ORIGINAL ARTICLE

Knowledge of healthcare workers to prevent methicillin-resistant Staphylococcus aureus infection in hospitals of Thi-Qar Governorate, Iraq

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DOI: 10.4081/jphia.2023.2787

Abstract. Methicillin-resistant Staphylococcus aureus (MRSA) infection is considered one of the nosocomial infections that can infect patients and healthcare workers (HCWs) and negatively affect the quality of care provided in the hospital. Evaluate the knowledge of HCWs regarding the prevention of MRSA infection in Thi-Qar Governorate. A descriptive cross-sectional study was conducted for 362 HCWs randomly selected from four hospitals and distributed as follows: 125 from Nasiriyah Teaching Hospital, 80 from Al-Hussein Teaching Hospital, 80 from Al-Haboubi Teaching Hospital and 77 from Souk Al-Shuyoukh General Hospital during the period from October 1 (2022) to May 1 (2023) and data was collected by using self-reported paper-based questionnaires. Our study showed 68.8% of HCWs enjoyed a moderate level of knowledge, and there was a strong correlation (P-value <0.05), between knowledge and some sociodemographic and occupational characteristics of the participants, which include age, educational level, job title, years of service and workplace in the hospital. Additionally, a relationship between knowledge and the source of the MRAS information was demonstrated which is a highly significant association between the total knowledge score and the sources of information. The knowledge of MRSA infection prevention among HCWs was moderate.

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Key words: knowledge, health care workers, methicillin-resistant Staphylococcus aureus (MRSA)

Introduction

Methicillin was once known as an antibacterial that was used to treat many diseases brought on by S. aureus, but it fast gained popularity in medicine and later promoted the creation of bacteria strains that were resistant to it (1). MRSA infection rates among healthcare professionals in Iran varied from 16 to 35%. MRSA prevalence was 10.1% in Jordan, 73% in Saudi Arabia, and 22.5% in Iraq (2). According to the (CDC), there were 23.9 cases of invasive MRSA infection in every 100,000 people in the entire population in 2012, and there were around 3.1 fatalities in every 100,000 people (3). The significance of this issue is understated, and the proportion of relevant contemporary research on healthcare workers' knowledge, of MRAS infection prevention, is insufficient, Ten research done in Europe between 2004 and 2009 includes the majority of published studies measuring HCWs' knowledge (4).

It has been recommended that having the right knowledge along with a good attitude may enable you to utilize safety precautions at work, As a result, there may be a lower chance of developing the illness (5). The propensity of HCWs to regularly engage in preventative actions may be significantly influenced by their knowledge of MRSA (4). The great majority of responders (97 and 77%, respectively) had heard of MRSA and rated their knowledge as good, very good, or outstanding (6).

HCWs demonstrated a good degree of understanding of the infection prevention and control procedures that must be taken when caring for MRSA infections (7). In a 2010 study conducted by author Silva, 43.7% of the HCWs polled did not know fundamental knowledge about S. aureus' resistance to Methicillin (8). In the intensive care unit of a hospital in Nepal, the knowledge of the importance of MRSA among the HCWs was found to be (14%) (9). According to a survey conducted in Sri Lanka, the majority of participants (65.7%) knowledge about MRSA was unsatisfactory (10) Given that HAIs are spread through HCWs' hands, hand washing is one of the most successful means of infection prevention (11).

Only 45% of the 63 HCWs observed by researchers in the Netherlands were able to identify tasks to prevent the spread of MRSA, despite having an overall knowledge of preventative measures of 87% (4). A previous study discovered that HCWs who think MRSA causes severe diseases to engage in better prevention strategies (12). In the Kingdom of Saudi Arabia a study find (78.3%) of nurses had fair knowledge, whereas all nurses had a strong knowledge of hand washing thereafter (13).

According to information, HCWs in Al-Qassim, Saudi Arabia, lack an understanding of recommended hand hygiene practices (14). Incorrect knowledge about the degree of isolation needed for MRSA patients was never held by HCWs, according to British research (7). Another study finds HCWs lacked knowledge of a variety of MRSA-related topics, including its control (12). In two German areas There is enough knowledge of MRSA, according to nearly half of the doctors (45.6%) (15). In another study Nursing staff in the emergency room had the lowest knowledge of standard precautions as compared to staff in other departments, according to working units (7). However, a significant 51% of HCWs reported in a survey in Sweden, that they had learned about MRSA via publications and websites including the Internet and professional journals (16).

