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### RESEARCH ARTICLE

#### INFECTION CONTROL KNOWLEDGE AND PRACTICES AMONG MEDICAL AND DENTAL INTERNS AT TAIBAH UNIVERSITY, SAUDI ARABIA, 2016

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#### Abstract

**Background:** Healthcare workers such as medical interns are at high risk of infection. Strict compliance is considered as an efficient way to reduce and control hospital acquired infections. Also, it minimizes infection transmission between patients as well as healthcare workers.

**Objectives:** To assess the knowledge and practices of medical and dental interns about the standard precautions of infection control.

**Methodology:** A cross sectional study was carried out among medical and dental interns from Taibah University, Saudi Arabia. A simple random sample of 102 interns participated in the study; 83 of them were medical interns and 19 were dental interns. A valid and reliable data collection tool was used through an electronic self-administered questionnaire. Afterwards, the data analysis was done using SPSS program version 22. Ethical approval was issued by the Taibah University IRB committee.

**Results:** In this study, we had a (63%) response rate. Most of the interns (50%) had a satisfactory level of knowledge about the standard methods of infection control. However, (93%) of the interns displayed insufficient knowledge regarding the necessity in wearing surgical gloves while providing medical care to patients with AIDS. Our findings also showed that the greatest source of knowledge was from senior doctors (61%). In the practice scale, (73%) of the interns had competent practice even though (54%) of them reported that they recapped needles after using them.

**Conclusion:** The majority of medical and dental interns had satisfactory knowledge and competent practice about infection control, and they mainly learned and acquired from their doctors.

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#### Introduction:-

Standard precautions are designed to minimize the risk of acquiring occupational infections in clinical centers. These infections could be gained from both expected and unexpected sources (1). As a result, healthcare workers such as medical interns are at a high risk of infections. Another reason why they need to be cautious is that they are the first responder to undiagnosed infectious cases (2).

Strict compliance of healthcare workers to infection control standard precautions prevent and control infections acquired in hospitals. Also it prevents the transfer of any infection between patients and healthcare workers (3)(4). Standard precautions also aim to prevent the transmission of infections from known and unknown sources and assist maintaining basic levels of patient safety and health care providers.

Previous studies on health science students and medical students found that the general knowledge and compliance of standard precaution were insufficient, especially in hand hygiene, sharp management, and individual protective equipment (5)(6).

A cross-sectional study carried out in Kuwait University found the prevalence of weak knowledge of standard infection control was 38.2% and that of poor practice was 27.7% (5)(7). The cause of the poor knowledge and compliance of interns to simple essential behaviors is inadequate guidelines and recommendations of standard precautions (6). Another cross-sectional study was also conducted in King Faisal University, Saudi Arabia. The research found that 80% of medical interns need to improve their expertise on infection control (6).

The aim of our study is to assess the knowledge and practices of medical and dental interns at Taibah University, Saudi Arabia about standard precautions of infection control.

**Objectives:-**

1. To assess the knowledge and sources of information of infection control precautions among medical students.
2. To evaluate the practice of infection control precautions among medical and dental intern.

**Methodology:-****Setting and Design:-**

A cross-sectional study design at Taibah University, Saudi Arabia. The duration of data collection was from July/2016 to September/2016.

**Subjects:-**

The data of all medical and dental interns, both of which were males and females, at Taibah University were collected. Interns or students from other fields such as nursing, pharmacy, and other applied medical sciences colleges were not included in our study.

**Data Collection:-**

A valid and reliable data collection tool was used through an electronic English version of a self-administered questionnaire. We also utilized a scale to assess the knowledge and practice of infection control. The knowledge scale was categorized into excellent, satisfactory, and poor. Those who gained from 15 to 18 considered as excellent, those who gained from 10 to 15 considered as satisfactory and those who gained below 10 considered as poor. The practice scale was classified into competent, weak, and unsafe. Interns who got from 65 to 90 have competent practice, while who got 49 to 64 have weak practice, lastly having a score from 16 to 48 considered as unsafe practice. The categorization was done to elicit the interpretation of data and ease the comparison between varieties of groups (8).

**Questionnaire Administration:-**

The questionnaire was given to each intern who had an informed consent of the right of not participating in the survey and the confidentiality of the process to take part in the study.

