

## Hand hygiene practice of health care workers in prevention of nosocomial infection in one hospital in Basrah

Alaa K. Mousa<sup>1</sup>

### ABSTRACT

**Background:** The hand hygiene plays an essential role in prevention as well as curing the nosocomial infectious disease. Physicians, nurses and laboratory persons are the major health care workers communicating with patients, could become the transporter in the cycle of infectious diseases.

**Objective:** To evaluate the knowledge and practice of health care workers for hand hygiene in hospital wards and study the predisposing factors effecting the hand hygiene.

**Methods:** A cross-sectional study carried out on doctors, nurses and laboratory men who worked in Al-Mawane Teaching Hospital in Basrah (Iraq). Questionnaire of hand hygiene for data collection was applied.

**Results:** 401 health care workers were studied, The results showed moderate level of hand hygiene for doctors, nurses and laboratory persons (average score 3.97 + 0.6). Nurses had the highest level of hand hygiene. Perfect hand washing was found in 62%, compared with 56% for laboratory staff and 29% for physicians. Gender was insignificant in the practice of hand hygiene, while age, level of education, duration of service, training courses and vaccination against type B hepatitis had statistically significant impact on hand hygiene.

**Conclusion:** The control of infection in hospitals goes through the care of hand hygiene in health workers, which need more attention. The current study revealed somewhat unacceptable level of knowledge and care of the cleanliness of the hands of doctors, nurses and laboratory persons. The need to develop the level of knowledge and practice by training programs and continuing medical education

**Key words:** Hand hygiene practice, health care workers, Basrah

ممارسة نظافة اليدين للعاملين في مجال الرعاية الصحية في الوقاية من العدوى في أحد مستشفيات البصرة الخلفية: تلعب النظافة اليدوية دورًا أساسيًا في الوقاية وكذلك علاج الامراض المعدية في المستشفيات. الأطباء والممرضات والعاملين في المختبرات هم اغلب العاملين في الرعاية الصحية وفي تماس مباشر مع المرضى، ويمكن أن يصبحوا السبب في نقل الأمراض المعدية. لذا فإن تقييم معلوماتهم وممارساتهم ومواقفهم فيما يتعلق بنظافة اليدين أمر ضروري لإبطاء وتيرة عدوى المستشفيات، وتوفير درجة جيدة من الرعاية الصحية. الأهداف: تقييم معرفة وممارسة العاملين في مجال الرعاية الصحية في المستشفيات العراقية لنظافة اليدين في ردهات المستشفيات المختلفة ودراسة العوامل المؤثرة في نظافة اليدين. طريقة العمل: الدراسة مستعرضة مقطعية حيث تم استهداف الأطباء والممرضين ورجال المختبرات الذين كانوا يعملون في مستشفى الموانئ التعليمي الحكومي في البصرة (العراق). تم تطبيق استبيان حول صحة اليدين لجمع البيانات. النتائج: 401 من العاملين في مجال الرعاية الصحية، ومستوى تقييم معتدل لنظافة اليدين للأطباء والممرضين والمختصين (متوسط الدرجات 3.97، SD = 0.6). وكان لدى الممرضات أعلى نسبة من النظافة المثالية بـ 62٪، مقارنة بالمختبريين بنسبة 56٪ والأطباء 29٪. كان للجنس قيمة غير ذات شأن على مستوى ممارسة النظافة اليدوية، في حين كان العمر ومستوى التعليم ومدّة الخدمة والدورات التدريبية والتطعيم ضد التهاب الكبد الفيروسي نوع B تأثيرًا مهمًا من الناحية الإحصائية على نظافة اليدين.

