

Perceptions of Medical students toward nosocomial infections at college of medicine-Babylon

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Abstract

Background: Health care Acquired Infections are a major cause of increasing morbidity and mortality around the world.

Nosocomial infection contracted during medical treatment is a huge problem in hospitals. Up to 5,000 patients die every year from nosocomial infections. Up to 30% are preventable through simple infection control procedures. Infections increase costs, waiting lists, and harm-wide.

The aims of this research are (1) to assess the knowledge, attitudes and behaviors of medical students toward nosocomial infections.

(2) to explore the source of information from which the medical students received their knowledge during college's study about nosocomial infections

Subject and Methods: it is a descriptive cross-sectional study, which carried on one hundred and six final year students using non random sampling technique, there is no inclusion or exclusion criteria. This study was done in Al- Hilla College of Medicine/ University of Babylon and conducted during the period from 1st of January to 30th of October 2013, by using questionnaire through direct interview.

Statistical analysis: Minitab version 18 software was used for data entry and analysis.

P value \leq 0.05 considered as significant.

Results: The study showed that the overall average of the medical students' knowledge about HCAs was (68.34%), however, the knowledge regarding specific areas was low, particularly concerning the risk of transmission of infection to the hospital personnel was(41.5%) and for the stethoscope was (43.86%) as a potential source of infections.

In general, their behaviors to reduce the risk of infections were (69.38%), whereas, (49.06%) of them wearing protective materials when contact with patient. Generally the attitudes of medical students were positive (68.68%).

Females had better attitudes than males (48.87%), (19.81%) concerning the perceived risk of acquiring a HAIs.

Advising information about some items of HCAs was generally (50, 65%). About safety (IV) inserted devices (52.84%) and only (22.16 %) have acceptable advised about Stethoscope cleaning.

Conclusions and recommendations: this study concluded that the students have adequate knowledge, positive attitudes and acceptable behaviors to reduce nosocomial infections; however, advising information about some items of HCAs was generally acceptable. These findings emphasize the need of stressing on education about this sort of infections in the health care curricula.

Key word: nosocomial infection, sixth year, perception.

1.Introduction

1.1 Health care-associated infections have long been recognized as crucial factors bothering the quality and outcomes of health care delivery. "An infection is considered nosocomial if it becomes evident 48 hours or more after hospital admission or within 30 days of discharge following inpatient care"^[1]. Health care-associated infections (HAIs) or nosocomial infections were not present or incubating at the time of admission, comprise a significant burden of illness^[2].

HAIs are a major cause of increasing morbidity and mortality in around the World as well as US. The mortality rates of Healthcare-associated infections (HAIs) are varying from 5% to 35% that make HAIs is among the ten top leading cause of death. Nosocomial infection is an identified public health problem world-wide with a prevalence rate of 3.0-20.7% and an incidence rate of 5-10 %^[3,4].

All admissions %5 to %10 percent are complicated by HAI in both the US and Western Europe. Annually, In the US alone 1.7 million infections resulting in approximately 99,000 deaths occur^[5].

More than 177 000 potentially infections (HAIs) occur annually in Australia with sizable attributable mortality^[6]. The World Health Organization (WHO) estimates an average of 9 million individuals are affected by nosocomial infections and approximately 1 million patients die each year because of these diseases^[7].

1.2 Developing countries were reported to have up to 20 times the risk of contracting a nosocomial infection compared with developed countries^[8]. Thus; spread of infection serves as a major source of worry for managers in health care practice, particularly in developing countries where the health care system is already overstretched.

The prevalence rate in Africa of nosocomial infections stills high .The reported rates in Tunisia9.4% Algeria 16.2%, Gabon 11% and Mali 9.6 %^[7].

1.3 The economic cost of nosocomial infection is highly increasing in the world due to increased rates of infections, long stay in hospitals and by multiple drug-resistant organisms (MDROs) increases. More than 70% of the bacteria cause resistant to at least one of the drugs used to treat them. Only in USA according to health economist at the CDC has recently estimated hospital costs of HAIs costs \$28–45 billion annually^[9].

1.4 The most important types of healthcare-associated infections are central line-associated bloodstream infections, catheter-associated urinary tract infections and surgical site infections (specifically those following abdominal hysterectomies or colon surgeries) during hospitalization. These account for a large proportion of illnesses and deaths associated with healthcare^[10].

Although infections occur in patients upon admission, healthcare workers among them medical students play a significant rule as potential factors for pathogenic agents' transmission pathway for spread of infections, due to poor infection control & prevention practices & overcrowding in the most clinical settings.

