

AWARENESS & KNOWLEDGE OF MEDICAL STUDENTS AND INTERNS ABOUT INFECTION CONTROL MEASURES

Saad Al-Zahrani¹, Fahad Al-Amry², Mabrouk Ghonaim³, Osama Abo-Salem³

¹ Department of Family Medicine, College of Applied Medical Sciences, Taif University, KSA

² Al-Hada Military Hospital, Taif, KSA

³ Department of Medical Laboratories, College of Applied Medical Sciences, Taif University, KSA

Correspondence to: Saad Al-Zahrani (ssmz2002@hotmail.com)

DOI: 10.5455/ijmsph.2013.2.331-337 Received Date: 15.12.2012

Accepted Date: 16.12.2012

ABSTRACT

Background: Health care workers (HCW) can be exposed to serious types of infections if they are not following proper infection control (IC) measures. No study has been performed to evaluate knowledge and awareness about IC policies and measures among medical students (MS) and interns in Taif region.

Aims & Objective: Our objective was to assess awareness and knowledge of MS and interns regarding IC measures.

Material and Methods: A cross-sectional, interview-based survey included 144 trainees in hospitals [102 from the College of Medicine (CM) and 42 from the College of Applied Medical Sciences (CAMS)], Taif university were enrolled in this study. Students and interns were invited to complete the questionnaire concerning awareness and knowledge about IC. Data were collected and analyzed using SPSS software.

Results: The overall awareness was 64.6%. All the interns of the CM had attended an orientation course. About 74% of the MS and interns gave correct answers about IC. About 67% of the studied trainees had received training about IC policies. About 25% of the trainees had been exposed to needle stick (NS); splash of blood or body fluid (SBF); contact with non-intact skin (CNS); sharp objects (SO) or acquired infection (AI). Further training about IC was required by 78.5% of the studied trainees. About 65% of the trainees had received hepatitis B virus (HBV) vaccine, however, 55% of those who received the vaccine did not complete the regimen.

Conclusion: A high number of MS and interns of both CM and CAMS were not adequately equipped with awareness and knowledge concerning IC. The majority of them require training and did not take or complete the regimen of HBV vaccine. Therefore, continued medical education and training programs should be started at the hospital level along with conferences to spread knowledge about IC.

KEY-WORDS: Awareness; Infection Control; Interns; Knowledge; Medical Students

Introduction

Hospital-associated infections (HAI) are those infections acquired during the patient's stay in hospital. They form a major worldwide public health problem despite advances in our understanding and control of these infections.^[1,2] The best clinical care in the world can be worthless if patients pick up other infections while they are in the hospital. HAI also include occupational infections which occur in HCW due to occupational hazards.^[3]

Regardless of where the infection originates, it is surely the first duty of every member of the staff in a hospital to do everything he can make sure that patients are cared for, and returned to health, as quickly as possible and as free from HAI as possible.^[4,5]

New students or interns annually start their practical training of different specialties in the different hospitals from different colleges and schools. Previous studies have demonstrated that the levels of awareness and knowledge of IC protocols or policies vary between specific groups of medical staff, and that compliance is greatly influenced by the examples set by senior staff members.^[3,6]

For implementation of all the preventive measures to decrease the risk of infection hazards and maintain safety of our future physicians and other HCW as well as patient safety, adequate awareness and knowledge of MS and interns about IC measures and policies are essential. To our knowledge, on the nation level, no similar study has been conducted to address the knowledge and awareness about IC policies

among medical and paramedical students and interns.

Objectives

1. To assess the awareness of MS and interns about IC measures.
2. To assess the knowledge of MS and interns regarding IC measures.
3. To define the impact of unawareness & noncompliance with IC measures.

Materials and Methods

Study Design

A cross-sectional, interview-based survey was conducted using a validated questionnaire to MS and interns of CM and CAMS, Taif University who were receiving training in the Ministry of Health (MOH) hospitals, Armed Forces Hospitals (AFH) and University Hospitals. Interns and MS in the above-mentioned hospitals, who gave written consent, were interviewed.