<sup>1</sup>MBChB, CABM, Department of Medicine, College of Medicine, University of Basrah, Iraq

EEmail:alaakhattarmousa@gmail.com

الاستنتاج: السيطرة على العدوى في المستشفيات تمر عبر العناية في نظافة اليدين لدى العاملين في مجال الصحة والتي تحتاج الى اهتمام أكبر و تكشف الدراسة الحالية عن المستوى المتوسط الغير مقبول في المعرفة والعناية في نظافة اليدين من أطباء، ممرضين ومختبريين وهنا تبرز الحاجة الى تطوير المستوى من خلال برامج التدريب والتعليم الطبي المستمر

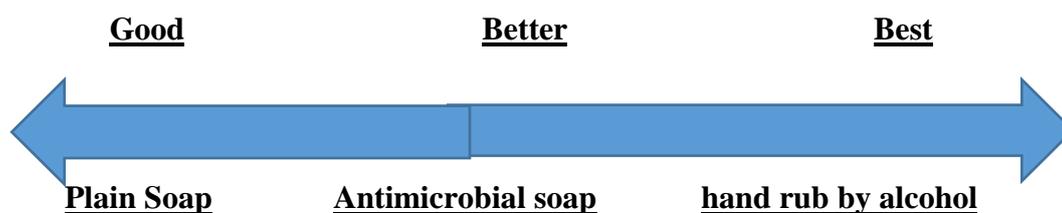
**الكلمات المفتاحية:** ممارسة نظافة اليدين، عمال الرعاية الصحية، البصرة

## INTRODUCTION

**H**and hygiene (HH) of health care workers (HCWs) is a keystone in the control and prevention of hospital-acquired infection (HAI). On the other hand non perfect HH causes direct transmission of infections by contact HCWs and patients during daily practice of health care in hospital.<sup>[1]</sup> Performing hand hygiene is an easy and effective way to stop and prevent HAI. Cleaning hands can prevent the flare up of microorganisms, including those that are resistant to antibiotics that are becoming untreatable. Standardly, HCWs clean their hands less than half of the times they should. Center of disease control (CDC) assess that each single year approximately 2 million individuals in the United States get an HAI, with high mortality (about 90,000 of these patients). HH decreases the incidence of nosocomial infection, more wide use of HH products that increase adherence to suggested hand hygiene practices will promote patient protection and control of infections, as clean hands are the first essential factor in stopping the spread of pathogens and

antibiotic resistance in healthcare settings.<sup>[1,2]</sup> An infectious microorganism requires three factors for spread within a HCWs setting; a source, liable host, and a method of transmission. Nosocomial infections (HAI) are one of the most important risk factors of morbidity and mortality. HAI occur all over the world in all nations, and over 90% occur in poor governments. Therefore, Nosocomial infections may have lethal outcome in hospitals and transmission from HCWs and patients may also lead to spread of infectious diseases in the community.<sup>[2,3]</sup> Hand hygiene is a term referring to washing of the hands by plain water and soap, which remains a standard way of HH in non-health care persons advised by CDC. While hand wash with antiseptic solution when using detergents contain a sterilizing antiseptic solution, including hand wash by antiseptic done preoperatively by operation theater staff. Usually antiseptic solution had a long life antimicrobial action.<sup>[4,5]</sup>

### Effectiveness of Hand Hygiene agents in sterilization<sup>[6]</sup>



Hand washing with plain soap and rub for 15 seconds then rinse with water and dry with disposable towel is good and safe at reducing bacterial counts while cleaning with antimicrobial agent is much better, and hand rubs with alcohol covering entire hands till dry are the best of all. These important practical notes will advance the hand hygiene process of HCWs and decrease the flare up of harmful microorganisms to patients and the staff in the hospitals.<sup>[7,8]</sup> In a large number of studies, hospital acquired infection rates were much less when disinfected hand washing was achieved by HCWs and went down when restriction to suggest HH practices established.

#### Indication of HH before and after:

1. Health care giver contact to patients or body fluids and excretions
2. Contact with non-intact skin or wound dressings, before wearing and after removing gloves.
3. when putting a central venous catheter or Inserting urinary bladder catheters
4. In case of peripheral vascular catheters or other invasive devices that do not require surgery.<sup>[7,8]</sup>

Gloves should be dressed when a HCW liable to come in contact with the blood or body secretions and other potentially infectious elements in agreement with general precautions, HCWs must remove the gloves after finishing the patient care and should not unchanged the gloves when go to another patient for the care and finally gloves should be discard and not washed or reused.<sup>[3,10]</sup> The use of various sorts of antiseptics in the practice of HH is associated with certain drawbacks and side effects.<sup>[11,12]</sup> Obstacles to HH are related to the hospital and HCWs. So both institution of occupational safety and health with small-group expert persons need to be available when applying a strategy to secure and improve hospital staff HH practice.<sup>[13]</sup> The present study was designed to assess the hand hygiene practice in health care

worker in the hospital setting. In addition, to find the factors affecting the compliance of hand hygiene in controlling health care related infections.

