

**KNOWLEDGE AND COMPLIANCES OF NURSES REGARDING METHICILLIN  
RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) INFECTION IN KIDNEY CENTER  
SERVICES**

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**ABSTRACT**

**Background:** Methicillin Resistant Staphylococcus Aureus (MRSA) infection is a serious nosocomial infection, which is preventable, and it is one of the most nosocomial pathogens worldwide. The health care workers can acquire this infection from patients during provision of health care services. **Aims:** This study aimed to assess knowledge and practices of nurses regarding MRSA prevention in the kidney services center. **Methodology:** Across sectional study was conducted in kidney services center, the data collected by fill the self- questionnaire about MRSA and its prevention. It included 58 nurses randomly selected to fill the questionnaire. These data collected from March to June 2019 and these data were analyzed by SPSS (20). **Results:** This study indicated that participants have poor knowledge level with regard to MRSA and its prevention, which is 32.7%. Besides, this study indicated that years of experience and level of education did not have a significant influence on the knowledge level of nurses regarding MRSA prevention guidelines, however, there is a positive association between years of experience and nurse's knowledge about ability of asymptomatic MRSA infected people can spread infection to others. On the other hands, this study reported that nurses have a good practices regarding MRSA prevention. Also, No relation was observed between Qualification level and nurses' attitude and practices. Also, no statistical association between years of experience and nurse's attitude and practice. **Conclusion:** It is a clear that there is a need for conducting educational programs on nosocomial infections for all health care workers to improve their knowledge and awareness and encourage their adherence towards reducing nosocomial infections in general and MRSA infection in particular.

**INTRODUCTION**

"Methicillin-Resistant Staphylococcus Aureus" (MRSA) has become a highly common infection in health care settings across the world (Warren, 2004), and it had first been recognized in the US in the late 1960s (Boucher, 2007).

MRSA leads to elevate the death rate in hospitals (CDC, 2019a). Moreover, it causes increased healthcare costs related to the admission and isolation of colonized patients (KimT 2001). Besides, it leads to an increase in the length of stay in hospital (Anne et.al., 2017 and Cosgrove et al., 2005).

MRSA is transmitted directly from one person to another, or indirectly, from person to contaminated things (CDC, 2013). The hands of health care workers play an essential role as a vector for MRSA infection

transmission (Warrel, 2012), and they put the hosts at risk for colonization. Furthermore, according to several studies, about 90% of workers who carry S. Aureus will also carry the bacteria on their hands causing contamination of the surrounding environment (Dancer, 2008; Rohr et al., 2009). Therefore, Healthcare workers are responsible for MRSA transmission in health care settings (Fluit and Schmitz, 2003). As a result, HSE recommended that the number of healthcare workers who are in direct contact with colonized or infected patients with MRSA should be kept to a minimum (Crowe et al., 2012).

Furthermore, MRSA can survive on surfaces and equipment such as fomites, towels, razors, as well as in the surrounding environment, for days and weeks. Also, it can persist for months on dry surfaces (Kramer et al., 2006). Dietze (2001) indicated that MRSA can survive

on sterile goods packages for more than 38 weeks; Staphylococcus and Enterococcus survive on commonly used hospital plastic and fabrics. In addition to this, Huang et al. (2006) reported that MRSA survives on plastic patient charts for 11 days, and on the tabletop and cloth curtain for 12 and 9 days respectively.

Snyder et al. (2008) found that 17% of medical staff carry this type of bacteria on their gowns and gloves. They also indicated that the risk of MRSA detection is increased in the rooms where endotracheal intubation, endoscopic gastrostomy, and jejunostomy tube are performed.

Roghamann et al. reported that 113 out of 403 nurses have been found MRSA colonized. In addition, they found that contamination of gloves was higher than gown contamination, namely 24% compared to 14%. Additionally, they reported that high risk activities for MRSA were dressing, linen changing, patient transferring and hygiene (Roghamann et al. 2015).