1.5 In Iraq to know the extent of problem regarding nosocomial infections in our society for e.g. a study was done in Basrah General Hospital, Iraq, found that

(65%) of patients were suffering from *Pseudomonas aeruginosa* infection which considered a high antibiotic resistant microorganism^[11].

Another study by Alrifai S.B.et al carried out in Tikrit, Iraq, found that nosocomial diarrhoea in children (32.4%) aged < 5 years, which emphasis on personal hygiene and improved care practices^[12].

Merdaw M. A. found that in the surgical wards of 4 hospitals in Baghdad city between 2010 -2011, the incidence of post operative infections 78.43% was from the 102 admitted patients^[13].

Knowledge; up-date information and self-learning, skills, a role modeling and compliance are necessary preventive measures to restrict the spread of nosocomial infections; in addition, patient safety education can be made significant to students by placing the principles in context with their current and future practical roles^[14].

The aim of this study is;

- (1) To assess the knowledge, attitudes and behaviors of medical students toward health care- associated infections (HAIs) or nosocomial infections.
- (2) To explore the source of information from which the medical students received their knowledge during college's study about nosocomial infections

2.Methodology

2.1 Study design A descriptive cross-sectional study which carried out on one hundred and six students using a convenience non random sampling technique, there is no inclusion or exclusion criteria.

2.2 Setting: The study was done in Babylon governorate/ Iraq

2.3 duration: this study conducted during the period from January to October 2013 at teaching hospitals, (al Hilla Teaching Hospital), (Maternity& Children Hospital) and (Margan Teaching Hospital), located at Babil.

2.4 sample: one hundred and six (106) students were participated from sixth year (37 males and 69 females).

2.5 ethical considerations: The study protocol as well as the questionnaire was approved by ethical and scientific committee of the Al kindy college of Medicine, Baghdad University with complete confidentiality was guaranteed to the participants were no name contain.

2.6 data collection: This study was carried out on final year students of college of medicine, University of Babylon, located at Babil. They were separated to four main groups, Medicine, Surgery, Pediatric, Gynecology and Obstetrics on the main hospitals at Babil. The questionnaire was distributed to the students after consent was sought and obtained from head master of medical college of medicine of Babil and all departments' masters at different hospitals where the students presented.

Prior to the study, participants were given a brief introduction to the purpose of the study, after which their consent was sought and obtained. The participants did not all complete and return the questionnaire. About ten students did not return the questionnaire. The Infection Control Questionnaire prepared by researcher according to international guidelines and another questionnaire on standard isolation precautions, hand hygiene, prevention and control measures of nosocomial infections and resources of information was used in this study^[15,16,17,18,19,20]. The questionnaire consisted of four main domains, with 30 items. Students' knowledge section was designed to explore student's knowledge related to health care associated infections (HAIs) or nosocomial infections. For each statement are whether students agree, uncertain or disagree, it consisted of (10 items). Response to each item was coded and scored as a correct answer (2), uncertain (1), incorrect answer (0). The second section was behaviors section which consisted of (10 items). This section is designed to gather information about student's behaviors. For each statement check whether student **always sometimes never** adopt each of the practices to reduce the risk of HAIs. Responsive scored was (2), (1), and (0) consequently. The third was **Attitude's** section (5 items) of the questionnaire, was designed to explore student attitudes toward precautionary guidelines and perception of the risk of acquiring HAIs by multiples questions. Each item was scored (2) for correct answer and (0) for incorrect answer. The last information's section (5 items) was designed to ask questions about sources of student's information on nosocomial. For each statement check whether student **always, sometimes, never** learned about HAIs during curricula implementation through their study. Response to each item was coded and scored (2), (1), and (0) consequently.

The equation $(NO \times 0 + NO \times 1 + NO \times 2) / 2 \times 100\%$, (NO=number) was used to estimate the mean percentage of any question in the research that needs to assess results of the questionnaire. The Iraqi grading rate system was used to interrupt any grading scale anywhere in the study as following:

Excellent.....	100-90%
Very good.....	80-89%
Good.....	70-79%,
Adequate.....	60-69%
Acceptable.....	50-59%
Weak.....	0-49%

2.7 Statistical Analysis: Data was analyzed by Minitab 18 software. Calculation of the Chi-square test for significance was used. P-value $\leq (0.05)$ is considered statistically significant.