#### METHOD

A cross-sectional study was adopted in the period of October to the end of December 2018, the studied group included in this study was 401 health care workers comprise of doctors, nurses and laboratory persons, invited to involve in this study from Al-Mawanee teaching governmental hospitals in Al Basrah, south of Iraq. Data were obtained using pre-test questionnaire from HCWs working in different hospital wards including, coronary care unit, intensive care unit, emergency unit, medical ward, surgical wards, operational unit, pediatric ward and obstetric wards. First the data recorded from the HCWs regard their general demographic data like age, sex, years of service in health care centers, level of education and vaccination. The second part of information is about the hand hygiene including knowledge and practice regarding some aspects of infection control programs in hospitals. This part contained 9 assessment questionnaires regard the practice of aseptic hand washing measures, with 5 choice Likert scale from 5 for strongly agree "always", 4 for agree "almost", 3 for sometimes "neutral", 2 for disagree, 1 for strongly disagree.<sup>[14]</sup>

**Table of 5 Likert Scale.**

Likert scale	Interval	Difference	Description
1	1.00 - 1.79	0.79	Strongly disagree
2	1.80 - 2.59	0.79	Disagree
3	2.60 - 3.39	0.79	Neutral
4	3.40 - 4.19	0.79	Agree
5	4.20 - 5.00	0.80	Strongly agree

Assessment of healthcare workers' was based on mean score for practice parameters, equal to 3 or more is recorded as an acceptable (3-4 revealed as a moderate and 4-5 reflected as a high), while mean score for practice items less than 3 is recorded as a un acceptable (low).<sup>[14]</sup>

As the environment of job differs for each group of HCWs, the chances for hand hygiene are also quite unlike; therefore modified questionnaire forma were applied for each of these groups. First part of the data covers the general and occupational characters of HCWs and the second part regard the practice and precautions of hand hygiene, ranging from always, often, sometimes, seldom to never. A pretest questionnaire with 30-day intervals and performing test-retest technique, the correlation coefficient of  $r = 0.73$  established the reliability of the questionnaire. Statistical analysis of the data in term of frequency, mean with standard deviation, mean of score and other statistical tests using the Statistical Package for the Social Sciences for Windows (SPSS-PC, version 20).

## RESULTS

(Table-1), presents selected characteristics of the 401 persons studied, 193 persons (48.1%) were men and 208 (51.9%) were women, Age-wise, 150 (37.4%) aged less than 30 years and 108 (26.9%) aged 30-39. Doctors form 154(38.4%) and 156 (38.9%) were nurses and 91(22.7%) were laboratory workers. With respect to education, 184(46%) had bachelor, 128(32%) had diploma and 89(22%) had secondary school graduation. 162(40.4%) had more than 10 years in service while 106(26.4%) of HCWs had less than a year in experience. 222(55.4%) were involved in training courses in hospital or outside and 179(44.6%) received at least single course.

**Table 1. Distribution of the general characters of health care workers in Al-Mawanee hospital.**

Hcws data		No.	%
<i>Age</i>	20 - 29	150	37.4
	30 - 39	108	26.9
	40 - 49	80	19.9
	50 and above	63	15.7
	Total	401	100
<i>Sex</i>	Male:	193	48.1
	Female:	208	51.9
	Total	401	100
<i>Type of job</i>	Doctors:	154	38.4
	Nurses:	156	38.9
	Lab.	91	22.7
	Persons:	401	100
	Total	401	100
<i>Degree of Education</i>	Bachelor:	184	46
	Diploma:	128	32
	Secondary	89	22
	Nurse school	401	100
	Total	401	100
<i>Experience in years</i>	Less than 1 year	106	26.4
	2 - 4	63	15.7
	5 - 10	70	17.5
	More than 10 years	162	40.4
	Total	401	100
<i>Training course of infection control</i>	Yes	179	44.6
	No training	222	55.4
	Total	401	100
<i>Vaccination Hepatitis B</i>	Yes:	230	57
	No:	171	43

(Table-2), reveals that most of healthcare workers had a moderate level of hand hygiene knowledge and practice regarding the infection control precaution steps, most of them 48% had an answer of always doing the hand hygiene steps in the conditions asked by questionnaire with a mean of score of 3.97, SD = 0.6, moderate level of regarding practice of control

of infection. Regarding the hand washing after accidentally contact with patient blood, other body secretion and contaminated instruments, most HCWs (90%) agreed about the infectivity of the patient regardless the diagnosis, which is considered as high score in evaluation. Also another high score (87%) was dressing gloves when contact with skin or mucus membrane.

