrastructure.

Scoring system:

- Score from 0 <75 referred to Incompetent performance.
- Score from 75 and more referred to competent performance.

Results

Table (1): Number and percentage distribution of the studied nurses according their demographic characteristic (No= 80):

Item	No	%
Gender		
Male	6	7.5
Female	74	92.5
Age		
Less than20 years	5	6.2
20 to less than 25	28	35.0
25 to less than30	25	31.3
30 years or more	22	27.5
Educational qualifications		
Nursing secondary	32	40.0
Nursing secondary + Specialty	5	6.2
Technical Institute	28	35.0
Bachelor of Nursing	15	18.8
Years of Experience		
Less than one year	7	8.8
One to less than 5 years	26	32.5
5 to less than10 years	36	45.0
10 years or more	11	13.7
Units		
NICU	20	25.0
Pediatric ward	20	25.0
Pediatric ICU	40	50.0
Number of Training Courses		
Once	33	41.25
Two	14	17.5
Three	12	15
Four or more	21	26.25

As regard the distribution of the studied nurses according to their demographic characteristics, table (1) reveals that, the majority of the studied nurses (92.5%) were females, 35.0% of them were in the age group of 20-25 years. Meanwhile, the highest percentage of the studied sample (40.0%) was secondary school nurses.

As regard the distribution of the studied sample to their years of experience, less than half of the study subjects 45.0% are having experiences 5 years to less than10 years and 50.0% of them are working in pediatric ICU. in relation to attend a training on infection control the above table shows that, 41.25% of the studied nurses attend once a training course on infection control while 15% of them had three training course.

Table (2): Number and percentage distribution of the studied nurses according their knowledge about HAI (No= 80).

Knowledge of Nurses	Un- Satisfactory		Satisfactory	
	No	%	No	%
Definition of HAI	46	57.5	34	42.5
Microbes that cause infection.	47	58.8	33	41.2
Common types HAI	69	86.3	11	13.7
Common causes of HAI	41	51.3	39	48.7
Prone to HAI	41	51.3	39	48.7
Safe injection from infection				
Definition of safe injection from infection	63	78.8	17	21.2
Practices harm the health care worker.	55	68.75	25	31.2
The standard measures followed in case the syringe needle comes into contact with injectable medication	50	62.5	30	37.5

Regarding to knowledge about definition, microbes types ,causes and susceptible for HAI the previous table (2) shows that 57.5%, 58.8%, 86.3% and 51.3% of nurses had unsatisfactory knowledge regarding definition, microbes, most common types ,causes, and person more prone to hospital acquired infection.

As regard to the safe injection showed that 78.8%, 68.75% and 62.5% of the study sample had unsatisfactory knowledge regarding definition of safe injection, practice harm the health care worker and the measures followed in case the syringe needle comes into contact with injectable medication.

Table (3): Number and percentage distribution of the studied nurses according to their total knowledge score regarding HAI (No= 80).

Total knowledge score	No	%
Unsatisfactory	48	60
Satisfactory	32	40

It is clear from table (3) shows that 60% of the studied nurses had unsatisfactory total knowledge, and 40% satisfactory of total knowledge regarding HAI.

Table (4): Number and percentage distribution of the studied nurses according to nursing performance regarding HAI (No= 80).

Item	Incompetent		Competent	
	No	%	No	%
Hand washing				
Hand washing material available	57	71.2	23	28.8
Alcohol-based hand rub is readily accessible and placed in appropriate locations	70	87.5	10	12.5
Hand drying materials placed near the sink in an area that will not become contaminated by splashing	80	100.0	0	0.0
Cannula insertion				
Secure the IV line to prevent movement of catheter	78	97.5	2	2.5
Maintain the closed system	46	57.5	34	42.5
Blood glucose meter				
Hand hygiene is performed before and after the blood glucose meter.	80	100	0	0
Handling of specimens				
Follow aseptic techniques when collecting specimen.	60	75	20	25

In relation to studied nurses' performance regarding to hand hygiene, table (4) reveals that 71.2%, 87.5% and 100% respectively of them were incompetent regarding hand washing material, availability of alcohol hand rub and hand drying materials to do hand hygiene.

The studied nurses were incompetent in performance regarding to secure the intravenous line during cannula insertion (97.5%) to prevent movement of catheter,

As regard to studied nurse's performance regarding blood glucose meter, this table shows that 100% of nurses did not use hand hygiene in blood glucose testing, and 75% did not follow aseptic techniques when collecting specimen.

Table (5): Number and percentage distribution of the studied nurses according to their total performance regarding HAI (No= 80).

total performance	No	%
Incompetent	47	59
Competent	33	41

It is clear from table (5) that 59% of the studied nurses were totally incompetent in performance related to HAI, and only 41% of them had competent performance.

Table (6): Number and percentage distribution of the studied nurses according to their competency towards infrastructure management of their units (No= 80).

Infrastructure management	No	%
Incompetent	43	54
Competent	37	46

It is clear from table (6) revealed that, 54% of the studied nurses had incompetent score of infrastructure of their unit, while 46% of them had competent score in caring of the infrastructure of their units.

Table (7): Correlation between total knowledge of the studied nurses and their total performance regarding HAI.

Item	Performance	
	r	P-value
Knowledge	0.71	0.02*

(*) *Statistically significant at p<0.05.*

Table (7) illustrates a positive correlation between total knowledge of the studied nurses and their total performance regarding HAI at $p < 0.05$.

Discussion

The finding of the current study regarding demographic characteristics of the studied nurses revealed that most of them were females. Meanwhile, above one third of the studied sample was graduated from nursing secondary school. This finding was supported by *Askarian (2014)* who had a study about knowledge and practice among Iranian nurses and students regarding standard isolation precautions, and mentioned that the majority of students were females. This may be due to no male nurses were working in the neonatal intensive care unit and pediatric surgical and medical units.