Therefore, CDC (2019) and HSE (2011) recommended that colonized or infected patients with MRSA should be isolated in private rooms in order to prevent MRSA transmission in health care setting. Worby et al., (2013) indicated that MRSA transmission can be reduced by 64% by adopting isolation and decolonization measures together. Therefore, it can rightfully be said that the above mentioned measures could be considered extremely effective in decreasing MRSA transmission rate.

Conversely, hand hygiene is the most effective way to reduce the risk of MRSA transmission, because workers in healthcare setting contaminate their hands by direct or indirect contact with infected patients. Between 2006 and 2011 Al Tawfiq et al., (2013) conducted an intervention study and found that rates of hand hygiene compliance was increased from 38% in 2006 to 83% in 2011, resulting in decreased rates of MRSA infections associated with health care workers (the decrease in infections was from 0.42 in 2006 to 0.08 in 2011). However, Lee et al., (2013) reported that the rate of MRSA infection kept decreasing 15% per month during the intervention phase of screening and decolonization strategy, while hand hygiene practice did not lead to a significant decrease in the infection rate, but rather, this rate remained unchanged during this phase of intervention. On the other hand, combined intervention strategies together have been identified to result in decreased MRSA infection rate to 18% per month.

**AIM:** This study aims to assess nurses' knowledge level and practices with respect to MRSA infection.

## METHODS AND MATERIALS

**Study Site:** This study was conducted in Al-Hawari Kidney Services Centre in Benghazi, Libya.

**Study Design:** The study design involves descriptive research based on a quantitative and cross-sectional approach.

## Method of Data collection

The data was collected between March and June 2019 by using a multiple-choice questionnaire to evaluate the nurses' knowledge, attitudes and practices regarding MRSA control prevention. The survey includes four sections;

- Section one: Involves socio-demographic information of the participants, including age, gender, years of experience, and qualifications level.
- Section two: Involves 8 questions about practices that must be adopted in order to prevent and control MRSA.

**Target population and sample size:** The total number of participants includes 71 workers divided into 4 groups: Group A includes 27 workers in the morning shift and Group B includes 27 workers in the afternoon, 10 nurses in Al Lithy branch and 7 nurses in the Sidi Younis branch of this center. The sample size included in the questionnaire was 58.

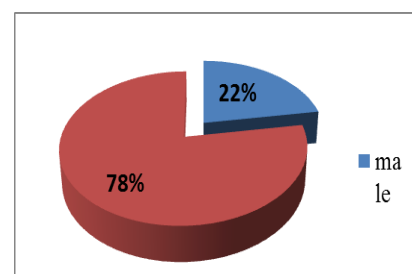
**Statistical analysis:** The study uses statistical package for social sciences (SPSS) version 22 software to analyze the collected data. The frequency and percentage of each question were determined. Furthermore, ANOVA test was used to assess the relationship between nurses' knowledge, attitudes and practices and some other variables.

**Ethical consideration:** This study was conducted after getting permission letter from the manager of Al-Hawari kidney services center. This permission was obtained after sending a preliminary request letter from university of Benghazi to the manager of this center.

## RESULTS AND FINDINGS

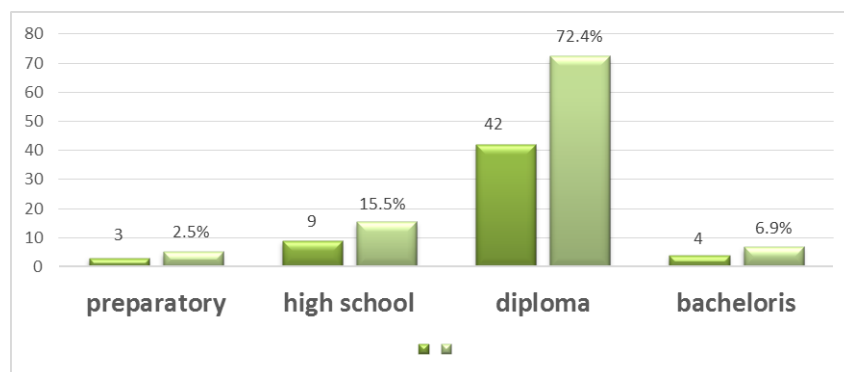
### 3.1 Demographic information

Figure 3.1 shows that more than half of the sample were females (N=45, 78%) and 22% (N=13) were males.



