

# KNOWLEDGE AND PRACTICE OF STANDARD PRECAUTIONS AMONG NEONATAL INTENSIVE CARE UNIT HEALTHCARE WORKERS OF MISURATA TEACHING HOSPITAL, LIBYA

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## ABSTRACT

Nosocomial infections persist as a major problem in neonatal intensive care units. Neonates in the NICU are vulnerable to many nosocomial infections from multiple devices for treating or monitoring their care. Thus, healthcare workers should have sound knowledge and strict adherence to infection control standard precautions. To assess the knowledge and practice of standard precautions among neonatal intensive care unit (NICU) healthcare workers in Misurata teaching hospital. A descriptive cross-sectional study was carried out on a sample of 28 consenting doctors, nurses and laboratory scientists in Neonatal Intensive Care Units of Misurata Teaching Hospital, Libya, during the period from March to May 2015. Data was collected through two tools: a) Structured questionnaire to assess knowledge level about standard precautions; and b) Performance observational checklist to assess practice of standard precautions. Data was analyzed using SPSS version 18. Majority of the studied HCWs are females (71.4%), belonged to the age group of 20-30 years (57.1%), with work experience less than 10 years (64.3%) and only 21.4% received infection control training. The overall mean knowledge score toward standard precautions is 68.4%, but mean practice score is 47.4%. And all scores are significantly lower among those who were non-trained. 89.3% of staff had good awareness in hand hygiene moments, 53.6% aware of hand washing steps, but only 32.1% actually practiced it right. While 85.7% of the staff had knowledge in use of personal protective equipments and fresh gloves, only 67.8% wore in practice. 53.6% knows about oral health care practices protocol, only 35.7% actually did it. 75% of the staff are aware of sterile technique in CVC care, 57.1% followed catheter care practices as per protocol. 64.3% are aware how to dispose wastes and sharps off in a right way, 46.3% did it frequently. While 85.7% are satisfied about instruments sterilization, only 39.3% of HCW reported that NICU environment is clean. There is inadequate knowledge and poor compliance with standard precautions of infection control among NICU health-care staff in Libya. It is very important to develop infection control policy and protocols that strengthen the training of HCW in standard precautions to improve not only their knowledge but also their practice.

**KEYWORDS:** Knowledge, Practice, Standard precautions, Neonatal Intensive Care Unit.

## INTRODUCTION

Hospital-acquired infection or Nosocomial infection refers to infections that may be acquired during the process of care and not manifested at the time of admission to a health care facility<sup>(1)</sup>. It is one of the leading causes of increased morbidity and mortality; longer duration of hospital/ICU stay; increased severity of the underlying illness; increased utilization of devices for monitoring and treatment; and increased cost of treatment<sup>(2)</sup>.

Hospital-acquired infections are a common occurrence in the neonatal intensive care unit (NICU). NICU is considered one of the high-risk areas in hospital that encounter high rate of infection and mortality<sup>(3)</sup>.

Neonates are more susceptible to infection because their host defense mechanisms are not mature. Also, they occupy an environment in which invasive interventions and antibiotics are frequently used. That often permit the invasion of common nosocomial pathogens, and the close proximity of patients in many NICUs facilitates transfer of organisms from patient to patient<sup>(4)</sup>.

It has also been suggested that the hands of healthcare workers play a significant role in the

transmission of nosocomial infection in NICUs, as *Pseudomonas aeruginosa*, a common nosocomial pathogen among neonates. However, in NICUs, modern neonatal nursing emphasizes the concepts of minimal handling coupled with clustering of nursing care<sup>(5)</sup>.

The implementation of infection prevention and control guidelines is important for the improvement of quality care in hospitals. Standard precautions are the basic infection control precautions that should be followed in any setting where health care is delivered<sup>(6)</sup>.

It is pertinent to mention here that little resources are required to implement standard precautions<sup>(7)</sup>. Hand hygiene practices of health care workers is the most important and an effective procedure in preventing nosocomial infection<sup>(8)</sup>. The recommendation on hand hygiene has recently been updated, and hand-washing has been replaced by hand rub as the standard of care<sup>(4)</sup>.

Implementation of standard precautions is dependent on the level of knowledge and compliance of healthcare workers, with a significant direct impact on the patient and HCW safety<sup>(9)</sup>. Failure to comply with policies and procedures that support the reduction of hospital acquired infections (HAIs) is a recognized problem. According to Centre for Disease Control (2002), limited knowledge, lack of facilities and poor working environment are commonly cited

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as barriers to compliance<sup>(7)</sup>. So, we conducted this study with the aim to assess the knowledge and practices of standard precautions among healthcare workers in the neonatal intensive care unit of Misurata teaching hospital.