**Data Analysis:-**

The collected data were analyzed using Statistical Package for Social Sciences (SPSS) version 22. Any result with a p-value of <0.05 was considered statistically significant for the purpose of this study.

**Ethical Approval:-**

Ethical approval was issued by the Taibah University IRB committee, with acceptance number; 143799859, 31/5/2016.

### Results:-

Some of the medical interns, who had a background about standard precautions, were gleaned either by doctors at the hospital or by the hospital itself through providing a bedside liable and from the media as well. When the interns were students, their syllabus had no course devoted to teaching or training of infection-control management and standard precautions.

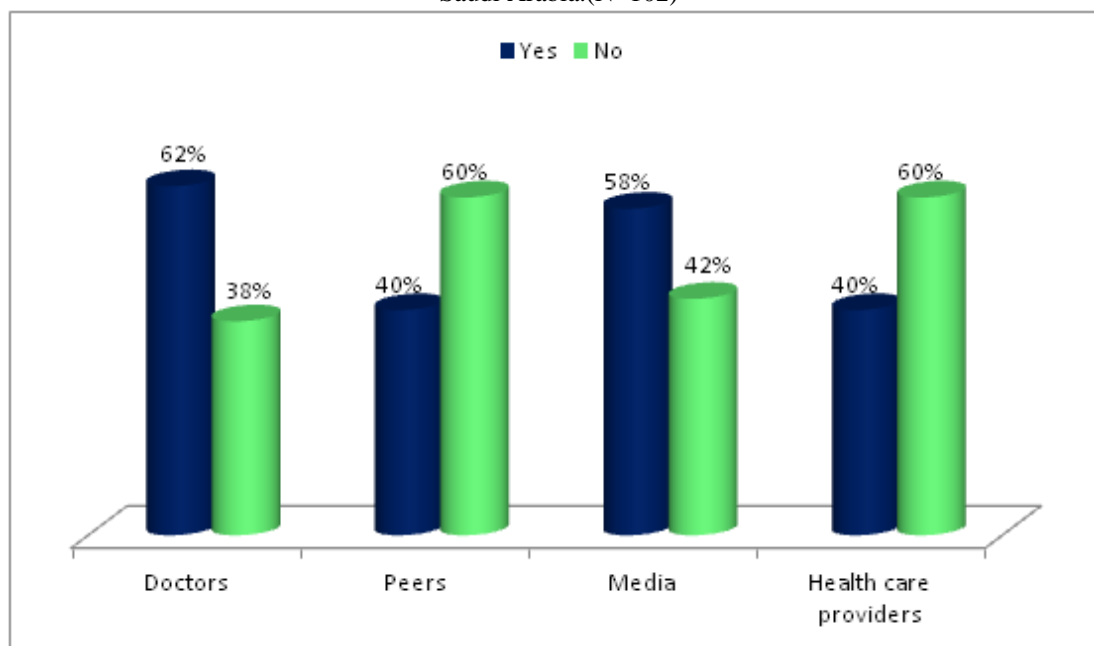
The total number of the interns (both genders) who participated in this survey, were 122 medical interns and 40 dental interns and the response rate was (63%). Among the respondents, (81%) of the participants were medical interns and (19%) were dental interns. Overall, the majority of interns (75%) studied infection-control practices in the university, while a few of them (26%) took part in previous extra courses on infection-control practice. (**Table.1**)

**Table.1:-** Distribution of socio-demographic characteristics of participants among medical and dental interns at Taibah University, Saudi Arabia.

(N=102)	N (%)
<b>Age</b> mean±SD	24±0.667
<b>Gender</b> Female Male	50 (49%) 52 (51%)
<b>Profession</b> Medical interns Dental interns	83 (81%) 19 (19%)
<b>When did you have hepatitis B virus vaccine?</b> Before your undergraduate clinical training years During your undergraduate clinical training years Just before your internship training Never had it	29 (28%) 21 (21%) 12 (12%) 40 (39%)
<b>Did you study infection- control practices during your undergraduate university studies?</b> Yes No	76 (75%) 26 (25%)
<b>Does your hospital/training centers provide formal bedside training about infection control (proper hand hygiene, using PPE, etc.)?</b> Yes No Yes but not sufficient	46 (45%) 26 (26%) 30 (29%)
<b>Did you have any previous extra courses about infection - control practices?</b> Yes No	26 (26%) 76 (74%)