**Figure 3.1: Respondents Frequency and Percentage Distribution (according to gender).**

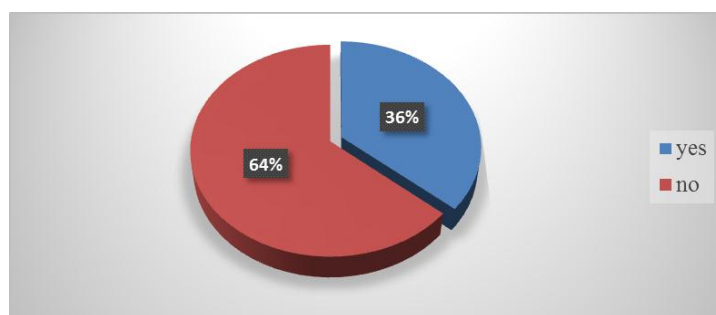
Figure 3.2 shows the largest proportion of the sample (N=42, 72.4%) held a diploma degree, 15.5% (N=9) were high school graduates, (N=4, 6.9%) had bachelor's degree, and 5.2% (N=3) had preparatory degrees.



**Figure 3.2: Respondents Frequency and Percentage.**

#### Distribution (according to the level of education)

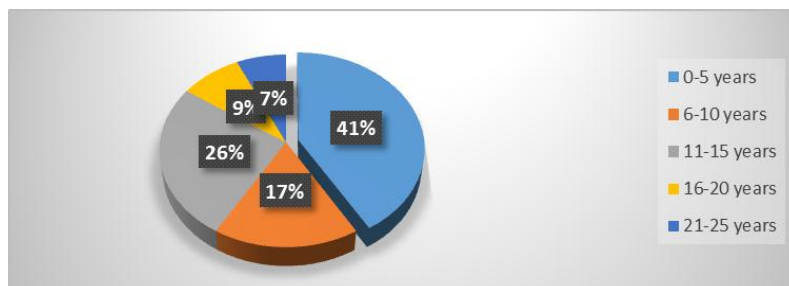
Figure 3.3 show that more than half of the sample (63.8%) do not work in other institution, while (36.2%) work in other institution.



**Figure 3.3: Percentage and frequency of nurses work in other institution.**

Figure 3.4 represents the respondents' experience in terms of years, which ranged from 1 to 25 years; the largest part of the sample had 0-5 years experience (N=24, 41%); the next groups had 11-15 years with 26%

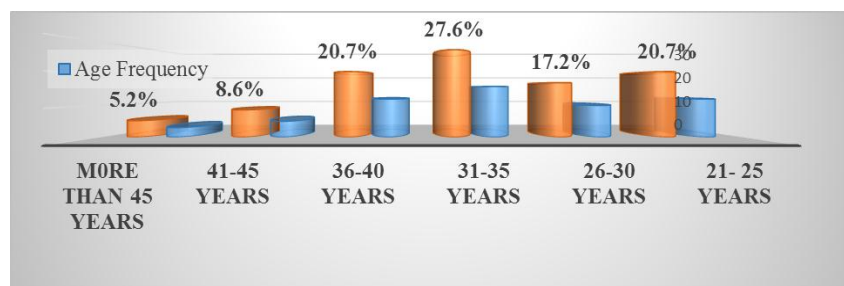
(N=15), 6-10 years (N=10, 17%) and 9% (N=5) were 16-20 years. The smallest section was (N=4, 7%) for 21-25 years.



**Figure 3.4: Respondents Frequency of Workers (according to the years of experience).**

Figure 3.5 demonstrates that the largest number of nurses (N=16, 27%) had 31-35 years of experience, and 20.7% (N=12) had both 21-25 year and 36-40 years of

experience; the next categories are 26-30 year 17.2% (N=10); 41-45 year (N=5, 8.6%), and (N=3, 5.2%) for more than 45 years of experience.