**Table 2. Distribution of knowledge and practice of hand hygiene standards among health care workers**

Hand hygiene questions	Always No. (%)	Almost No. (%)	Sometimes No. (%)	Rarely No. (%)	No No. (%)	M.s	Eval.
1. Hand washing must be done before and after patients contact	222(55%)	77(20%)	93(23)	9 (2)	0	4.1	M
2. Hand washing must be done before & after wearing gloves	190 (47)	98 (25%)	68 (17)	26 (6)	19 (4)	4	M
3. Hand washing must be done after contact accidentally with blood or body secretion or contaminated instruments	361(90)	33(8)	0	7 (2)	0	4.8	H
4. Gloves must be dressed on contact with skin or mucus membrane	350 (87)	30 ( 8)	16(4)	5(1)	0	4.9	H
5. Goggles must be put on for protection even with glass in cases of expose to splashes of blood or body fluid	29(7)	115(29)	91(23)	82(20)	84(21)	3.9	M
6. Hand sterilization with betadine is essential in cases of expose to splashes of blood or body fluid	154 (38)	114(28)	71(18)	0	62(16)	3.1	M
7. Mask of the face must be put on for protection even with glass in cases of expose to splashes of blood or body fluid	152(38)	75(19)	97(24)	63(16)	14(3)	3.9	M
8. Needle of syringe should not be bent before discard	119(30)	70(18)	60(15)	26(6)	126(31)	3.3	M
9. Gown Must be dressed if there is risk of of expose to splashes of blood or body fluid	172(43)	113(28)	34(8)	27(7)	55(14)	3.8	M
Total average of overall % & MS	48%	20%	15%	11%	10%	3.97+0.6	M

MS: Mean of scores; Eval: Evaluation; H: High(4.2 – 5); M: moderate (2.6 – 4.19); L: Low (below 2.6)

(Table-3), shows the correct and optimal hand hygiene practice among HCWs; 29% of doctors had correct answer, 62% of nurses had the correct answer while 56% of laboratory persons practice the perfect way of hand hygiene in contact with patients in different hospital wards.

**Table 3. Distribution of the perfect answer regarding knowledge and practice of hand hygiene standards of Health care workers (Doctors, nurses and laboratory persons).**

<b>Hand hygiene questions</b>	<b>Doctor correct answer No. (%)</b>	<b>Nurses correct answer No. (%)</b>	<b>Lab. Person correct answer No.(%)</b>
<b>1. Hand washing must be done before and after patients contact</b>	<b>45 (29)</b>	<b>115(74)</b>	<b>62(68)</b>
<b>2. Hand washing must be done before &amp; after wearing gloves</b>	<b>19 (12)</b>	<b>114(73)</b>	<b>57 (37)</b>
<b>3. Hand washing must be done after contact accidentally with blood or body secretion or contaminated instruments</b>	<b>118(77)</b>	<b>152(97)</b>	<b>91(100)</b>
<b>4. Gloves must be dressed on contact with skin or mucus membrane</b>	<b>125(81)</b>	<b>145(93)</b>	<b>80 (88)</b>
<b>5. Goggles must be put on for protection even with glass in cases of expose to splashes of blood or body fluid</b>	<b>8 (5)</b>	<b>0</b>	<b>21 (23)</b>
<b>6. Hand sterilization with betadine is essential in cases of expose to splashes of blood or body fluid</b>	<b>31(20)</b>	<b>82 (52)</b>	<b>41 (45)</b>
<b>7. Mask of the face must be put on for protection even with glass in cases of expose to splashes of blood or body fluid</b>	<b>5 (3)</b>	<b>104(67)</b>	<b>43(47)</b>
<b>8. Needle of syringe should not be bent before discard</b>	<b>19 (12)</b>	<b>56(36)</b>	<b>44(48)</b>
<b>9. Gown Must be dressed if there is risk of expose to splashes of blood or body fluid</b>	<b>30 (19)</b>	<b>97 (62)</b>	<b>45 (49)</b>
<b>10.Total: percentage of perfect hand hygiene (Mean)</b>	<b>29</b>	<b>62</b>	<b>56</b>

(Table-4), reveals that no-significant difference between the practice of hand hygiene in HCWs in relation to gender, while there is significant difference regarding the other parameters as age, level of education, years of experience, training session and hepatitis B vaccination.