In Ethiopia HCWs with ten or more years of experience are 3.41 times greater than to be knowledgeable regarding infection control than those with fewer than five years of experience (17). Glove use, disinfection, and disposal were all topics that nurses had a good understanding of (71.7, 63.3, and 93.3%, respectively), and 60% of nurses report having solid knowledge according to a study in Saudi Arabia (13). In George Mason University found when asked how long MRSA may survive on surfaces outside of the body, 40% of HCWs received inaccurate answers (4). HCWs who have ever participated in infection control training were approximately 5.02 times higher probability to be knowledgeable regarding it compared to those who haven't (17).

Doctors had the most knowledge about antibiotic usage, perhaps because they were more aware of the connection between antibiotic usage and resistance and had easier access to recommendations (18). The majority of HCWs also properly recognized that MRSA may spread even by asymptomatic individuals (4). Therefore this study aims to assess the level of knowledge of HCWs to prevent (MRSA) infections in hospitals of Thi-Qar Governorate and determine the relationships between the knowledge and sociodemographic and Occupation characteristics.

Materials and methods

Study period. This study was performed from October 2022 and ended in May 2023.

Study design. A descriptive cross-sectional study design with an assessment approach was used to evaluate the level of HCWs' knowledge of preventing methicillin-resistant Staphylococcus aureus (MRSA) infection in some Thi-Qar Governorate Hospitals.

Inclusion criteria. All HCWs of all job titles who agreed to participate in the study.

Exclusion criteria. HCWs who are being selected for the pilot study and HCWs who disagree to participate in the study.

Sample size and sampling techniques. The four hospitals in Thi-Qar governorate select by using The simple random sample and it's (AL-Hussein Teaching Hospital, AL-Habboubi Teaching Hospital, and AL-Nasiriyah Teaching Hospital and addition to Suq Al-shuyukh General Hospital in Thi-Qar Governorate's Suq Al-shuyukh District).

The suggested sample size is 362, as determined by The suggested sample size is 362, as determined by Using Steven Thompson's equation as shown below:-

n=The minimum sample size
N=Community size 6200
Z=Standard degree=1.96
P=Rate of availability of property=0.50,
d=Error ration=0.05. (19)

$$n = \frac{N * P(1-P)}{N-1 * (d2 \div Z2) + P(1-P)},$$

The numbers of HCWs were calculated proportionally for each hospital, by taking the ratio of HCWs for a specific hospital to the total number of HCWs in all previously chosen hospitals was multiplied by the sample size to determine the proportion of HCWs working in each hospital.

The head of each department in each hospital provided a list of names of the HCWs. Then, using this list, a simple random sample was used to choose a sample from each hospital.

Data collection method. Data was collected using a self-report paper-based questionnaire once all necessary approvals had been obtained. Before asking the HCWs to fill out the questionnaire, the study's aim was fully described to them and their agreement was gained. Following that, it was given to each employee individually before being collected from the participants. The questionnaire included the following paragraphs:

Section one: Sociodemographic and Occupation Characteristics.
Section two: This section addresses the knowledge field and was evaluated using 16 questions.

Statistical analyses. Data for this study were collected using a questionnaire, and the answers to any question were put into coded sheets. The data was then entered by a computer and analyzed using the software SPSS-28 statistical tool. The data was displayed in simple frequency, percentage, mean, range (minimum and maximum values), and standard deviation measures. The significance of the difference in the various percentages (qualitative data) was tested using the Pearson Chi-square test (χ2-test). If the P-value had been equal or even less than 0.05, statistical significance was given consideration.

Ethical considerations. Before starting the study and data collection, permission from the Southern Technical University/Faculty of Graduate Studies/Basra research ethical committee according to Book No. 698 on 27/6/2022. To legally visit the hospitals in Thi-Qar Governorate, official approvals

Table I. The association between the total knowledge score and the socio-demographic characteristics of the participants.