**Figure 3.5: Respondents Frequency of Workers (according to the age).**

### First part: Knowledge level of nurses regarding MRSA

According to table 3.1, the knowledge level of nurses about the importance of preventing MRSA transmission

before contact with patients was 32.7% at Al-Hawari Kidney Services Center in 2019, with high scores observed in Q4.

**Table 3.1: Nurses' Frequency and percentage Distribution to questions of evaluating MRSA prevention.**

Knowledge questions	Answers	frequency	%
Q1 MRSA stands for	Correct answer	4	6.9
	Incorrect answer	54	93.1
Q2- MRSA IS	Correct answer	8	13.8
	Incorrect answer	50	86.2
Q3- MRSA infection transmission	Correct answer	7	12.1
	Incorrect answer	51	87.9
Q4 preventing MRSA infection transmission BEFORE contact with MRSA patients	Correct answer	42	72.4
	Incorrect answer	16	27.6
Q5-The most effective hand hygiene technique in killing germs are	Correct answer	12	20.7
	Incorrect answer	46	79.3
Q 6- How long can MRSA live outside the body	Correct answer	5	8.6
	Incorrect answer	53	91.4
Q7-Asymptomatic MRSA infected people can spread infection to others	Correct answer	35	60.3
	Incorrect answer	23	39.7
Q8-MRSA nasal carriers should be treated with	Correct answer	21	36.2
	Incorrect answer	37	63.8
Q9- A patient with MRSA infection or colonization should not be discharged home before infection/colonization eradication	Correct answer	37	63.8
	Incorrect answer	21	36.2
<b>Mean of the knowledge level</b>		<b>32.7%</b>	

According to the results of ANOVA test there is no association between qualification level and nurses'

knowledge of MRSA except Q1 and Q9, where the p values were less than 0.05. (see table 3.2).

**Table 3.2: Results of ANOVA test for examining association between respondents' knowledge of MRSA prevention and qualification level.**

Questions	Mean Square	F	Sig.
Q1	.360	7.364	<b>.000</b>
	.049		
Q2	.201	1.724	.173
	.117		
Q3	.037	.332	.802
	.112		
Q4	.264	1.322	.277
	.200		
Q5	.149	.885	.455
	.168		
Q6	.120	1.533	.216
	.078		
Q7	.412	1.760	.166
	.234		
Q8	.260	1.115	.351
	.234		
Q9	.705	3.374	<b>.025</b>
	.209		

According to table 3.3. There is a positive relationship between years of experience and nurses' knowledge of

Q7, while there is no relationship with other knowledge questions. (Table 3.5)

**Table 3.3: Results of ANOVA test for examining association between respondents' knowledge of MRSA prevention and years of experience.**

Questions	Mean Square	F	Sig.
Q1	.048	.716	.585
	.067		
Q2	.089	.719	.583
	.123		
Q3	.047	.419	.794
	.113		
Q4	.313	1.607	.186
	.195		
Q5	.181	1.094	.369
	.166		
Q6	.026	.303	.874
	.084		
Q7	.572	2.615	<b>.045</b>
	.219		
Q8	.135	.555	.697
	.243		
Q9	.103	.422	.792
	.245		

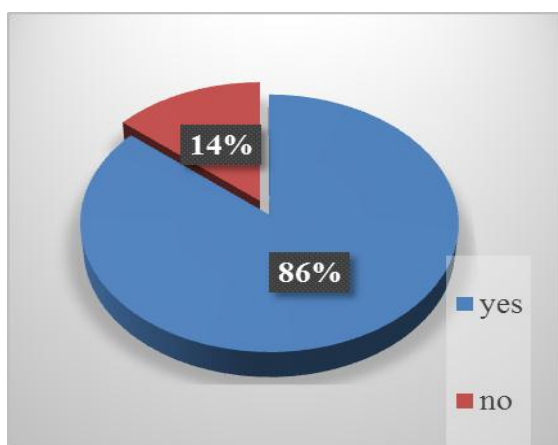
According to table 3.4, no relationship has been observed between gender and nurses' knowledge regarding MRAS prevention.