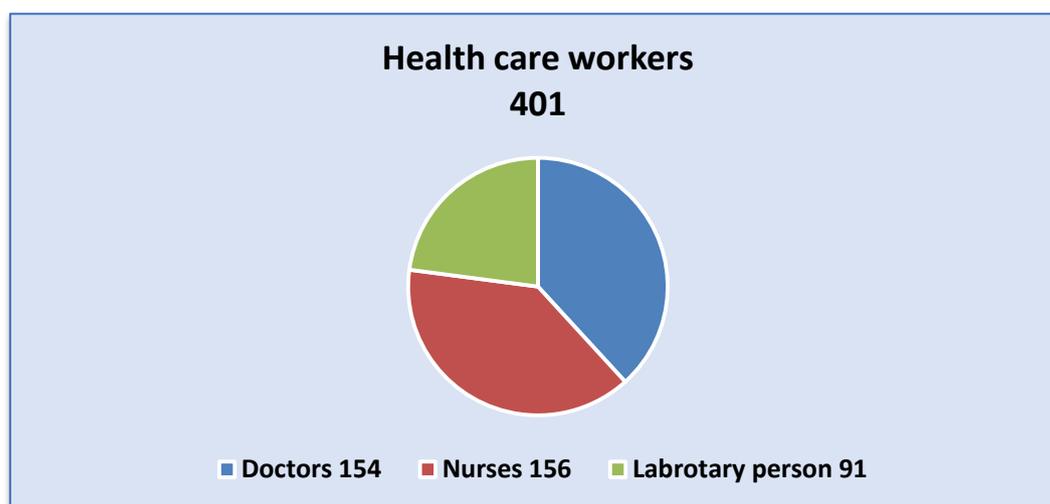
**Table 4. Distribution of Demographic features of health care worker and practice of hand hygiene**

Demographic Data		High Practice	Moderate practice	low practice	Significant & P-value
Gender	Men	34	132	27	$\chi^2 = .12$ df = 2 P-value > 0.05 non-significant
	Women	35	142	31	
	Total	69 (17%)	274 (68%)	58 (15%)	
Age	20 – 29 year	26	107	17	$\chi^2 = .12$ df = 5 P-value < 0.05 Significant
	30 – 39	19	76	13	
	40 – 49	13	62	5	
	50 & more	11	29	23	
	Total	69	274	58	
Level of Education	Bachelor	42	109	33	$\chi^2 = 21.2$ df.= 4 P-value < 0.05 significant
	Diploma	23	86	19	
	Secondary	4	79	6	
	Total	69	274	58	
Years of experience	< 1 year	28	57	21	$\chi^2 = 46.4$ df. = 5 P-value = < 0.05 Significant
	2 – 4	15	34	14	
	5 – 10	10	43	17	
	> 10 years	16	140	6	
	Total	69	274	58	
	Training Course	Yes	43	111	
NO		26	163	33	
Total		69	274	58	
Vaccination Hepatitis B	Yes	27	172	31	$\chi^2 = 13.42$ df.= 2 P-value < 0.05 Significant
	NO	42	102	27	
	Total	69	274	58	

$\chi^2$ : Chi-square; df: degree of freedom; Significant. at P < 0.05.

The table shows that high HH practice and moderate HH was in younger age group 20-29 years and those with Bachelor degree of education, also high practice and moderate practice in those with in the first year of service in hospital while moderate HH practice in those with more than ten years of experience. This

table shows that the HCWs who had a training course of infection control had high practice of HH while moderate practice of HH was more among those with no training course. HCWs who completed their vaccination of hepatitis B had modest HH practice, all these parameters were a statistically significant at P-value < 0.05.