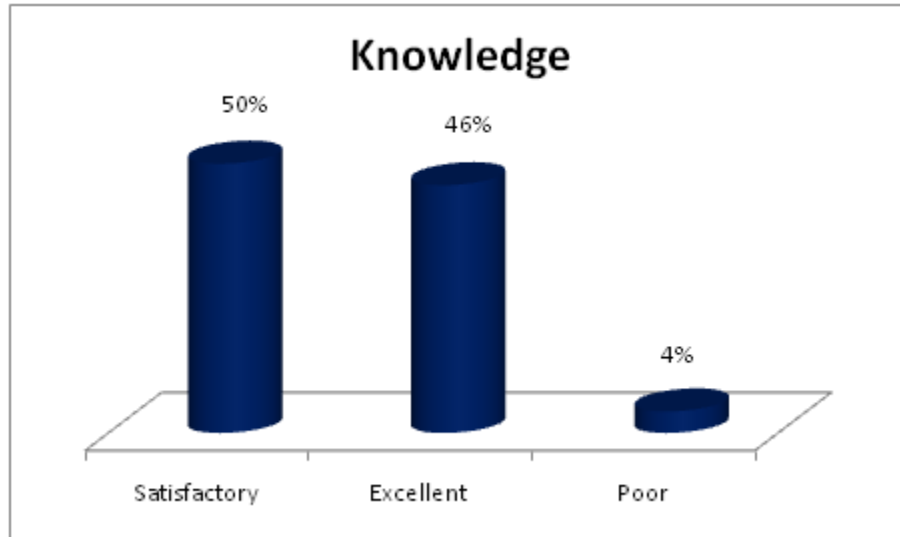
Regarding the source of learning infection-control practices, the highest reference (62%) was from doctors. Also, (58%) of the participants claimed that they obtained this knowledge from the media (YouTube, TV, books, etc.), and (60%) think that they did not learn about infection control from their peers nor from healthcare providers (**Fig. 1**).

**Figure 1:-** Source of learning practice of infection control among medical and dental interns at Taibah University, Saudi Arabia.(N=102)

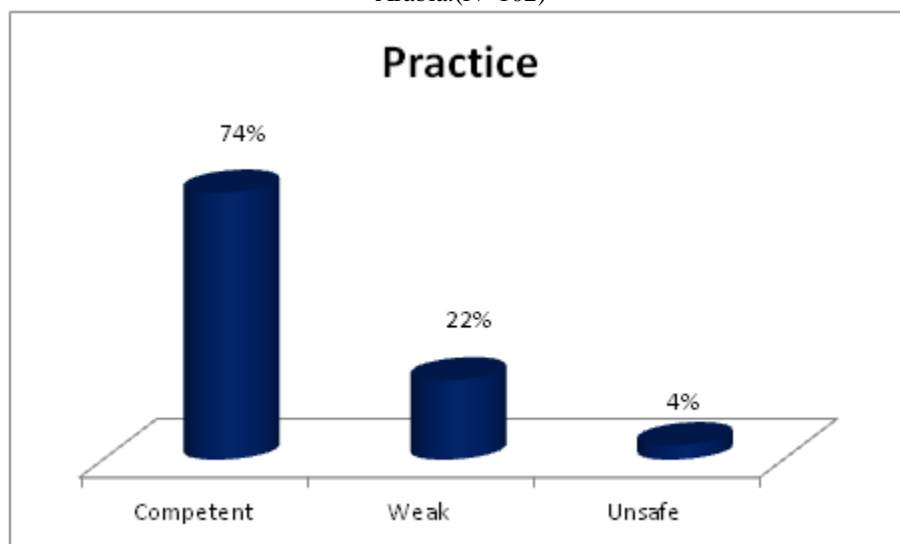


In the knowledge scale, we found that most of interns had satisfactory knowledge and that a few had excellent and poor knowledge. (**Fig. 2**).