**Table 3.4: Results of the ANOVA test for examining the association between respondents' knowledge of MRSA prevention and gender.**

	Mean Square	F	Sig.
Q1	.001	.016	.900
	.066		
Q2	.004	.034	.853
	.123		
Q3	.018	.168	.683
	.110		
Q4	.017	.082	.775
	.207		
Q5	.047	.279	.600
	.169		
Q6	.001	.018	.895
	.082		
Q7	.002	.010	.922
	.248		
Q8	.726	3.211	.079
	.226		
Q9	.726	3.211	.079
	.226		

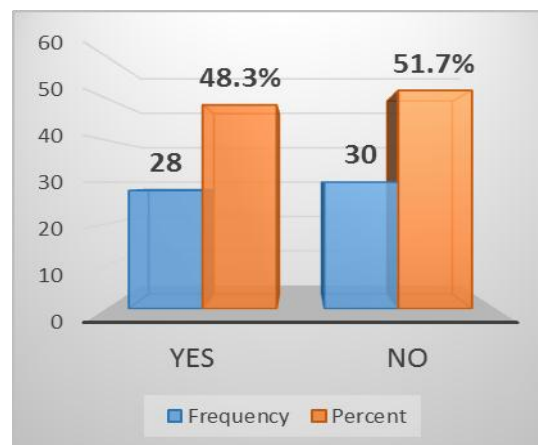
#### **Second part: Nurses' practices regarding MRSA prevention:**

Figure 3.6 show that most nurses (86.2%) wore gloves when dealing with MRSA infected patients, while (13.8%) did not wear gloves when dealing with MRSA infected patients. Also, Figure 3.7 shows that most nurses (N=30, 51.7%) did not wear a gown when entering a MRSA isolation room, while the rest of 48.3%(N=28) nurses wore a gown when entering a MRSA isolation room.



**Figure 3.6 percent and frequency for consistently wearing gloves when dealing with MRSA infected patient.**

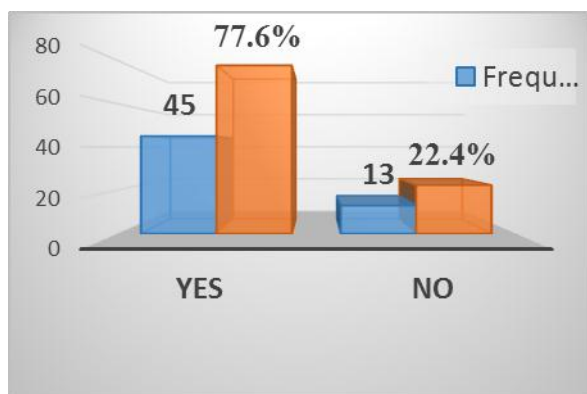
Figure 3.8 demonstrates that the largest number of nurses- 77.6% (N=45) consistently perform hand hygiene before touching a patient with MRSA infection, while (N=13, 22.4%) of nurses are not consistently performing hand hygiene before touching a patient with MRSA infection.



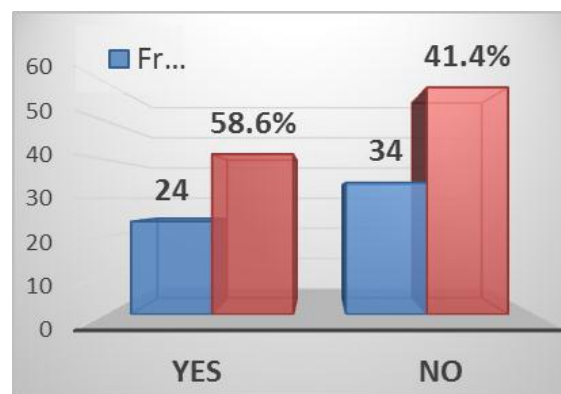
**Figure 3.7 percent and frequency for consistently wearing a gown when entering a MRSA isolation room**

Figure 3.9 represents 58.6% (N=34) of other staff members who do not wear a gown when entering a MRSA isolation room, compared to 41.4% (N=24) members who wear a gown when entering a MRSA isolation room.