## DISCUSSION

Hand Hygiene of health care workers in hospital is important part of patients medical care , takes a lot of attention by the WHO and Local government in order to decrease dissemination of infections and improve the control of infections in hospital by continuous medical education to improve knowledge and practice of hand hygiene precautions. <sup>[12]</sup> (Table-1), shows equal gender distribution of demographic parameters of the studied group, 48.1% were men and 51.9% were women of the HCWs, with 64.3% of the studied subject at age 20-39 years old. This findings agree with study which was done in Iran, which showed 45.9% men and 54.1% women. <sup>[15]</sup> and the study of Iraq, which reveal that most 64.3% of healthcare workers at age of 20-39 years. <sup>[16]</sup> Regarding to the level of education, the study results showed that 46% of the HCWs graduated by bachelor from university institute, most of them were doctors, diploma form 32% and 22% were graduate from secondary nursing school. Regarding the year of service and experiences, 60% of the healthcare workers were less than 10 years. This results less than the Egypt study, which shown that three quarters 73.3% of subjects their experience reached from 1 to 10 years. <sup>[17]</sup> In spite of 40% of the studied group had long period of experience, more than 55% had no training course for infection control in hospital, which is like other study in Iraq 24.3%. <sup>[16]</sup>

Studies have reported significant improvement in compliance with the standard precautions from 48% to 74% after an educational symposium. <sup>[18,19]</sup> The knowledge and practice of hand hygiene in HCWs were assessed in the present study which shows that most of the hospital staff had a moderate level of knowledge (48%). This finding mimic Jordanian study which reported moderate knowledge of 49%, <sup>[10]</sup> but lower than results reported in an Egyptian study (57%) <sup>[17]</sup> while other studies in Iraq one in Kirkuk city revealed a poor practice, <sup>[20]</sup> and the other in AL Amara city shows a high level of knowledge and practice of infection control of standard precautions in HCWs. <sup>[21]</sup> Our study also shows that doctors gained the lowest evaluation degree of hand hygiene (29%) as compare to nurses (62%) and laboratory men had 56% possibly because of low experience and less training courses in junior doctor, this result differ from other study in Palestine which reveal equal level in both doctors and nurses. <sup>[22]</sup> Regarding the association between HCWs practices with their demographic parameters, the study shows that there is statistically significant difference among healthcare workers' practice with age, level of education, training courses, hepatitis vaccination and years of experience at P-value < 0.05. While, it shows no significant difference with gender at P - value > 0.05. This results differ from other

study in Iraq, Iran and Palestine were no statistically significant relationship between mean score of hand hygiene practice regarding sex, experience years, and training courses but it significant with age and level of education.<sup>[21-23]</sup>

## CONCLUSION

1. Most health care workers in hospital do not have enough level of knowledge and practice concerning the application of hand hygiene precaution steps, junior doctor had the lowest level in compare with the nurses with higher degree.
2. Most of health care workers had insufficient training courses and vaccination

## RECOMMENDATION

1. A clear and written guideline of hand hygiene practice is needed in hospital wards and in all health care institutions to improve the HCWs information, attitude and implementation of the standard control measures and guidelines of infection control.
2. Planning for an educational programs and training courses for junior doctors, nurses and laboratory persons all at once with continuous checking to provide all the requirements to maintain hand washing and sterilization in health institutions.
3. Further studies are therefore necessary on a larger sample in other setting.