Questionnaire Design

A valid and modified questionnaire which was designed based on the study objectives, taking help from the previous literature and studies available on the topic. It demonstrated the following aspects: (i) participants demographic data; (ii) awareness assessment and (iii) knowledge assessment

Pilot Study

A pilot study was conducted by distribution of 20 questionnaires to 20 interns to assess the validity of the questionnaire.

Study Population

Overall 144 trainees in hospitals [102 from the CM (58 interns and 44 students) and 42 from the CAMS (24 interns and 18 students)] were enrolled in this study.

Study Area

(i) MOH hospitals; (ii) Taif AFH and (iii) University's hospitals

Statistical Analysis

Data entry was done through EpiData twice. Two members of the team entered the same data and the data files were compared to rule out errors in entering the data. Data were collected and analyzed using SPSS version 16. Percentages and proportions were calculated for all the variables. Relevant tables and graphs were computed. The following statistics were applied:

1. Descriptive statistics: The number and percent of the studied personnel for different variables.
2. Analytical statistics: Chi-square test was used to compare 2 or more qualitative variables. Significance was determined at p value < 0.05.

Ethical Consideration

Ethical approval was obtained from Taif University ethical review committee before starting data collection.

Results

The Studied Trainees

There were 144 interview-based questionnaires filled. One hundred and two were from CM (58 interns and 44 students) and forty two were from CAMS (24 interns and 18 students). There were in total 90 males and 54 females. They were involved in training in MOH (92), University Hospitals (39) and AFH (13). The duration of training of the enrolled trainees was variable as shown in table 1.

Table-1: Characteristics of the Studied Group

Characteristics		CM		CAMS	
		No.	%	No.	%
Level	Interns	58	56.86	24	57.14
	Students	44	43.14	18	42.86
Sex	Males	66	64.71	24	57.14
	Females	36	35.29	18	42.86
Training Place (hospital)	AFH	6	5.88	7	16.67
	MOH Hospitals	64	62.75	28	66.66
	University Hospitals	32	31.37	7	16.67
Duration (month)	0-3	32	31.37	10	23.81
	3-6	20	19.61	14	33.33
	6-9	20	19.61	9	21.43
	9-12	30	29.41	9	21.43

Awareness Assessment

The overall awareness percentage amongst the entire studied group was 64.6% as demonstrated

in table 2. Comparison between students of CM and CAMS is shown in table 3. Students of CM had significantly ($P<0.001$) more awareness about using face masks, dealing with isolated patients and IC guide manual. On the other hand, students of CAMS had significantly ($P<0.001$) more awareness about the proper way of wearing sterile gloves. There was no significant difference regarding attendance orientation course in the college or hospital, hand washing technique, NS injury, rules of safety during injection and the proper methods of waste disposal. Awareness assessment among interns is shown in table 3. All of the interns of CM had attended an orientation course in the college. They were aware about NS injury, rules of safety during injection, IC guide manual ($P<0.001$) and dealing with isolated patients ($P<0.05$). However, interns of CAMS were more aware about using face masks ($P<0.01$) and the proper methods of waste disposal ($P<0.05$).

Table-2: Overall Assessment of IC Parameters among the Studied Population

Parameters	Average Awareness (%)
Awareness assessment	64.6
Knowledge assessment	73.5
Receiving training	66.9
Exposure to a problem during training	25.4
Requirement of further training	78.5
Receiving HBV vaccination	64.6
Completing HBV vaccine regimen	54.9

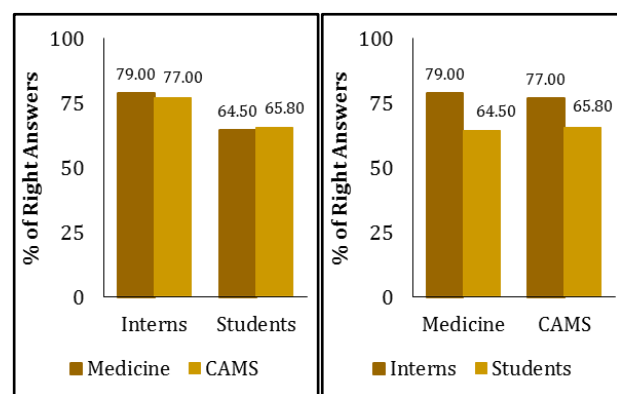


Figure-1: Comparison of Knowledge Assessment between CM and CAMS among Interns and Students (There was no significant difference between the 2 colleges or between interns and students)