3. Result and discussion:

3.1 As future clinicians students need to learn about patient safety. There is a progression from knowing "what" to knowing "how" and ultimately to "doing". With the growing recognition of the harms caused by health care comes the need for medical students to learn how to deliver safer care.^[14]

3.2 In the current study the overall average of participants' knowledge concerning the various aspects of HCAIs was generally adequate (68.34%), however, there are many areas where the knowledge was excellent (96.69%) especially regarding hand hygiene measures before and after dressing, the risk of Invasive procedures were very good (89.26%) on nosocomial infection and duration of intubation and mechanical ventilation was excellent (91.5%) as in table 2. In contrast, there are other areas where the knowledge was weak, particularly concerning the risk of transmission of infections to the hospital personnel (41.50%) and stethoscope as a potential source of infections (43.86%). Established upon these considerations, these medical students need to learn more in order to diminish the rate of HCAIs.

According to another studies conducted in same field they found in Italy there was (very good) knowledge (86.3%) of medical students about HCAIs^[15]. While another studies found good knowledge (70.58%) of nosocomial infections among medical students at the College of Health Sciences, University of Ghana. Another study was conducted at Qazvin University of medical science in Iran revealed that the students' good knowledge

(79.9%) on nosocomial infections [^{1,21}], furthermore, at the Medical University of Graz in Austria, a study found the knowledge on hygiene guidelines appears to be good(70%) among medical students^[22].

In contrast, a study carried out among medical students attending Shantou University Medical College (SUMC) in China, demonstrated that medical students have limited (acceptable) knowledge (52.5 %)^[23]. Moreover, another study achieved to measure students' knowledge of infection control measures and their sources of information, at Rouen University (Rouen, France), found the knowledge of nursing students was better than medical students in three areas, hand hygiene, standard precautions, and nosocomial infection also the same results were found in Italy^[15,16].

3.3 As seen in table 3, the students' behaviors in current study were adequately (69.38%). Results from this study indicated that most respondents always performed hands hygiene measures after dressing changes and any contact with the surgical site were very good(86.32%) attendance for the prevention of the HCAs. They showed very good (83.96%) desire for encouraging patients to inform their health-care providers any changes in their devices or any new discomfort. Whereas, they perceived acceptable (62.73%) manner to act as a role model to health care providers, clients and families with regard to infection prevention and control strategies, however, they need to be more encouraged to play this role by their teachers and expert staffs in classrooms and bedside teaching.

The students responded to take vaccination against hepatitis B was good (73.11%). The hepatitis B virus (HBV) considers the most common occupational viral infections; however, it can be prevented by vaccination. For instance, in 1990, the HBV infection rate among unvaccinated US healthcare personnel was three to five times greater than in the US general population while the rate was reversed in 2010 five times less than in the US general population due to the introduction of routine HBV immunization and comprehensive occupational health and safety policies^[24].

The students reacted good (72.16%) to hands washing after hands move from infected body site to clean site and adequately (66.98%) before and after wearing gloves. The hand hygiene, wearing gloves and protective materials consider the corner stone in preventive pathogens transmission but not all students or health care workers are disposed to it, in a study carried out in Tikrit, Iraq revealed (75%) of medical staff and employees had contaminated hands.^[25]

According to Sulaiha S A, et al, that most of students either fail to wash their hands or fail to follow the correct steps in effective hand washing during clinical practice, the overall frequency of hand washing before and after contact with patients were (6.7%) and(23.7%) respectively which are mostly very weak^[26].

Another study conducted in Qassim College of Medicine, Saudi Arabia to evaluate the consciousness, and compliance of hand hygiene among undergraduate medical students during their clinical study. It had revealed the average awareness regarding the positive indications of hand hygiene was (56%) while the(44%) of students were either not sure or unaware of the indications of hygiene^[12]. Generally compliance rates of hand hygiene (HH) among healthcare providers (HCPs) stay low, in spite of, identifying that HH is very important in reducing infection rates.

In a recent systematic review by Mukerji A, et al, of 96 studies (with 65 studies in intensive care settings) on HH compliance of HCPs from developed nations, it was found that compliance rates were as weak as 30–40% in intensive care settings compared with 50–60% in other settings^[27].

In this study the students reacted weakly (46.22%) toward wearing protective eyewear and/or mask when they were at direct contact with a patient. Eyewear protects transmission infections through out cornea of the eye by droplets or splashes of body fluid secretions or blood such as HIV & HBV.

The awareness was acceptable (53.3%) regarding staying home when they have infectious diseases such as febrile respiratory illnesses, Cold sores or diarrhea so that they will be a potential source of causing iatrogenic nosocomial infection for their colleagues and patients in clinical settings. The British General Medical Council (GMC) in its booklet, serious communicable diseases, states that “You must always take action to protect patients when you have good reason to suspect that your own health, or that of a colleague, is a risk to them. You must consider how any infection you have may put patients at risk”^[28].