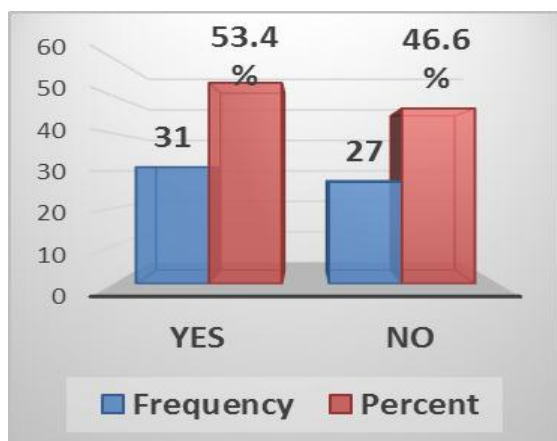
**Figure 3.8: Percent and frequency for consistently performing hand hygiene before touching a patient with MRSA infection**



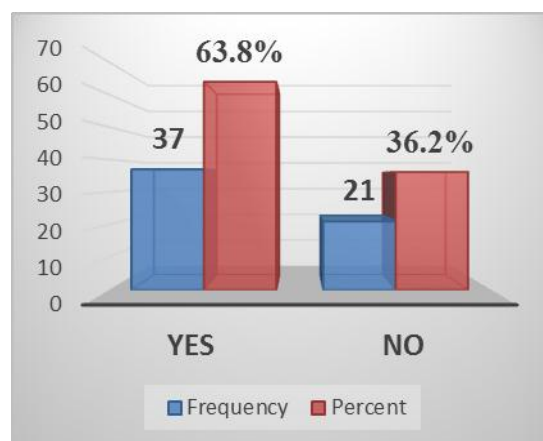
**Figure 3.9: Frequency and percent of other staff members who consistently wear a gown when entering a MRSA isolation room.**

Figure 3.10 shows 53.4% (N=31) of other staff members consistently performing hand hygiene before touching a patient, while 46.6% (N=27) are not consistently performing hand hygiene before touching a patient. Figure 3.11 shows that 21, or (36.2%) of nurses do not

consistently perform hand hygiene after touching a patient with a MRSA infection, while 63.8% (N=37) consistently perform hand hygiene after touching a patient with a MRSA infection.

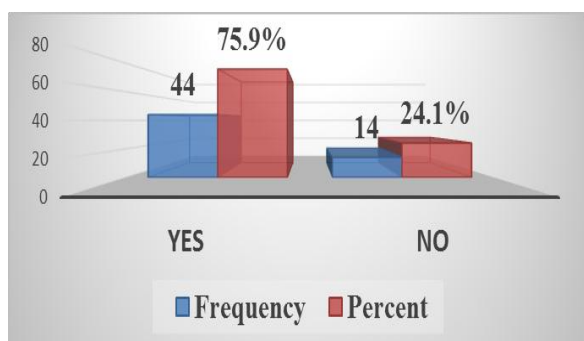


**Figure 3.10 frequency and percent of other staff members who consistently perform hand hygiene before touching a patient with MRSA infection.**



**Figure 3.11 frequency and percent of other staff members who consistently perform hand hygiene after touching a patient with a MRSA infection.**

Figure 3.12 shows that 75.9% (N=44) of other staff members consistently wear gloves when dealing with MRSA infected patients, while (24.4%) do not wear gloves when dealing with MRSA infected patients.