Knowledge Assessment

Table 2 showed that 73.5% of MS and interns gave correct answers about different types of questions in IC. There was no significant difference in the overall knowledge percentage between MS and interns or between CM and CAMS as shown

(Figure 1). However, there were significant differences between these groups when the single parameters were compared. Students of CAMS had more knowledge about nosocomial infection (NI), hand hygiene ($P<0.01$) and using gloves ($P<0.05$). Interns of CM had more knowledge about alcohol-based hand rub ($P<0.01$). There was no significant difference between the 2 colleges (for both MS and interns) concerning precaution standards or their behavior after splashes (table 4).

Training of IC Policies

About 67% of the studied trainees had received training in one or more of IC policies (table 2). Higher percentage of MS of CAMS had attended training about wearing gloves and safe waste disposal ($P<0.05$ and $P<0.01$ respectively). On the other hand, higher percentage of interns of CM had attended training about dealing with infectious patients ($P<0.01$) and safe IV cannulation ($P<0.05$). There was no significant difference regarding hand washing, and wearing of face masks or gloves (table 5).

Compliance with IC Policies During Training

Table 2 showed that 25.4% of the studied trainees had been exposed to a problem during training (NS, SBF, CNS, SO or AI). Students of CM were more significantly exposed to CNS, SO and AI ($P<0.01$, $P<0.05$ and $P<0.05$ respectively) (Figure 2A). On the other hand, interns of CAMS were more significantly exposed to SO ($P<0.001$) as shown in Figure 2B.

Requirement for further Training

Table 2 shows that 78.5% of the studied trainees desired further training about IC. However, there was no significant difference between the 2 colleges or between students and interns regarding the need of further training (Figure 3).

HBV Vaccination

About 65% of the trainees had received HBV vaccination; however, 54.9% of those who received the vaccine did not complete the regimen (table 2). There was no significant difference between 2 colleges or between students & interns regarding receiving HBV vaccine (Figure 4).

Table-3: Awareness Assessment about IC among MS

Awareness Parameter	CM			CAMS			χ^2
	Total No.	Yes	%	Total No.	Yes	%	
The Studied College (MS)							
Orientation attendance in college	44	24	54.55	18	14	77.78	3.33
Orientation attendance in hospital	44	18	40.91	18	4	22.22	1.95
Hand washing technique	43	30	69.77	18	8	44.44	3.46
Using face mask	44	44	100.00	18	12	66.67	16.26*
NS injury	43	26	60.47	18	12	66.67	0.21
Rules of safety during injection	44	20	45.45	18	6	33.33	0.77
Dealing with isolated patients	44	38	86.36	17	10	58.82	22.4*
Proper way of wearing sterile gloves	44	16	36.36	18	18	100.0	20.9*
IC guide manual	44	34	77.27	18	4	22.22	16.3*
Proper methods of waste disposal	44	22	50.00	18	8	44.44	0.17
The Studied College (Interns)							
Orientation attendance in college	58	58	100.0	24	22	91.67	20.91*
Orientation attendance in hospital	58	34	58.62	23	12	52.17	0.27
Hand washing technique	58	56	96.55	24	22	91.67	0.87
Using face mask	58	44	75.86	24	24	100.0	6.98€
NS injury	58	56	96.55	24	16	66.67	13.68*
Rules of safety during injection	58	34	58.62	24	4	16.67	12.02*
Dealing with isolated patients	57	36	63.16	24	8	33.33	6.07£
Proper way of wearing sterile gloves	58	56	96.55	24	22	91.67	0.87
IC guide manual	58	34	58.62	24	6	25.0	7.68€
Proper methods of waste disposal	58	52	89.66	24	16	100.0	6.33£