**Figure 2:-** Assessment of knowledge scale among medical and dental interns at Taibah University, Saudi Arabia.(N=102)



In the practice scale, we found that vast majority of participants had competent practice and that a few of them had weak and unsafe practice. (**Fig. 3**)

**Figure 3:-** Assessment of practice scale among medical and dental interns at Taibah University, Saudi Arabia.(N=102)

For more details about knowledge of interns about infection-control practice, (93%) of them thought that there was no need to wear surgical gloves in all caring procedures provided to patients suffering from AIDS. As sweat and tears are non-infectious, we thought that we did not need standard precautions against them in this research. However, in our study, most of the interns mentioned that health care providers should take standard precaution against sweat (77%) and tears (73%). (**Table 2**)

**Table 2:-** Infection-control knowledge among medical and dental interns at Taibah University, Saudi Arabia.

(N=102)	Right answers N ( % )	Wrong answers N ( % )
Needles used for medication preparation or injecting patients should be discarded in the sharp box.	99 (97%)	3 (3%)
Spots of blood spilled from the patient must be cleaned using sterilizing agent dedicated for this purpose.	86 (84%)	16 (16%)
Facial mask and eye protection is not necessary if the necessary procedure for the patient may cause volatility or spill a patient's blood or body fluids.	94 (92%)	8 (8%)
Standard precautions should be applied to all patients regardless of the presence or absence of the source of the infection.	94 (92%)	8 (8%)
Wearing surgical gloves is necessary in all caring procedures provided to patients suffering from AIDS.	7 (7%)	95 (93%)
Standard Precautions are applied only to patients suffering from AIDS or hepatitis.	83 (81%)	19 (19%)
Standard precautions should be applied in cases in which there is a contact with the patient's sweat.	24 (23%)	78 (77%)
Standard precautions should be applied in cases in which there is a contact with the patient's tears.	28 (27%)	74 (73%)
Standard precautions should be applied in cases in which there is a contact with the patient's saliva or mouth secretions.	88 (86%)	14 (14%)
Standard precautions should be applied in cases in which there is a contact with the patient's vaginal secretions.	99 (97%)	3 (3%)
Standard precautions should be applied in cases in which there is a contact with the patient's urine or stool.	92 (90%)	10 (10%)
It is a must to use/wear the face mask when entering rooms for patients with chickenpox and measles.	84 (82%)	18 (18%)
Patients with illnesses spread by droplets or spray must wear the facemask throughout	94 (92%)	8 (8%)

the process of transferring them transferred from one ward to another.		
It is necessary to use isolation gown when entering rooms of patients who need contact precautions.	98 (96%)	4 (4%)
Patients with diseases spread by droplets or spray should not be isolated in private rooms.	84 (82%)	18 (18%)
Patients who are in need of using contact precautions should be isolated in private rooms.	77 (75%)	25 (25%)
Tools of patients who need contact precautions should not be used or shared with other patients.	96 (94%)	6 (6%)
Double surgical gloving is necessary when performing procedures or nursing care for patients with diseases spread by blood contact such as AIDS or hepatitis-B.	84 (82%)	18 (18%)

As for the assessment of infection control-practices, we found that (54%) of the interns recapped the needle after using it, a practice that can cause it to prick. (**Table 3**).

**Table 3:-** Assessment of infection-control practices among medical and dental interns at Taibah University, Saudi Arabia.