	Total knowledge score						
	Poor knowledge (<30 score)		Moderate knowledge (30-38 score)		Good knowledge (>38 score)		
	No.	%	No.	%	No.	%	P-value
Age groups							<0.001*
<25 years	10	16.4	37	60.7	14	23.0	
25-29 years	20	10.9	132	71.7	32	17.4	
30-34 years	7	10.6	49	74.2	10	15.2	
35-39 years	7	25.0	17	60.7	4	14.3	
40-44 years	0	0.0	12	85.7	2	14.3	
≥45 years	0	0.0	2	22.2	7	77.8	
Gender							0.058
Male	24	13.4	113	63.1	42	23.5	
Female	20	10.9	136	74.3	27	14.8	
Education level							<0.001*
Preparatory	2	18.2	6	54.5	3	27.3	
Diploma	15	8.4	137	76.5	27	15.1	
BSc	25	16.8	92	61.7	32	21.5	
Higher Diploma	0	0.0	5	100.0	0	0.0	
MCs	1	9.1	9	81.8	1	9.1	
PHD	1	14.3	0	0.0	6	85.7	
Marital status							0.983
Single	22	12.4	121	68.4	34	19.2	
Married	22	11.9	128	69.2	35	18.9	

were obtained from the Thi-Qar Health Directorate (Training and Human Development Center) according to Book No. 536 on 24/7/2022.

Participants' verbal consent was acquired at the beginning of data collection. The research's objective and benefits have been defined to participants. after which they were given an anonymous, self-reported paper-based questionnaire when they agreed to participate.

Results

The age of the participants ranged from 21 to 57 years, with a mean of 29.07±5.71 years. The highest percentage (50.8%) was for the age group (25-29) years, while the lowest percentage (2.5%) belonged to the age group (≥45 years). There was a slight female predominance of 50.6% while the male was 49.4% of participants from HCWs in this study. As for the educational level, the highest percentage (49.4%) of HCWs hold a diploma, followed by 41.2% of bachelor's degree holders, for both the preparatory stage and MCs was 3%, the PhD was 1.9%, and the lowest was the higher diploma with 1.4%. Most HCWs (51.1%) were married and (48.9%) were single.

Concerning the job title of HCWs, the results indicated that the highest percentage (21.3%) of HCWs were medical assistants, followed by technical nurses with a percentage of 20.0%, University Nurses) 18.2%, (Medical technician) 15.2%, (physician) 7.5%, (Laboratory Assistant) 6.9%, (pharmacist) 5.2%, (Skilled nurse) 2.8%) and Bacteriologist (1.9%), The results found that the highest percentage (66.9%) of HCWs have a service of ≤5 years, while the lowest percentage (1.1%) of them have a service of more than 20 years. Regarding the place of work in the same hospitals, the results reveal that the highest percentage (21.8%) of HCWs work in Emergency departments, while the lowest percentage (9.1%) of HCWs work in the Internal medicine department.

The present study report that the highest percentage (68.8%) of HCWs have a moderate knowledge level, followed by 19.1% of them have good levels, the lowest percentage (12.2%) of the participants have poor levels. While the overall knowledge score of HCWs was which rested within the moderate level of knowledge as in Fig. 1.

The results indicate that there is no significant association between the total knowledge score and the sociodemographic characteristics (P-value >0.05), except age groups, and education level have a significant association with the total knowledge score (P-value <0.05) as appear in Table I.

There is a highly significant association between the total knowledge score and the occupation characteristics of the HCWs (Job title, Years of Service, and Workplace in the hospital) as clear in Table II. The highest percentage

Table II. The association between the total knowledge score and the occupation characteristics of the participants.

	Total knowledge score						
	Poor knowledge (<30 score)		Moderate knowledge (30-38 score)		Good knowledge (>38 score)		
	No.	%	No.	%	No.	%	P-value
Job title							<0.001*
Physician	2	7.4	16	59.3	9	33.3	
Pharmacist	2	10.5	12	63.2	5	26.3	
Medical technician	18	32.7	33	60.0	4	7.3	
Medical assistant	11	14.3	54	70.1	12	15.6	
Bacteriologist	0	0.0	5	71.4	2	28.6	
Laboratory assistant	0	0.0	25	100.0	0	0.0	
University nurse	5	7.6	42	63.6	19	28.8	
Technical nurse	5	6.6	56	73.7	15	19.7	
Skilled nurse	1	10.0	6	60.0	3	30.0	
Years of service							0.002*
≤5 years	30	12.4	169	69.8	43	17.8	
6-10 years	10	12.3	60	74.1	11	13.6	
11-15 years	4	16.0	10	40.0	11	44.0	
16-20 years	0	0.0	9	90.0	1	10.0	
>20 years	0	0.0	1	25.0	3	75.0	
Workplace in the hospital							<0.001*
Consulting department	9	14.3	46	73.0	8	12.7	
Emergency department	5	6.3	60	75.9	14	17.7	
Intensive care unit	7	18.9	25	67.6	5	13.5	
Internal medicine department	4	12.1	11	33.3	18	54.5	
Laboratories	13	17.3	57	76.0	5	6.7	
Surgical wards	6	8.0	50	66.7	19	25.3	

