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Infection control measures among interns/house surgeons in teaching hospitals under University of Medicine (1), Yangon

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Abstract

Health care workers are responsible for prevention and control of communicable diseases in the hospital environment. This study aimed to focus on infection control measures among house officers. A cross-sectional descriptive study was conducted in 2010 at three teaching hospitals in Yangon City by introducing anonymous self-administered questionnaires to randomly selected 150 respondents. SPSS version 16.0 was used for analysis. Over half of the respondents were found to have high knowledge and perception but the practice was poor. Infection control messages acquired through health talks, seminars and media were influencing factors on knowledge while training programs significantly influenced both knowledge and perception. Senior house officers had significantly higher mean perception scores than their juniors ($p=0.005$). Their hand washing practice was significantly influenced by newspapers and magazines ($p=0.003$) and poster and pamphlet ($p=0.056$). Compliance on utilization of surgical mask as a precautionary measure for airborne transmission was associated with knowledge ($p=0.02$), adequate supply in wards ($p=0.001$) and donation from medical product company ($p=0.042$). They bought gloves for handling infectious materials ($p=0.000$), and needle recapping practice before discarding was related to knowledge ($p=0.05$). Knowledge, perception and practice of house officers were interrelated to each other. Further education and training of house surgeons, resource allocation and continuous monitoring were deemed necessary for proper infection control and safe hospital environment.

Key Words: Infection control measures, house officers, hospitals, University of Medicine (1)

Introduction

Health care-associated infections have been recognized for 150 years and still remain a hazard to health care workers (HCWs) and patients in both developed and developing countries¹. Infections have a multi-factor causative relation with health-care provision. Political and economic constraints influencing health systems and provision of health care as well as human behavior associated with socioeconomic status of the patient are important factors that determine the quality of care.

Health care workers can be exposed to blood and other body secretions in the health care setting through mucocutaneous exposures, needle stick and other injuries due to sharp equipments. Health workers have a high risk of acquisition of potentially fatal diseases such as Hepatitis B & C, and HIV infections². Moreover, with the increasing emergence of life-threatening infections such as severe acute respiratory syndrome (SARS), viral haemorrhagic fevers such as Ebola and Marburg viral infections, new influenza pandemic and re-emerging infectious diseases like plague and tuberculosis, the chances of health workers contracting infections in a hospital setting is high. There is an urgent need for efficient infection control measure in all health care settings along with the capacity building for health care workers. Any breach in infection control practices could facilitate transmission of infection among patients and also among health care workers and attendants³.

Most infections are, however, preventable with appropriate infection control measures, which not only restrict the spread and but also help to prevent new infections occurring in hospitals. Therefore, it is important for all health workers to adhere to infection control guidelines strictly. Infection control precautions developed by Center for Disease Control in USA are grouped into standard precautions and transmission-based precautions. Standard precaution is designed to reduce risk of transmission for all patients receiving care in hospitals regardless of their diagnosis or presumed infection status. This is achieved by means of hand hygiene, personal protective equipment, appropriate handling of patient care equipment and hospital waste, prevention of needle or sharp injuries and environmental sanitation. Transmission-based precaution relates to the routes of transmission and is designed to reduce the risk of airborne, droplet, and contact transmission in hospitals⁴.

According to the world health report 2002, WHO estimated that about 2.5% of HIV cases and 40% of hepatitis B and C cases among HCWs worldwide were due to occupational exposures⁵. More than 100,000 accidental needle stick injuries among HCWs were reported in UK hospitals annually⁶. The estimated cost of treating a healthcare professional exposed to blood or other potentially infectious materials can range from hundreds or thousands of dollars per exposure. Additional cost may stem from drug toxicity suffered during treatment, lost time from work, and the potential societal cost such as a reduction in productivity⁷. Among health care personnel with known exposure to a patient with infectious forms of TB, the skin-test conversion rates had ranged from 18% to 55%. Incomplete implementation of recommended infection control measures is the primary cause of TB transmission in health care facilities⁸. During the SARS pandemic, 20 to 60% of cases were reported among HCWs worldwide⁹. Influenza transmission and outbreak in hospitals and nursing homes have been well documented as due to transmission acquired through close contact with respiratory droplets¹⁰.