£ P<0.05; € P<0.01; *P<0.001

Table-4: Knowledge Assessment about IC

Knowledge Parameter	CM			CAMS			χ^2
	Total No.	RA	%	Total No.	RA	%	
The Studied College (MS)							
NI	44	25	56.82	18	16	88.89	8.21€
Precaution standards	44	27.5	62.50	18	12	66.67	0.05
Hand hygiene	43	23.5	54.65	18	16.5	91.67	8.58€
Using gloves	44	29.5	67.05	18	16.5	91.67	4.79£
Behavior after splashes	44	37.5	85.23	17	15	88.24	0.03
Alcohol-based hand rub	42	15	35.71	18	8.5	47.22	1.07
The Studied College (Interns)							
NI	58	45	77.59	24	16.5	68.75	1.23
Precaution standards	56	50	89.29	24	22.5	93.75	0.91
Hand hygiene	58	55.5	95.69	24	23.5	97.92	0.85
Using gloves	58	50.5	87.07	24	18	75.00	2.04
Behavior after splashes	58	56.5	97.41	24	23.5	97.92	1.00
Alcohol-based hand rub	58	46	79.31	24	11.5	47.92	7.05€

RA; Right answer; £ P<0.05; € P<0.01

Table-5: Training about IC Polices among Students and Interns

Infection Control Policy	CM			CAMS			χ^2
	Total No.	Yes	%	Total No.	Yes	%	
The Studied College (MS)							
Hand washing	44	24	54.55	18	12	66.67	3.16
Wearing gloves	44	22	50.00	18	14	77.78	4.05£
Wearing face mask	44	16	36.36	18	8	44.44	0.35
Dealing with infectious patients	44	18	40.91	18	8	44.44	0.07
Safe IV cannulation	44	16	36.36	18	10	55.56	1.93
Safe use and disposal of sharps	44	18	40.91	18	14	77.78	6.96€
The Studied College (Interns)							
Hand washing	58	56	96.55	24	24	100.00	0.86
Wearing gloves	58	52	89.66	24	22	91.67	0.07
Wearing face mask	58	50	86.21	24	22	91.67	0.48
Dealing with infectious patients	58	44	75.86	24	10	41.67	8.81€
Safe IV cannulation	58	34	58.62	24	8	33.33	4.34£
Safe use and disposal of sharps	58	56	96.55	24	24	100.00	0.86

£ P<0.05; € P<0.01

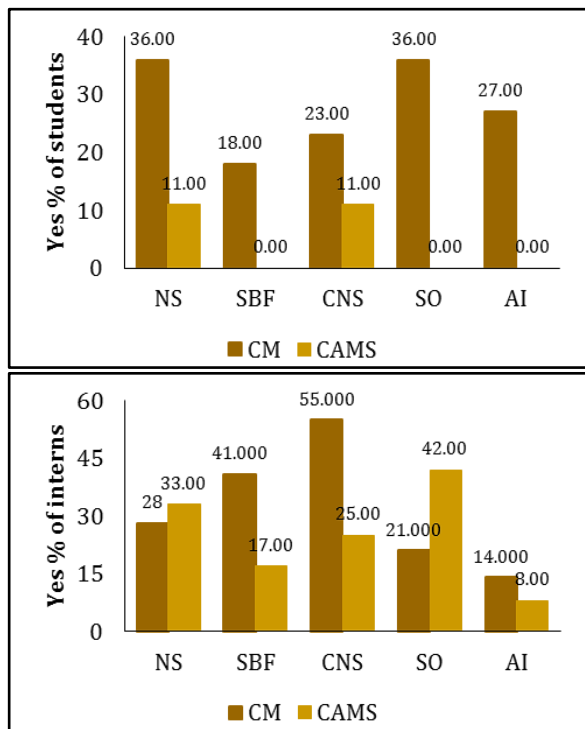


Figure-2: Comparison of Compliance with IC Policies during Training between CM and CAMS among Students and Interns (A) Students of CM were more significantly exposed to CNS, SO and AI ($P < 0.01$, $P < 0.05$ and $P < 0.05$ respectively); (B) Interns of CAMS were more significantly exposed to SO ($P < 0.001$). [NS; needle sticks; SBF; splash of blood or body fluids; CNS; contact with non-intact skin; SO; sharp objects; AI; acquired infection]