## METHODS

### Study setting:

This study was conducted as an observational cross-sectional study at the neonatal intensive care unit of Misurata teaching hospital in Libya, during the period from March to May 2015.

### Study subjects:

Our study included 28 NICU health care workers, they were as follow: 11 nurses, 9 doctors, 5 house officers and 3 laboratory scientists.

### Ethical issue:

An informed consent was obtained from all participants in this study.

### Data collection:

The data was collected data using two tools: structured questionnaire: containing questions about: (i) Demographic characteristics: age, sex, profession, work experience and IC training Questions to assess their knowledge level about standard precautions.

They included knowledge of hand hygiene moments, hand washing steps, knowledge about use of personal protective equipment's and fresh gloves, oral health care practices protocol, sterile technique in CVC care, proper wastes and sharps disposal, instruments sterilization and environmental sanitation. (ii) Two questions about their satisfaction about instruments sterilization and environmental sanitation. B) Performance observational checklist: to assess their practice of standard precautions.

### Statistical analysis:

Data was analyzed by SPSS software version 18 and the results was summarized, presented and displayed as frequencies and percentage in suitable tables. Statistical analysis of qualitative data was performed using Chi-square test, while fisher exact test was used if there is an expected value in a cell < 5. Results were accepted as significant when ( $p < 0.05$ ).

## RESULTS

The Majority of the studied HCWs were females (71.4%), belonged to the age group of 20-30 years (57.1%), with experience less than 10 years (64.3%) and only 21.4% of them had received infection control training. They were as follow 39.3% nurses, 32.2% doctors, 17.8% house officers and 10.7% laboratory scientists (table 1).

Among the studied NICU health care workers, the overall mean knowledge score toward standard precautions was 68.4% and the knowledge scores are significantly higher among HCWs who had received training on infection control than that among those who were not trained (91.7% and 63.1% respectively).

(Table 1) Relevant Characteristics of the Studied NICU Health Care Workers.

Relevant Characteristics	Total NICU HCWs N. (28)	
	Freq.	%
<b>Age</b>		
20 - 30	16	57.1
> 30 - 40	8	28.6
> 40	4	14.3
<b>Sex</b>		
Male	8	28.6
Female	20	71.4
<b>Type of healthcare worker</b>		
House officers	5	17.8
Doctor	9	32.2
Nurse	11	39.3
Laboratory scientists	3	10.7
<b>Work experience</b>		
< 10	18	64.3
≥ 10	10	35.7
<b>Received IC training</b>		
Yes	6	21.4
No	22	78.6

89.3% of staff had good awareness in hand hygiene moments and 53.6% were aware of hand washing steps. While 85.7% of the staff had knowledge in use of personal protective equipments and fresh gloves, 53.6% knows about oral health care practices protocol, 75% of the staff are aware of sterile technique in CVC care, 64.3% were aware how to dispose wastes and sharps off in a right way, 71.4% had knowledge about instruments sterilization and only 53.6% of HCW reported knowledge about proper environmental sanitation (table 2).

(Table 2) Knowledge of Standard Precautions among the Studied NICU Health Care Workers.

Knowledge of Standard Precautions	Trained 6 (21.4 %)		Un-trained 22 (78.6 %)		Total NICU HCWs N. (28)		P. value
	N.	%	N.	%	N.	%	
Hand hygiene moments	6	100	19	86.4	25	89.3	0.94
Hand washing steps	6	100	9	40.9	15	53.6	0.013*
Use of personal protective equipments	6	100	18	81.8	24	85.7	0.71
Oral health care practices protocol	5	83.3	10	45.4	15	53.6	0.049*
Sterile technique in CVC care	5	83.3	16	72.7	21	75	0.52
Proper wastes and sharps disposal	6	100	12	54.5	18	64.3	0.024*
Instruments disinfection and sterilization	5	83.3	15	68.2	20	71.4	0.43
Environmental cleaning	5	83.3	10	45.4	15	53.6	0.049*
Mean Overall Knowledge	5.5	91.7	13.9	63.1	19.1	68.4	<0.001*

Majority of NICU health care workers are satisfied about instruments sterilization (85.7%), but only 39.3% of HCW reported that NICU environment is clean (table 3).