(N=102)	Always N (%)	Most of the times N (%)	Sometimes N (%)	Rare N (%)	Never N (%)
I put the used needles and surgical blades in the pot allocated for this purpose.	66(65%)	21(20%)	8(8%)	0(0%)	7(7%)
I wash my hands before providing nursing care to patients.	57(56%)	2(21%)	17(17%)	4(4%)	2(2%)
I wash my hands before doing nursing care even if they were not direct contact with the patient's blood or body fluids (for example, preparing medications).	35(34%)	25(24%)	20(20%)	14(14%)	8(8%)
I wear sterile surgical gloves when touching blood or body fluids or internal mucosa or in cases of wounds in the skin.	63(62%)	19(18%)	9(9%)	4(4%)	7(7%)
I wear non-surgical gloves when performing nursing care that may result in direct contact with the patient's blood or body fluids.	61(60%)	21(20%)	11(11%)	2(2%)	7(7%)
I cover my wounds with a cover that is impermeable to water before providing care to patients.	51(50%)	17(17%)	22(21%)	7(7%)	5(5%)
I wash my hands immediately after removing medical gloves.	57(56%)	24 (23%)	14(14%)	3(3%)	4(4%)
I change the on-surgical medical gloves when I move from one patient to another.	84(82%)	13(13%)	3(3%)	1(1%)	1(1%)
I wash my hands after providing nursing care to a patient.	70(69%)	24(23%)	4(4%)	3(3%)	1(1%)
I remove tools and objects contaminated with blood in a medical waste bag, regardless of the presence of the source of the infection.	76(74%)	14(14%)	8(8%)	3(3%)	1(1%)
I clean tools that have stains of blood on them, with disinfectants.	65(55%)	13(12%)	12(12%)	6(6%)	15(15%)
I clean surfaces and tools used for patient care after the completion of the care.	44(44%)	18(18%)	16(16%)	7(7%)	15(15%)
I wear facemask when there is a possibility of a leakage or spillage of any body fluids from the patient.	70(69%)	21(20%)	7(7%)	2(2%)	2(2%)
I wear protective apron when there is a likelihood of exposure to the patient's blood or body fluids.	58(57%)	22(21%)	15(15%)	4(4%)	3(3%)
I perform needle recapping after giving the patient injection or using the needle.	55(54%)	22(21%)	9(9%)	4(4%)	12(12%)
I wear eye protective tool when there is a possibility of	42(41%)	22(21%)	12(12%)	13(13%)	13(13%)

a leakage or spillage of any body fluids from the patient.					
I empty the sharp container when it becomes completely full.	33(32%)	24(24%)	11(11%)	3(3%)	31(30%)

In our study, interns who learn from their senior doctors had excellent to satisfactory knowledge (59%) more than interns who didn't learn from them (37%) but the difference were non-significance ( $p=.681$ ). (**Table 4**).

In the other hand, interns who did not learn from their peers had excellent to satisfactory knowledge (57%) more than interns who learn from them (39%) but the difference were non-significance ( $p=.137$ ). (**Table 4**).

**Table 4:-** Impact of source of knowledge on medical and dental interns background regarding infection-control at Taibah University, Saudi Arabia.

(N=102)		Excellent N (%)	Satisfactory N (%)	Poor N (%)	p-value**
learn infection control practices from your doctors	YES	31 (30%)	30 (29%)	2 (2%)	.681
	NO	16 (16%)	21 (21%)	2 (2%)	
learn infection control practices from your peers	YES	14 (14%)	25 (25%)	2 (2%)	.137
	NO	33 (32%)	26 (25%)	2 (2%)	
learn infection control practices from media	YES	26 (25%)	31 (30%)	2 (2%)	.817
	NO	21 (21%)	20 (20%)	2 (2%)	
learn infection control practices from Health care providers	YES	17 (17%)	23 (22%)	1 (1%)	.540
	NO	30 (29%)	28 (28%)	3 (3%)	

\*\* Likelihood Ratio \* Level of significance at  $<0.05$  (chi-square test was used)

In our study, interns who learn from their senior doctors had competent practices (48%) more than interns who didn't learn from them (25%) but the difference were non-significance ( $p=.234$ ). (**Table 5**)

In the other hand, interns who did not learn from their peers had weak to unsafe practices (21%) more than interns who learn from them (6%) but the difference were non-significance ( $p=.073$ ). (**Table 5**).

**Table 5:-** Impact of source of knowledge on medical and dental interns practices regarding infection-control at Taibah University, Saudi Arabia.

(N=102)		competent N (%)	weak N (%)	Unsafe practice N (%)	P value **
learn infection control practices from your doctors	YES	49 (48%)	13 (13%)	1 (1%)	.234
	NO	26 (25%)	10 (10%)	3 (3%)	
learn infection control practices from your peers	YES	35 (34%)	5 (5%)	1 (1%)	.073
	NO	40 (39%)	18 (18%)	3 (3%)	
learn infection control practices from media	YES	45 (44%)	11 (11%)	3 (3%)	.452
	NO	30 (29%)	12 (12%)	1 (1%)	
learn infection control practices from Health care providers	YES	32 (31%)	8 (8%)	1 (1%)	.643
	NO	43 (42%)	15 (15%)	3 (3%)	

\*\* Likelihood Ratio \* Level of significance at  $<0.05$  (chi-square test was used)

## Discussion:-

The purpose of this study was to assess the knowledge and practice of infection control among medical and dental interns depending on many variables. We found in this study that the knowledge of infection control was satisfactory by (50%) unlike a study conducted in the king Faisal University in which (80%) of the participants needed to improve their knowledge of infection control (6).