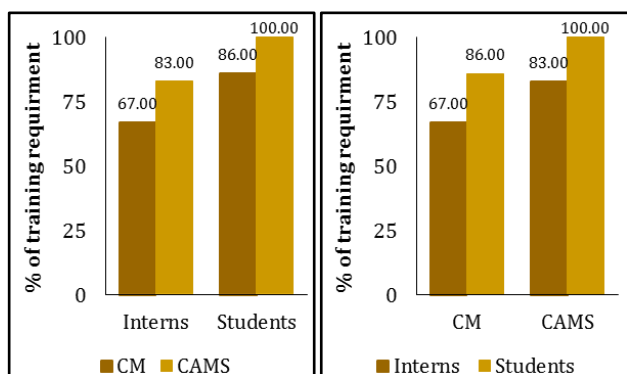


Figure-3: Comparison between Interns and Students and between CM and CAMS Concerning Requirement of Further Training (There was no significant difference between the 2 colleges or between interns and students.)

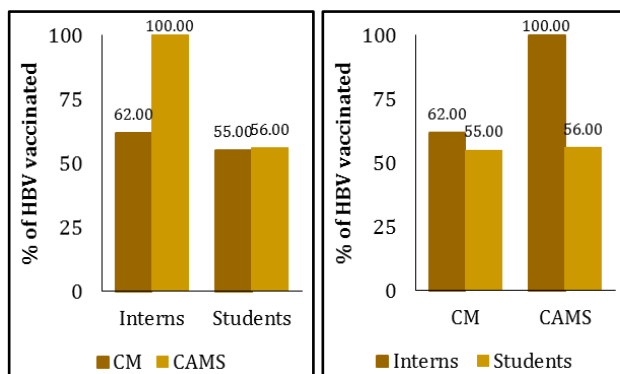


Figure-4: Comparison between Interns and Students and between CM and CAMS Concerning Receiving HBV Vaccine (There was no significant difference between the 2 colleges or between interns and students.)

Discussion

Exposure to infectious diseases is one of the most frequently identified occupational hazards facing HCW. Awareness and adequate knowledge are important requirements for all HCW. In this study, the overall awareness of the studied trainees about IC measures was about 65%. Our results showed that students of CM had more awareness about using face masks, dealing with isolated patients and IC guide manual while those of CAMS had more awareness about wearing sterile gloves. Medical and paramedical students and trainees, being a part of the healthcare delivery system, are exposed to the same, if not greater magnitude of risk as other HCW when they come into contact with patients and contaminated instruments.^[5,7] In many teaching centers, medical and paramedical students and trainees are the first level of contact with patients.^[8,9] They are expected to undertake activities related to patient care with the starting of their clinical years.^[10] All of the interns of CM had attended an orientation course in their college. They were aware about NS injury, rules of safety during injection, IC guide manual and dealing with isolated patients. Interns of CAMS were more aware about using face masks and safe use and disposal of sharps. However, not all of them were aware about all aspects of IC although they have to face the risks associated with occupational hazards facing HCW.^[11,12]

The overall percentage of knowledge assessment of the trainees was about 73.5%. There was no difference between students and interns or between MS and CAMS in the overall assessment. However, students of CAMS had more knowledge about NI, hand hygiene and using gloves while interns of CM had more knowledge about alcohol-based hand rub. There were some wrong answers for some of the questions, indicating presence of some defects in their knowledge. To protect MS and interns from injuries and to prevent NI, they should have adequate knowledge before their initial training period.^[13,14] Lack of adequate knowledge of standard precautions^[9,15] and isolation precautions has been reported to be insufficient^[7]. Significant improvement in short-term knowledge of IC practices by MS was previously reported.^[16] As IC is a part of the curriculum for MS in both CM and CAMS,

continuous improvement of this course is mandatory.^[17]

Our results showed that about 67% of the studied trainees had received training in one or more of IC policies. Higher percentage of students of CAMS had attended training about wearing gloves and safe waste disposal. On the other hand, higher percentage of interns of CM had attended training about dealing with infectious patients and safe IV cannulation. However, some of the studied trainees had no previous training. Therefore, the provision of training programs that provide information about IC is a priority for both medical and paramedical students. Moreover, efforts are required for bringing a reduction in the risk perception of interns through awareness campaigns and reorientation trainings.^[18]