**(Table 3)** Satisfaction of NICU Health Care Workers about Instruments Sterilization and the Quality of Environmental Sanitation

Satisfaction	Total NICU HCWs N. (28)	
	N.	%
Instruments Sterilization	24	85.7
Quality of Environmental Sanitation	11	39.3

The overall mean practice score of standard precautions among NICU health care workers is 47.4% and the practice scores are significantly higher among

those who were trained on infection control than that among those who were not trained (76.2% and 39.6% respectively). Only 32.1% actually practiced hand hygiene as protocol, 67.8% wore protective equipments and fresh gloves in practice, 35.7% practice oral health care practices as per protocol, 57.1% followed catheter care practices as per protocol. 46.3% frequently dispose wastes and sharps off in a right way, 64.3% frequently use sterilized instruments and only 28.6% of HCW follow environmental cleaning as recommended (table 4).

**(Table 4)** Practice of Standard Precautions among the Studied NICU Health Care Workers

Practice of Standard Precautions	Trained 6 (21.4 %)		Un-trained 22 (78.6 %)		Total NICU HCWs N. (28)		P. value
	N.	%	N.	%	N.	%	
Hand hygiene steps	4	66.6	5	22.7	9	32.1	0.035*
Use of personal protective equipments	6	100	13	59.1	19	67.8	0.046*
Oral health care practices protocol	3	50	7	31.8	10	35.7	0.36
Sterile technique in CVC care	5	83.3	11	50	16	57.1	0.16
Proper wastes and sharps disposal	5	83.3	8	36.3	13	46.4	0.031*
Instruments disinfection and sterilization	5	83.3	13	59.1	18	64.3	0.27
Environmental cleaning	4	66.6	4	18.2	8	28.6	0.038*
Mean Overall Practice	4.6	76.2	8.7	39.6	13.3	47.4	<0.001*

## DISCUSSION

Nosocomial infections are being a common problem all over the world. It is a continuing problem in intensive care units causing increased morbidity, mortality and excess health care cost<sup>(4)</sup>. Therefore, increase knowledge and improve practical HCWs' skills can play important roles in preventing nosocomial infection. HCWs in neonatal intensive care units should practice standard precautions on a day-to-day basis as an integral part of patients' care<sup>(10)</sup>. Officials at the CDC estimate that one third of all nosocomial infection are caused by a lack of adherence to established infection control practices and standard precautions<sup>(4)</sup>. So, our study attempted to assess the level of knowledge as well as the practices of neonatal intensive care unit healthcare workers regarding standard precautions.

As demonstrated from the current study, nearly 57.1% of the studied HCWs aged between 20 to 30 years old. This finding is in concordance with that of Eskander et al<sup>(10)</sup> who studied knowledge and practices regarding standard precautions among Egyptian cancer hospital intensive care nurses, and founded that about two thirds of them was 20-30 years. Also it is similar to that of Sreedharan et al<sup>(11)</sup> in the United Arab Emirates and that of Efstathiou et al<sup>(12)</sup> which studied compliance of Cypriot nurses with standard precautions. While, Labrague et al<sup>(13)</sup>, found in their study that the mean age was slightly lesser. This young age of the studied sample reflect the ability to acquire knowledge and change their practices based on submission of IC training. In this

regards Alwutaib et al<sup>(14)</sup> revealed that older age is an important determinant of lower knowledge levels. Concerning gender, our study revealed the dominance of females among HCWs (71.4%), with work experience less than 10 years (64.3%). These findings are in agreement with that of Eskander et al<sup>(10)</sup>, Labrague et al<sup>(13)</sup>, Vaz et al<sup>(15)</sup>, and Hamid et al<sup>(16)</sup>, who founded also the dominance of females among their studied samples. As well, Eskander et al<sup>(10)</sup> and Kennedy et al<sup>(5)</sup>, found the great majority of their studied sample had work experience less than 5 years.

The present study revealed unsatisfactory level of knowledge among NICU health care workers. The overall mean knowledge score toward standard precautions is 68.4%. These results are in agreement with the findings of Eskander et al<sup>(10)</sup> and Qayyum et al<sup>(17)</sup> in their studies, who found poor knowledge about nosocomial infections and standard precautions measures among the studied HCWs. However, on contrary to our findings, Ibrahim et al<sup>(18)</sup>, revealed that majority of their studied group were aware of nosocomial infections transmission and standard precautions. In this regards Perry and Potter<sup>(19)</sup> concluded that increasing nurses' knowledge about standard precautions can intervene to prevent developing of infections.