The finding of the current study revealed that one third of them were in the age group of 20 to 25 years, This may be because the neonatal intensive care unit is a newly opened since 3 years and all nurses working in this unit were recently graduated. This finding was supported with the finding of *Sreedharan et al., (2011)* who carried a study entitled "Knowledge about standard precautions among university hospital nurses

in the united Arab Emirates" and mentioned that one third of the studied nurses between 20 to 30 years old.

The finding of the current study showed that nearly less than half of the study subjects having experience of 5 years to less than 10 years in nursing field, this finding was un supported with the finding of Taheri and *Jokar (2007)* who studied the comparison of knowledge of students and nursing staff in relation to hospital infections, and mentioned that that most of sample has less than 5 years of employment in the hospital.

The finding of the current study revealed that two third of the studied nurses attended training courses on infection control, *Ebied (2011)* added in a study about impact of blood-borne diseases prevention program on compliance with infection control standard precautions among nurses in family health centers, and found that more than half of nurses attended infection control course.

Nurses' knowledge regarding to infection control about definition, microbe's causes, and types and susceptible for HAI, the current study showed that the majority of the studied nurses had unsatisfactory knowledge definition and microbe's causes infection. This result unsupported by *Ibrahim et al., (2011)* who carried a study entitled "assessment of infection control practices in neonatal intensive care unit" and found that the majority of their studied group aware with, what infection is and how it is transmitted.

As regard to the safe injection the current study showed that more than three quarter of the study sample had unsatisfactory knowledge regarding safe injection. This finding unsupported with *Potter et al. (2016)* which emphasized on the importance of keeping the needle and syringe sterile. Because any part of the syringe that touched becomes contaminated if any parts by accident touched the syringe and needle was no longer sterile in the current study.

Regarding to performance of hand hygiene the majority of them were incompetent to do hand hygiene according to five moments. This may be due to lack of awareness to the importance of hand washing. These findings are not supported by *Shinde and Mohite (2014)* who reported that approximately half of the respondents had good attitudes in the five moments of hand hygiene among nursing staff and students at a tertiary care hospital. This may be due to continues audit of hand hygiene due to hand hygiene is one of the most important procedures for preventing the transmission of HAI, hand hygiene is a simple procedure which is instrumental in reducing HAI and cross transmission of pathogens in the hospitals.

As regard to maintenance of IV cannula insertion. The current study reveals that the majorities of nurses were incompetent maintenance of IV cannula

insertion regarding wipe the hub of cannula, didn't secure the line and not maintain the touch technique. This may be due to load of work due to shortage of nurses' number or lack of awareness about the importance of these measures. This is not supported with *Mohamed (2011)* who carried study entitled "Knowledge and practices of nursing regarding hand washing and use of gloves in Alexandria hospitals" and reported that staff nurses were competent with infection control measures after the insertion of peripheral intravenous catheter such as covering the insertion site and labeling it with date and time of insertion.

In relation to studied nurse's practice regarding blood glucose meter, the current study reveals that the majority of them were incompetent regarding hand washing before and after the procedure and not cleaned or disinfected the devices after each use This may be due available written policy regarding cleaning and disinfected of infrastructure of hospital units. These findings are not in the same line with *CDC (2010)* that emphasized on the unsafe practices during assisted monitoring of blood glucose and insulin administration would contributed to transmission of HBV or have put persons at risk for infection include using finger stick devices for more than one person using a blood glucose meter for more than one person without cleaning and disinfecting it in between uses. Using insulin pens for more than one person failing to change gloves and perform hand hygiene between finger stick procedures. This may be due to inadequate information about the importance of cleaning and disinfection of blood glucose monitoring to prevent the transmission of blood disease viruses.

The current study illustrated majority of the studied sample was incompetent in caring of infrastructure of their units. This finding was rationalized by a study done by *Mehta et al (2014)* proposed that it was necessary for head nurses and staff nurses to

have guidelines for the disinfection and sterilization procedures for their infrastructure with the aim to avoid infections. Moreover, it is important to give more emphasis on the planning of training and retraining courses directed to the improvement of technical knowledge and behavior regarding infrastructure.

It was observed from the current study that there was positive correlation between total knowledge of the studied nurses and their total performance regarding hospital acquired infection at $p < 0.05$. This study was not supported by the study of *El-Sayed et al (2015)* who carried study entitled " Nurses Knowledge and Practice for Prevention of Infection in Burn Unit at a University Hospital " and reported that the correlation between total nurses knowledge and practice regarding application of infection control measures was not significant except knowledge and practice of environmental cleaning there was a moderate positive correlation.

This study revealed that if pediatric nursing staff knowledge increase the performance of them improved about HAI measures and this could be improved by continues education and on-job training about standard precaution measures.

Conclusion

Based on the results of the present study, it can be concluded that almost two thirds of studied nurse had unsatisfactory knowledge as compared to more than one third of them had satisfactory knowledge regarding hospital acquired infection. More than half of the studied nurses were incompetent, while more than one third of them were competent in performance of applying measures regarding hospital acquired infection. On the hand, more than half of the studied nurses had incompetent scores in management of infrastructure of their unit. Meanwhile there was a positive correlation between total knowledge of the

studied nurse and the total performance regarding hospital acquired infection.

Recommendations

The current study recommended that updating knowledge and practice of nurses in work through:

- Continuous training programs about HAI.
- Strict follow up and observation of nurses' performance in applying of infection control standard precautions to prevent HAI.
- Emphasizing the importance of following latest evidence-based practices of infection control by continuing education and training programs.

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