According to several researches there were weak practices and adherence regarding HCAs prevention measures among medical students, for instance, in Iran, and China practices toward standard isolation precautions were weak (33.3%) ,(44.5%) respectively and also in Austria adherence is limited(weak) (49%) and requires improvement due to only(43%) performed hygienic hand disinfection according to WHO guidelines^[21,22,23].

3.4 Table 4 shows that the overall perceived of attitudes of medical students toward nosocomial infection in this study were adequate (68.68%), since there were significant trend very good (83.02%) to support training of medical providers to fight infection when they are at the top of administration pyramid during their career.

They showed positively perceived very good (83.96%) through compliance using of protective materials to control infections transmission in the surgical emergency unite. In another hand, they were acceptable (52.83%) tendency toward hand washing with alcohol gel after any event of examination during overcrowding situations and also they exhibited acceptable (51.89%) attitudes about disposing medicals waste by their selves, whereas, it is considered as a part of the duty of medical staffs to preserve perfective cleaning environments in clinical settings. The medical students must take responsibility as early as possible in controlling infections because they are tomorrow's doctors. Females were better than males with statistically significant differences ($P = 0.000$) in some aspects; for e.g. in hand washing with alcohol hand gel and cleaning spoiled floor ($p = 0.000$).

This outcome seems to be nearly the same with findings by Barikani A, et al, who reported that medical students had positive attitudes (73.7%) toward Standard Isolation Precautions^[21].

In contrast, a study was done at University of Sri Jayewardenepura revealed that participants had weak (<50%) attitudes. The study shows the need for further improvement of the existing hand hygiene training programs to address the gaps in knowledge, attitudes and practices^[29].

3.5 table 5 shows that the overall outcome of advising information of students' knowledge about HAIs were generally acceptable (50.65%), since, only (22.16%) advised to clean their stethoscope.

In addition, they sometimes had been advised about safety (IV) cannulation or inserted devices (52.84%), where as, Batool A. Al-Shawii, et al found all neonates (100%) who had invasive procedures (cannula or intravenous set) or received oxygen therapy (O₂) had bacterial infection and out of the total neonates, 9.3% had bacterial infection in the Neonatal Intensive Care Unit (NICU) of the Baghdad Teaching Hospital, Iraq^[30]. In present study also approximately half of students had not been informed regarding contact precaution measures (53.77%), whereas, these subjects are considered crucial foundations in preventive measures and control of HCAs. The problem seems due to defect in curriculum which may be not properly covered or neglected this topic; on the other hand, clinical teachers had no role in transfer knowledge and practices about preventive nosocomial infections to their students. The results of advising information during college courses of this study followed with findings by other researches, for instance, Yuanchun Huang et al demonstrated that medical students have limited knowledge and practice (52.54%) regarding HCAs due to substantial deficiencies in their learning resources^[23].

Herbert VG, et al found (79%) of the respondents asked to an obligatory course on hygiene standards in medical education and the demand for an optimum education in hygiene is high^[22].

Barikani A, et al, clarified the necessity of standard isolation in prevention of disease in patients in all duration of education must be emphasized and facilities should be improved^[21].

4. Conclusion

The consequences of the current study demonstrate that:

1. The overall medical students' knowledge about nosocomial infections was adequate, in spite of this; the knowledge was **weak**, particularly concerning the risk of transmission of infections to the hospital personnel and stethoscope as a potential source of infections.
2. There is a positive attitudes, while, students revealed acceptable attitudes about disposing medical wastes by their self.
3. Practices to reduce the risk of nosocomial infection were adequate, however, reacted **weakly** toward wearing protective materials when they are at direct contact with a patient.
4. The overall advising information of medical students to some items of HCAs was **acceptable**.

5. Recommendations

1. encouraging an adherence regarding HCAs among students in order to reduce the prevalence of infections and compliance with intervention are mandatory.
2. For final (senior) students it is best to do extra courses on nosocomial infection prevention and control measures during clinical training.
3. Encouraging the clinical teachers to act as a role model for students to comply on HCAs prevention and control measures.
4. A review of health care curricula would need to pave the way for more practice regarding infection control teaching in all our educational system.

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Table1: distribution of studied sample regarding gender

gender	No.	%
male	37	34.9
female	69	65.1
total	106	100

The sample composed of 106 students from sixth year, the number of females is two third more than the number of males.