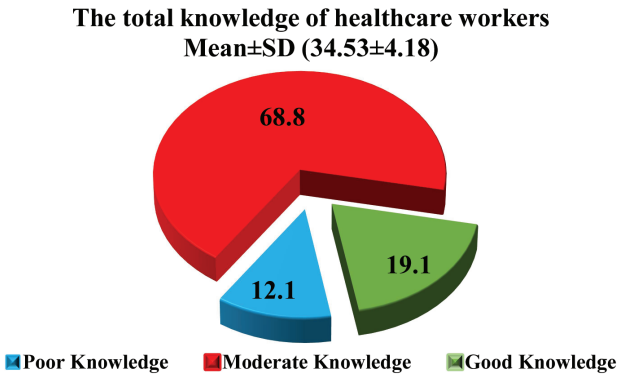

Figure 1. The overall knowledge of the healthcare workers about preventing MRSA infections.

(40.6%) of HCWs gain information by studying at university. While the lowest percentage (8.6%) of them gain information through the awareness programs of the Ministry of Health as in Fig. 2. The results indicate that there is a highly significant association between the total knowledge score and the sources of information (P-value=0.001) as appears in Table III.

Discussion

HCWs who age ≥45 years have a good level of knowledge. This is due to previous clinical experiences with which they have faced. Also, research in Egypt discovered that nurses who were 35 years old or more had greater knowledge (20).

HCWs who have an Education level (PhD) have a good level of knowledge. This is due that PhD knowledge gained through academic studies. This finding is consistent with the findings of a study conducted in Trinidad, which found a positive correlation between knowledge level and educational level (21).

The physicians, HCWs who have served for more than 20 years, and those who work in the Internal medicine department have a good level of knowledge compared with other categories. The HCWs in some departments are recent graduates whose work experience is limited, which is reflected in their knowledge. In addition to the information provided by the academic education of physicians, they in turn can develop HCWs in the medical departments in which they work together. A study conducted in Palestine, found different results where pharmacists were shown to have the highest levels of knowledge among HCWs, while physicians and medical technicians came in close

Table III. The association between the total knowledge score and the sources of information about MRSA infection.

		Total knowledge score			
		Poor knowledge (<30 score)	Moderate knowledge (30-38 score)	Good knowledge (>38 score)	P-value
Your information about methicillin-resistant Staphylococcus aureus (MRSA) obtained through					0.001*
By studying at university	No.	25	83	39	
	%	17.0%	56.5%	26.5%	
From the media	No.	5	71	9	
	%	5.9%	83.5%	10.6%	
Through the awareness programs of the Ministry of Health	No.	5	23	3	
	%	16.1%	74.2%	9.7%	
All of the above	No.	9	72	18	
	%	9.1%	72.7%	18.2%	