**Figure 3.12 percent and frequency of other staff members consistently wear gloves when dealing with MRSA infected patient.**

## DISCUSSION

### Nurses Knowledge regarding MRSA prevention

According to the current study, the knowledge level of nurses in Kidney Services Center is low. The knowledge level had been measured in several studies. Seibert (2013) evaluated the knowledge of medical staff regarding MRSA transmission and prevention in the acute care unit and he found an excellent knowledge level of about 98.1%. Furthermore, Herimat assessed the knowledge level of health care workers regarding prevention strategies for MRSA in 13 governmental hospitals in West Bank Governmental. The sample included 331 workers ( physicians, nurses, pharmacists, midwives and technicians). He found that workers have poor knowledge level regarding MRSA (of about 60.7%), with the highest knowledge level being reported for physicians (84.8%), and the lowest level reported for midwives and nurses ( 25% and 54.2% respectively) (Herimat, 2016). In 2017, another study conducted by

Suss to test the nurses' knowledge level, their attitudes, and compliance to MRSA control and prevention at College of Nursing of University of Southern Mississippi. It found that nurses had adequate level of MRSA knowledge, but they lacked knowledge regarding MRSA antibiotic treatment (Suss, 2017). Moreover, Kheder (2012) evaluated the knowledge and practices of MRSA prevention among 300 medical staff of different departments in Khartoum state hospitals and found a poor knowledge level (58.7%) of many aspects of MRSA. also the author found that only 7.3% knew that MRSA stands for Methicillin Resistant Staphylococcus Aureus. On the other hand, Lloyd et al., (2016) reported insignificant differences in the level of knowledge of MRSA in sophomore and senior level baccalaureate nursing students, in which the seniors were approximately two years older than the sophomores. The researchers found that the knowledge level was similar in the two groups mentioned above, and that the knowledge did not change as the students progressed in their education (Lloyd et al., 2016).

#### **Nurses knowledge level and qualification level**

The present study found that the knowledge level of some aspects was associated significantly with the qualification level, and Esther et al. (2017) reported that this knowledge level has a positive relationship with education level, with higher scores reported among registered nurses and nurses with master's degree (Esther et al., 2017)

#### **Nurses knowledge level and years of experience**

The results of the ANOVA test in this study reported that years of experience did not have correlation with nurses' knowledge level except with their knowledge about the asymptomatic carrier being able to transmit the infection. On the other hand, Esther et al. (2017) found positive association between nurses' knowledge level and years of experience (Esther et al., 2017).

#### **Nurses' knowledge level and gender**

The results of the current study showed that there is no significant difference between the gender of nurses and their knowledge score on MRSA. Similarly, Esther et al. indicated that gender did not have any correlation with the knowledge level (Esther et al., 2017).

#### **Nurses practices regarding MRSA prevention**

The findings of this study indicated that the percentage of nurses compliant with wearing gloves before contact with patients was 86.2%, and 77.6% of them were compliant with the hand hygiene requirements. The compliance with wearing gown was low, 48.3%. On the other hand, the practice after contact with patients was about 63.8% for hand hygiene. Furthermore, Seibert assessed the practices and found that practices for wearing gloves, gown and hand hygiene were 95.5%, 89.0% and 95.1% respectively. However, overall adherence to wear all of the pervious mentioned was 84.4% (Seibert, 2013). Besides, Suss found that 71.11%

of nurses wear gloves and 46% wear gloves when they enter an isolation room. He also found that only 44.4% of the sample perform HH before and after contact with patients. When they asked about their peers, the researcher found that **62.2% of their peers were wearing gloves, 44.4% wearing gloves** and 66.6% perform HH (Suss, 2017). Furthermore, Herimat reported poor practices for control measures of MRSA, which were about 26% of all sample adherence to all MRSA prevention practices. In other words, 36% of health care workers wear gowns when they are dealing with MRSA infected patient, 58.6% wear gloves when dealing with infected patients and 55.4% performed hand hygiene before touching these patients. (Herimat, 2016)

#### **CONCLUSION**

The results of the current study showed that nurses have a very poor knowledge level (32.7%) regarding MRSA prevention and control. Besides, this study indicated that years of experience and level of education did not have a significant influence on the knowledge level of nurses regarding MRSA prevention guidelines except that there is positive association between years of experience and nurses' knowledge about the ability of asymptomatic MRSA infected people to spread infection to others. Furthermore, no relation was observed between the qualification level and nurses' attitudes and practices. Also, there was no statistical association between the years of experience and nurses' attitude and practices. In order to improve the awareness level of nurses, the local protocol should be implemented, and a training programme should be completed by all nursing personnel in this centre.

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