Table 2: Students' knowledge regarding Health care-associated infections and control measures

Question	Disagree		Uncertain		Agree		NO (CA) & %	
	No	%	No	%	N. O	%	No.	%
1.Hand hygiene measures before and after dressing	0	0	7	6.60	99	93.40	205	96.69
2.Your stethoscope is a potential source of infections.	36	33.96	47	44.34	23	21.70	93	43.86
3.Healthcare workers caring of patient with MRSA	29	27.36	47	44.34	30	28.30	107	50.47
4.Changes in antibiotics use lead to antibiotics resistance	14	13.21	17	16.04	75	70.75	167	78.77
5. The risk of transmission infection to the hospital personnel.	59	55.66	11	10.38	36	33.96	83	41.50
6.The environment is source nosocomial infection.	25	23.58	11	10.38	70	66.04	151	71.22
7.prevalence of Nosocomial infection in the world	8	7.55	65	61.32	33	31.13	131	61.79
8. the risk of Invasive procedures on nosocomial infection	4	3.77	14	13.21	88	83.02	190	89.62
9.Duration of intubation and mechanical ventilation related to Ventilator Associated Pneumonia.	2	1.89	14	13.21	90	84.91	194	91.50
10. Gloves do not obviate the need for hand hygiene.	35	33.02	14	13.21	57	53.77	128	60.37

Note; correct answers (CA).

The overall average of the medical students' knowledge is (68.34%) about HAIs.

Table 3: Distribution of studied sample regarding their behaviors to reduce the risk of HCAIs

Question	Never		Sometimes		Always		NO of (CA) & %	
	NO	%	No	%	NO	%	No	%
1.Wearing protective materials/eyewear & mask	31	29.25	52	49.06	23	21.7	98	46.22
2.handwashing/moving From infected to clean site	16	15.09	27	25.47	63	59.43	153	72.16
3.handwashing/before &after gloves wearing	22	20.75	26	24.53	58	54.72	142	66.98
4.disposal materials Needle or sharp	12	11.32	24	22.64	70	66.04	164	77.35
5.stay home / infectious illness	24	22.64	51	48.11	31	29.25	113	53.3
6.hepatitis B/ Vaccination	17	16.04	23	21.70	66	62.26	155	73.11
7.role model /prevention measures	14	13.21	51	48.11	41	38.68	133	62.73
8.handwashing/before &after dressing	6	5.66	17	16.04	83	78.30	183	86.32
9.role educator /clients	7	6.60	20	18.78	79	74.53	178	83.96
10.respiratory hygiene/cough etiquette	9	8.49	42	39.62	55	51.89	152	71.69

The average students behaviors were(**69.38%**) toward prevention and control of nosocomial infections

Table 4: Gender distribution of studied sample regarding attitudes precautionary guidelines and perceptions of risk of acquiring HCAs

Question	Female (CA)		male (CA)		Total (CA)		p-value
	NO	%	NO	%	NO	%	
1.surplus budget	55	51.89	33	31.13	88	83.02	0.215
2.Handwashing with alcohol hand gel	47	44.34	9	8.49	56	52.83	0.000
3.cleaning spoiled floor	58	54.72	18	16.98	76	71.7	0.000
4disposing medicals materials	40	37.74	15	14.15	55	51.89	0.087
5.protactive materials	59	55.66	30	28.3	89	83.96	0.554

CA ;(correct answer)

The overall perceived of medical students was **(68.68%)** about HAIs.

Table 5: Gender distribution of studied sample regarding curriculum evaluation of advising information of some items of HAIs

Question	Never		Sometimes		Always		Total Answering No &%
	Female No. %	Male No ,%	F no,%	M no, %	F no,%	M no,%	
standard hand-washing	6 5.66%	11 10.38%	27 25.47%	16 15.09%	36 33.96%	10 9.43%	153 63.67%
2. standard precautions	6 5.66%	4 3.77%	36 33.96%	27 25.47%	27 25.47%	6 5.66%	129 60.84%
3. safe (IV) or inserted devices	17 16.04%	12 11.32%	27 25.47%	15 14.15%	25 23.58%	10 9.43%	112 52.84%
4.stethoscope cleaning	43 40.57%	25 23.58%	20 18.87%	9 8.49%	6 5.66%	3 2.83%	47 22.16%
5. contact precaution	12 11.32%	8 7.55%	36 33.96%	22 20.75%	21 19.81%	7 6.60%	114 53.77%

The overall advising information of medical students to some items of HCAIs was (50.65%).

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