## REFERENCE

1. WHO. Hand Hygiene: WHO Highlights Importance of Good Hand Hygiene for Patient Safety. World Health Organization, Geneva 2012. Available at [http://www.who.int/mediacentre/news/notes/2012/hygiene\\_20120504/en/](http://www.who.int/mediacentre/news/notes/2012/hygiene_20120504/en/)
2. Daugherty, E.L., et al. Safety Culture and Hand Hygiene: Linking Attitudes to Behavior. *Infection Control*, 2012; 33, 1280-1282. <http://dx.doi.org/10.1086/668432>
3. WHO. Patient Safety: WHO Guidelines on Hand Hygiene in Health Care-First Global Patient Safety Challenge, Clean Care Is Safer Care. World Health Organization, Geneva, 2009.
4. Cardo D, Dennehy PH, Halverson P, Fishman N, Kohn M, Murphy CL, et al. Moving toward elimination of health care associated infections: A call to action. *Am J Infect Control*. 2010; 38(9): 671-5.
5. Weber, DJ, Anderson, D, Rutala, WA. The Role of the Surface Environment in Healthcare-Associated Infections. *Current Opinion in Infectious Diseases* 2013; 26, 338-344. <http://dx.doi.org/10.1097/QCO.0b013e3283630f04>
6. WHO. Good Hand Hygiene by Health Workers Protects Patients from Drug Resistant Infections. World Health Organization 2014. Available at: <http://www.who.int/mediacentre/news/releases/2014/hand-hygiene/en/>
7. Rajcevic, S., et al. Knowledge, Habits and Attitudes of Health Care Workers about Hand Hygiene. *HealthMed* 2012; 6: 1418-1423.
8. Kendall, A., et al. Point-of-Care Hand Hygiene: Preventing Infection behind the Curtain. *American Journal of Infection Control* 2012; 40, S3-S10. Available at: <http://dx.doi.org/10.1016/j.ajic.2012;02.009>
9. Ministry of Health and World Health Organization (MOH/WHO): National Guideline for Infection Control in Health Facilities. Ministry of Health (MOH) collaborative with WHO, Iraq, 2009, P.15-32.
10. Dreidi, MM, Alrimawi I, Saifan, AR, Batiha, AM. Hand Hygiene Knowledge, Practices and Attitudes among Nurses and Physicians. *Health* 2016; 8: 456-462
11. Hillier MD. How to Wash Your Hands Effectively. *Nursing Standard* 2015; 30: 34-36. <http://dx.doi.org/10.7748/ns.30.3.34.e9691>
12. Centers for Disease Control and Prevention (2010). Hand Hygiene Saves Lives.
13. WHO. Core components of infection prevention and control programs in health care Standard principles of infection prevention and control, CH-1211. World Health Organization, Geneva 2011.
14. Dennis L. Clasen and Thomas J. Dormody, "Analyzing Data Measured by Individual Likert-Type Items," *Journal of Agricultural Education* 1994; 35 (4):

15. Ghadamgahi F, Zighaimat F, Ebadi A, Houshmand A. Knowledge, attitude and self-efficacy of nursing staffs in hospital infections control. *Iranian Journal of Military Medicine* 2011;13 (3): 167-172.
16. Selman H., and Arkan B. "Impact of an Education Program on Health care workers' Knowledge toward Infection Control at Primary Health Care Centers in Holy Karbala City". *International Journal of Asian Academic Research Associates*. 2017, 4(3): 59. 6
17. Maha M, Eman S. Evaluation of an educational Program on Nurses' Knowledge and Practice Regarding Standard Precautions of Infection Control Measures in Outpatients Clinics. Egypt, *International Journal of Advanced Research* 2015;3 (6): 1024-1034
18. Brooks AJ, Phipson M, Potgieter A, Koertzen H, Boffard KD. Education of the trauma team: video evaluation of the compliance with universal barrier precautions in resuscitation. *Eur J Surg* 1999; 165: 1125-1128.
19. Richman G, Dorsey A, Stayer S, Schwartz R. Compliance with Standard Precautions among Pediatric Anesthesia Providers. *The Internet Journal of Anesthesiology* 2000; 4: 1-8.
20. Mahmud N, Abdul Sahib S. Assessment of Nurses' Practices toward Infection Control Standardized Precautions in Azady Teaching Hospital in the City of Kirkuk. *Iraqi National J. for Nursing Specialties* 2011 24(1): 52 - 58.
21. Tahseen A. Evaluation of nurses, knowledge and practices concerning infection control at primary health care centers in AlAmara city. Master Thesis, University of Baghdad / College of Nursing, 2014, Pp. 52-72.
22. Imad F, Ahmad A, Faeda E, Lubna H. Knowledge and Practice of Nursing Staff towards Infection Control Measures in the Palestinian Hospitals. *Journal of Education and Practice* 2015;. 6 (4).p.79.
23. Karimi SH, KHademian M. A survey on knowledge attitude and practice of medical staff to pathogen factor with blood at Shariati hospital in Fasa.Tehran; *Iranian Congress of Infections Disease*, 2001