In this study, 89.3% of staff had good awareness in hand hygiene moments and 53.6% were aware of hand washing steps, but only 32.1% actually practiced it right. A similar study conducted by Sharma et al<sup>(20)</sup> demonstrated that 86% was aware of all five

moments of hand hygiene and 80% knew all steps of hand washing as stated by the WHO. But only 24 per cent of the ICU staff actually followed all five moments of hand hygiene. These practices were almost similar to Mikatti et al<sup>(21)</sup>, which showed that although staff were well aware of proper hygienic practices, their performance was below the accepted recommendations. The modern NICU nursing concepts promoted minimal-handling protocol and clustering of nursing care. Study by Pittet et al showed that high demand for hand hygiene combined with high workload were the most significant risk factors for noncompliance<sup>(22)</sup>.

Our study showed that 85.7% of the staff had knowledge in use of personal protective equipments and fresh gloves. While, only 67.8% wore in practice. This was in line with the findings of Kennedy et al<sup>(5)</sup> and Sharma et al<sup>(20)</sup>, where healthcare workers surveyed also demonstrated high knowledge of in the usefulness of gloves to prevent the spread of infection, but the reported actual use of gloves was low. Gloves and PPE are equally essential to protect health care workers and patient too from cross infection through reducing the risk of exposing skin or mucous membranes to potentially infectious materials such as blood and other body fluids.

The present study had also established a link between patient's oral hygiene and infection control. About 53.6% of studied group satisfying knowledge about oral health care practices protocol, but only 35.7% actually did it in practice. The results were similar to Sharma et al<sup>(20)</sup> demonstrated that 80% of the staff had knowledge about patient's oral health care practices, 44% of the staff followed it as per the protocols.

In this study, a disconnect existed between central venous catheter care knowledge and practice. Although participants demonstrated high knowledge of appropriate CVC care (75%), the reported actual practice of such procedures as per protocol was low (57.1%). These results were in agreement with the findings of many studies conducted by Kennedy et al and Sharma et al<sup>(5,20)</sup>.

As revealed from the current study, about two thirds of the studied sample (64.3%) were aware how to dispose wastes and sharps off in a right way, only 46.3% frequently dispose them off in practice right way. That is in line with other similar studies conducted by Sharma et al<sup>(20)</sup>, Eskander et al<sup>(10)</sup>, and Kermodé et al<sup>(23)</sup>. In this regards, Schmid et al<sup>(24)</sup>, and Efstathiou et al<sup>(12)</sup> recommended that needles never should be recapped, as this could poses a serious danger through needle-stick injuries.

This study showed that 71.4% of HCWs had knowledge about instruments sterilization and 53.6% of them reported knowledge about proper environmental sanitation. While, only 64.3% frequently use sterilized instruments and only 28.6% of HCW follow environmental cleaning as recommended. On the same line with this finding was,

Ahmed et al<sup>(25)</sup> illustrated that nurses and laboratory technicians had unsatisfactory knowledge and practice. However, Alwutaib et al<sup>(14)</sup> reported acceptable knowledge level and practice about sterilization and environmental sanitation. Majority of NICU health care workers in our study were satisfied about instruments sterilization (85.7%), but only 39.3% of HCW reported that NICU environment is clean. Only 21.4% of the studied HCWs had received infection control training. The knowledge scores were significantly higher among HCWs who had received training on infection control than that among those who were not trained (91.7% and 63.1% respectively). Also, the practice scores were significantly higher among those who were trained on infection control than that among those who were not trained (76.2% and 39.6% respectively). This was in agreement with Kable et al<sup>(26)</sup> who found that just one-third of their studied nurses attended training courses about infection control, expressing more poor knowledge level and practices. However, Ebied<sup>(27)</sup> found that more than half of nurses attended infection control courses. Attending training programs increase the HCWs' knowledge and refine their practices which are helpful in preventing infection in ICU. So, training programs should be conducted in the hospital. This was also recommended by Eskander et al<sup>(10)</sup> and Sharma et al<sup>(20)</sup> who stressed on continuing nursing training programs especially in carrying out procedures that require strict aseptic techniques.

## CONCLUSION

There is inadequate overall knowledge level and poor compliance with standard precautions of infection control among NICU health-care staff in Libya especially among those who didn't receive training on infection control. A disconnect existed between knowledge and practice, inspite of having high knowledge about some IC standard precautions, their practices didn't reach satisfactory level.

## RECOMMENDATIONS

It is very important to develop infection control policy and protocols that strengthen the training of HCW in standard precautions to improve not only their knowledge but also their practice. Also, we recommend strict observation of HCWs' performance of infection control standard precautions to correct poor practices when required.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

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