Our findings revealed that about 25% of the studied trainees had been exposed during training to one or more of these conditions (NS, SBF, CNS, SO or AI). This result indicates a possible lack of compliance with IC measures. Despite the continuing impact of HAI on the National Health Care System, reports suggest that medical staff have poor compliance with even the most basic IC procedures.^[19] Our findings showed that students of CM were more significantly exposed to CNS, SO and AI while interns of CAMS were more significantly exposed to SO. NS injuries have been reported to be among the potential occupational hazards for HCW and to be associated with a number of different health hazards as acquisition of potentially fatal diseases such as Hepatitis B and C and human immunodeficiency virus⁽⁶⁾. Therefore, a high level of noncompliance with basic IC measures by medical staff may exist and may be attributed to lack of familiarity with IC guidelines.^[19]

A large percentage (78.5%) of our studied trainees had a desire for further IC training. Those personnel included participants from the 2 colleges as well as from both students and interns. These findings may indicate the importance of implementation of continuous training about the different IC policies for all the medical and paramedical students and interns. The provision of training programs will protect both the HCW and patients from exposure to HAI^[19], however,

educational aims and strategies must depend on the target group. Poor IC practices will be regarded in a negative light by patients and their families, regardless of any other manifest skills of the practitioner.^[19]

Occupational exposure to blood or other body fluids in health care settings constitutes a small but significant risk of transmission of blood-borne viruses.^[20] Only 65% of the trainees enrolled in our study had received HBV vaccine and 54.9 % of those who received the vaccine did not complete the regimen. This was noticed in students and interns of both CM and CAMS, indicating that lack of protective antibody level may occur in a large proportion of them. Dental students were reported to have occupational exposure to blood or other potentially infectious materials.^[21] Therefore, the medical universities should take necessary action to inform, educate and vaccinate the trainees who may be at risk. The MOH should make HBV vaccination mandatory for all health professionals. However, there may be a false impression about prophylaxis, vaccination and treatment of HBV.^[22] Therefore, knowledge alone is not sufficient to bring about behavioural changes, but is imperative for health education personnel to remove misconceptions. This can be done by well-structured health education programs, seminars, workshop and conferences.

Conclusion

This study points to inadequate knowledge and awareness about IC amongst the medical and paramedical students and interns. Only through proper education of the future HCW, the burden of HAI can be reduced.

Recommendations: (1) Improvement of IC education programs must be performed to increase safety of our graduates and patients. (2) A medical education program should be started at the hospital level along with seminars which highlight the importance of IC policies. (3) More emphasis should be placed on IC curriculum taught in undergraduate education. (4) Administration of HBV vaccine to all non-immune medical and paramedical students and interns.

ABBREVIATIONS

AFH: Armed Forces Hospitals; AI: acquired infection; CAMS: College of Applied Medical Sciences; CM: College of Medicine; CNS: contact with non-intact skin; HAI: Hospital-associated infections; HBV: hepatitis B virus; HCW: health care workers; IC: infection control; MS: medical students; MOH: Ministry of Health; NI: nosocomial infection; NS: needle stick; SBF: splash of blood or body fluid; SO: sharp objects.