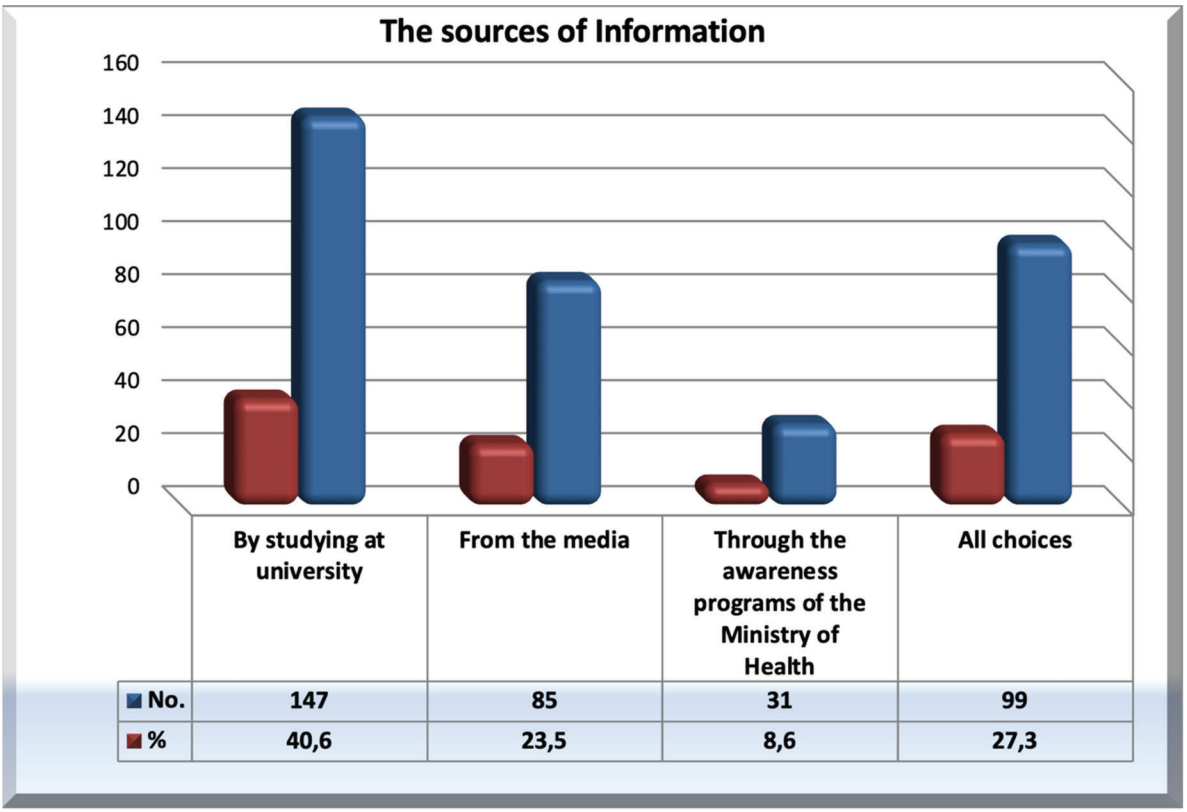

Figure 2. Distribution of the participants according to their information about MRSA infection.

behind (22). These results agree with the results of a study conducted in Libya, which discovered a positive correlation between the number of years of service and nurses' knowledge of MRSA (23).

Our study disagrees with a study performed in Trinidad, which discovered that nurses working in surgical departments had higher levels of knowledge than those working in other medical wards (21). This may be due to the quality of programs directed to those departments in hospitals.

Poor information about MRSA gained through Ministry of Health awareness programs may be due to a lack of MRSA infection education programs for medical workers in hospitals. This explains that HCWs who gain information by studying at university have a good level of knowledge.

The majority of the participants in the Sri Lankan study received their information about MRSA from other HCWs, while others also obtained it through literature, clinical trials, and the Internet (10). In contrast, a study conducted

in Palestine revealed that the majority of participants 37% got their information on MRSA from scientific reports and posters, with the media coming in second with 12.7% of the participants (22).

Conclusions

Generally, the HCWs had a moderate level of knowledge about preventing MRSA infection. The study demonstrated that the participants of old age groups, higher educational levels and job titles had good levels of knowledge. The study showed that the service years, the workplace in the hospital and job title have a significant association with the level of knowledge.

Recommendations

1. Develop and modify HCWs' beliefs related to the prevention of MRSA infection through continued and improved training programmes.
2. More research with larger numbers of HCWs in different hospitals to confirm the importance and seriousness of MRSA.
3. Provide HCWs with guidelines and explanation posters about the prevention of MRSA infection.

Funding

None.

Ethical approval and consent to participate

Permission was granted from the Southern Technical University/Faculty of Graduate Studies/Basra research ethical committee according to Book No. 698 on 27/6/2022. To legally visit the hospitals in the Thi-Qar Governorate, official approvals were obtained from the Thi-Qar Health Directorate (Training and Human Development Center) according to Book No. 536 on 24/7/2022.

Informed consent

Participants' verbal consent was acquired at the beginning of data collection. They agreed to participate to the questionnaire.

Conflict of interest

The authors declare no potential conflict of interest.

Accepted: 22, August 2023; submitted: 13, July 2023.

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