A major reason for transmission of infection in hospitals is because of the lack of personal hygiene in HCWs, especially due to improper hand washing, improper disposal of sharp instruments and improper use of personal protective equipment¹¹. If hand washing is inefficient and the supply of hand antiseptics is inadequate or not provided the contaminated hands of the

caregiver then can come into contact with either the patient or with an inanimate object that will later come into direct contact with another patient¹². During 2006, among 438 patients who underwent elective operations in surgical ward 7 and 8 of Yangon General Hospital 5.7% of them acquired post-operative wound infections¹³. HCWs are at risk of acquiring these infections through occupational exposure but they could also transmit infections to patients. Thus a program should be in place to prevent and manage infections occurring among hospital staff¹³. In combating hospital infections, the main gaps identified are the requirement of a standard procedure for precaution measures, training in the area of clinical management and infection control as well as the need for equipment and supplies such as personal protective equipment¹⁴.

The differences in level of development and availability of resources, variations in organizational factors such as education, training, guidelines and individual factors (e.g., knowledge, experience and practice) have been shown as determinants of adherence to infection control.

Objectives

Knowledge, perception, practice and influencing factors for infection control measures among interns/house surgeons assigned to tertiary hospitals in Yangon were studied because they are future backbone of health care setting, and responsible for not only clinical management but also for health care administration including disease control. The results of this study are expected to provide ways to implement interventions and to enhance the skill of house surgeons for prevention and control of hospital infections.

Materials and Methods

A cross-sectional descriptive study design was used to study the knowledge, perception, practice and influencing factors related to infection control measures among 150 house surgeons assigned to Yangon General Hospital, New Yangon General Hospital and East-Yangon General Hospital under University of Medicine (1), Yangon in 2010. All house surgeons serving at these hospitals were eligible where 33 male and 117 female subjects of age between 21 to 25 years were selected by simple random sampling.

Semi-structured and self-administered questionnaire was employed maintaining anonymity. Open ended questions were used to elicit some practices without any prompting and answers were noted down according to the responses. Data entry and checking was carried out by using EPI-data version 3.1 after editing for consistency and completeness. Data analysis was done by using SPSS version 16.0. The value of 1 was assigned for correct answer across 98 knowledge items. Their perception was assessed by 10 statements using 5 points Likert scale scoring 5 points (strongly agree) to 1 point (strongly disagree) for positive statements. Reverse direction (1

point for strongly agree and 5 points to strongly disagree) was applied to negative statements. Total 41 questions were administered to underscore their practices. Descriptive analysis was done by calculating frequency and percentages. Chi² test, t test and ANOVA were used to test associations. Two-sided p value (0.05) was considered criterion for all statistical significance.

Results

1. Knowledge, perception and practices of house officers (Table 1)

Among the house surgeons, 57% had high knowledge with mean value of 74.08 ranging from 55 to 58. Regarding perception questions focusing on perceived susceptibility, severity and benefit towards infection control measures, hand hygiene and personal protective equipment, there were nearly 60% who had high perception score. Eighty percent of respondents practiced hand washing before and after patient examination, and 75% during handling of infectious materials. However, nearly 60% did not report any hand washing after instrumentation procedures in the ward such as insertion of urinary catheters and blood sampling. While all interns usually washed their hands with soap and water, 36% of them sometimes used only water. Nearly 90% of house surgeons in the study used disposable non-sterile latex rubber gloves during handling of infectious materials. But only 8% of respondents wrongly utilized this type of gloves during per-rectal examination instead of using sterile surgical gloves. The habit of changing gloves between different patients was admitted by 62% of respondents and utilization of hair cover in the labour room was found in only 13%. Around 67% of respondents adhered to the precautionary measure to prevent air-borne transmission by wearing surgical masks but only 28% of them used masks for droplet precautions. There were only 6.7% of interns who had ever used N95 mask during the influenza A (H1N1) outbreak, in isolation room, for air-borne precaution and for droplet precaution. Ninety percent of house surgeons disposed needles into old drinking water bottles and only 32% of them used WHO card box for waste disposal. It was also mentioned that only 7% had proper facility within their arm's reach to dispose needles. Nearly 15% of respondents recapped needles by handling the cap.