References

- McDermott C, Gibb AP, Paterson-Brown S, Brady RR. Fact or infection: do surgical trainees know enough about infection control? *Ann R Coll Surg Engl* 2008; 90 (8): 647-50.
- Tavolacci M-P, Ladne J, Bailly L, Merle V, Pitrou I, Czernichow P. Prevention of nosocomial infection and standard precautions: knowledge and source of information among healthcare students. *Infect Control Hosp Epidemiol* 2008; 29: 642-7.
- Hayashida K, Imanaka Y, Fukuda H. Measuring hospital-wide activity volume for patient safety and infection control: a multi-centre study in Japan. *BMC Health Serv Res* 2007; 7: 140.
- Mousa AA, Mahmoud NM, Tag El-Din AM. Knowledge and attitudes of dental patients towards cross-infection control measures in dental practice, *East Med Health J* 1997; 3 (2): 263-73.
- Shariati B, Shahidzadeh-Mahani A, Oveysi T, Akhlaghi H. Accidental exposure to blood in medical interns of Tehran University of Medical Sciences, *J Occupational health* 2007; 49 (4): 317-321.
- Saleem T, Khalid U, Ishaque S, Zafar A. Knowledge, attitudes and practices of medical students regarding needle stick injuries. *J Pak Med Assoc.* 2010; 60 (2) :150-6.
- Friedewald M, Elwin C. New graduate nurses and infection control: knowledge versus practice. *Austra Infect Control* 2003; 8 (1): 21-27.
- Askarian M, Honarvar B, Tabatabaee HR, Assadian O. Knowledge, practice and attitude towards standard isolation precautions in Iranian medical students. *J Hosp Infect* 2004; 58 (4): 292-6.
- Bellamy E. An evaluation of patient satisfaction regarding the care and information provided by infection control nurses relating to MRSA. *Br J Infect Control* 2008; 9 (3): 6-10.
- Danchaivijitr S, Tantiwatanapaiboon Y, Chokloikaew S, Tangtrakool T, Suttisanon L, Chitreechuer L. Universal precautions: knowledge, compliance and attitudes of doctors and nurses in Thailand. *J Med Assoc Thai.* 1995; 78: (Suppl 2): S112-7.
- Calabro K, Bright K, Kouzekanani K. Long-term effectiveness of infection control training among fourth-year medical students. *Med Educ Online* [serial online] 2000; 5:1. Available from URL <http://www.med-ed-online.org>.
- Mathur M, Shripad T, Tainwala S, Misra V. A study to evaluate the impact of hospital infection control training programme on health care workers, *Bombay hospital J* 2007; 49 (4): 65-71. 2007.
- Stein AD, Makarawo TP, Ahmad MFR. A survey of doctors' and nurses' knowledge, attitudes and compliance with infection control guidelines in Birmingham Teaching Hospitals. *J Hosp Infect* 2003; 54 (1): 68-73.
- Madani TA, Albarrak AM, Alhazmi MA. Steady improvement of infection control services in six community hospitals in Makkah. *BMC Infect Dis.* 2006; 6: 135-9.
- Houang ETS, Hurley R. Anonymous questionnaire survey on the knowledge and practices of hospital staff in infection control. *J Hosp Infect.* 1997; 35 (4): 301-306.
- Calabro K, Weltge A, Parnell S, Kouzekanani K, Ramirez E. Intervention for medical students: effective infection control. *AJIC* 1998; 26: 431-436.
- Koller W, Flamm H, Rotter M, Wewalka G, Mittermayer H. Educational programmes for infection control in Austria. *J Hosp Infect.* 1991 Jun; 18 Suppl A: 495-501.
- Lal P, Singh MM, Malhotra R, Ingle GK. Perception of risk and potential occupational exposure to HIV/AIDS among medical interns in Delhi. *J Commun Dis.* 2007 Jun; 39(2): 95-9.
- Ferguson JK. Preventing healthcare-associated infection: risks, healthcare systems and behaviour. *Intern Med J.* 2009 Sep; 39(9): 574-81.
- Sagoe-Moses C, Pearson RD, Perry J, Jagger J. Risks to health care workers in developing countries. *N Engl J Med* 2001, 345(7): 538-541.
- Kotelchuck D, Murphy D, Younai F. Impact of underreporting on the management of occupational bloodborne exposures in a dental teaching environment. *J Dent Educ* 2004; 68: 614-22.
- Tirounilacandinn P, Krishnaraj S, Chakravarthy K. Hepatitis-B infection: awareness among medical, dental interns in India. *Ann Trop Med Public Health*, 2009; 2 (2): 33-36.

Cite this article as: Al-Zahrani SS, Al-Amry F, Ghonaim MM, Abo-Salem OM. Awareness & knowledge of medical students & interns about infection control measures. *Int J Med Sci Public Health* 2013; 2:317-323.

Source of Support: Nil

Conflict of interest: None declared