In this study, (92%) of the interns recognized the importance of applying standard precautions to all patients regardless of the presence or absence of the source of the infection. This performance was higher than that in the King Faisal University in which only (41.8%) recognized that all patients were sources of infections (6).

About the knowledge of applying standard precautions to all body fluid as a source of infections, there were some variations between (23%) of the interns recognized to apply standard precautions to patient's sweat and (27%) to patient's tears. This appears to be the difference compared to the previous study in which (31.9%) of them recognized that all body fluids except sweat were sources of infections (6).

Many previous studies reported that students' attitudes toward infection-control practice were influenced by their senior doctors (9) (10). This finding corresponded with our results, which showed that the major source of learning infection-control practices was from the doctor's (62%) In other words, there was an increase in the responsibility of the doctors about practicing infection-control precaution at bedside.

The present study showed that (58%) of the interns learned about infection control from the media (YouTube, TV, book, etc.). This result is quite similar to that of a previous study in which self-learning and informal bedside clinical practices were the main sources of knowledge of infection control, especially about dealing with sharp injuries (11).

Overall in this study, we found that (74%) of the interns are competent in their practices, (22%) have weak practice, which is a similar outcome to a study done in the Kuwait university where they had a (27.7%) prevalence of poor practice (7).

Washing hands before and after patient contact is important. Still in our study only (56%) of the interns, wash their hands before patient contact, while (69%) wash afterwards. While in other studies, the overall frequency of hand washing before patient contact was (6.7%), and (23.7%) after (12). Another study in India reported that hand hygiene compliance by Healthcare Workers was less than (50%) (13).

When touching blood, body fluids, internal mucosa or in cases of wounds in the skin we found that (62%) of our interns wear sterile surgical gloves, while (60%) wear non-surgical gloves. This is found to be less than other studies, that had (75.5%) of respondents that reported to adhere to wearing gloves while performing procedures (11). A study in Uganda had (83.25%) of the respondents who always use gloves when drawing blood or placing cannulas (14). On the other hand, a study done on Healthcare workers had lesser results than ours, where only (43%) have always used gloves when drawing blood (15).

According to WHO, washing hands after removing medical gloves is required for glove usage and hand hygiene (16). In concern to this practice we found that respondents in our study have, lower rate (56%) compared to another study in Nigeria that had (77%) of doctors wash their hands before and after using gloves (17). Another study also had higher results in which (61%) of their respondents reported to always wash their hands after gloves usage (15).

In this study, (69%) of intern's wear face mask when there is a possibility of spitting out or spillage of any body fluids from the patient. This is a higher result in comparison to a previous study that had (50%) of doctors that wears cap and mask before invasive procedures (16).

Needle recapping after usage and giving injections is a behavior that increasing the risk of needle stick injury and infected by blood borne diseases. We found (54%) of the interns in our study a higher result in comparison to other studies, where in Nigeria only (31.3%) of the doctors perform it (16), and (44%) in a study at Uganda.

### **Conclusion:-**

The present study showed that the majority of medical and dental interns had satisfactory knowledge about infection control. Moreover, most of them learned infection-control practice from their senior doctors.

### **Limitation of the Study:-**

We used in this study a self-administered questionnaire to measure the practice. This method is not the best method, as it does not provide clear picture about it. Another limitation was low response rate (63%) especially among the dental interns (47%).

### **Recommendation:-**

We recommend that stakeholders in the medical profession should update their medical curricula by focusing and brainstorming on topics that would minimize the high risk of infections to which interns and patients are susceptible.



They should also use educational seminars, workshops, pamphlet and posters in universities and hospitals to educate doctors, nurses, and other medical professionals about infection control.

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