2. Factors influencing mean knowledge scores on infection control measures (Table 2)

Regarding knowledge of infection control measures obtained by means of health talks and seminars, those with this history had more knowledge than those who did not attend such health talks and seminars. Similar situation was observed with regards to receiving knowledge on infection control from radio and television, newspapers, journals, posters and pamphlets and internet. Those that have access to the above mentioned modes of information sources had higher mean knowledge scores than those who did not. Regarding mean knowledge scores between

those who reported of receiving training on infection control measures and those without the training, the scores were significantly higher among those with the history of training.

3. Factors influencing mean perception scores on infection control measures (Table 3)

Interns who had longer service in the wards have a higher mean perception scores. Infection control messages received by means of a formal lecture is a significant influencing factor for high perception score among house surgeons. Another factor that increases the mean perception score is the training on infection control measures.

4. Factors influencing practice on infection control measures

(a) Hand washing practice before and after patient examination (Table 4)

A high statistically significant relationship was observed between such practice and those who received infection control messages from newspapers and journals. A similar finding was observed among those who received information on hand washing practice s from posters and pamphlets.

(b) Utilization of surgical mask during exposure to patients with air-borne infection (Table 5)

Regarding utilization of surgical mask when exposed to patients with air-borne infection, a significant association was observed between such practice and obtaining infection control measures from radio and television. More than 71% who received information through radio and television used surgical mask. There was also a significant association between utilization of surgical mask during exposure to patients with air-borne infection and the supply of masks in the ward and by medical product company. Among the respondents with high knowledge scores, surgical mask was used in a significant number of respondents during exposure to patients with air-borne infection.

(c) Utilization of latex rubber gloves during handling infectious materials (Table 6)

Majority of respondents (92.9%) received information about infection control messages through health talks and seminars. A significant association was observed between utilization of latex rubber gloves while handling infectious materials and receiving information on its use. It was

found that 90% of the respondents had to buy the gloves themselves and association between buying of gloves on their own and using it for handling infectious materials was significant.

(d) Practice of needle recapping before discarding (Table 7)

Almost all respondents regardless of whether they have low or high knowledge scores expressed their habit of recapping needles before discarding. A significant association was seen between knowledge scores and practice of recapping needles before discarding them.

Discussion

An overall high knowledge level regarding infection control measures in this study was found to be higher than the rate of 47.6% reported in the study of knowledge, attitude and practice towards HIV/AIDS prevention and care among house surgeons in Myanmar in 2003¹⁵. As the overall perception score was also high in more than half of the respondents, this means that the house surgeons were knowledgeable with respect to the infection control measures and this is also reflected in their perception.

The study showed that there was lower compliance of hand washing before and after patient examination (80%) compared to the study conducted among house officers of North Okkalapa General Hospital of the University of Medicine (2), Yangon in 2007. In this study, the level of compliance on hand washing before and after patient examination was 85.6%¹⁶. The respondents in this study scored poor for adhering to hand washing after instrumentation procedures which might lead to increased rate of hospital associated infection. Soap was the hand hygiene material commonly used by 99.4% of the health workers was plain soap¹⁷. However, the utilization of only water for hand washing needs to be addressed urgently by the hospital administration.

The finding that 8% of house surgeons using non-sterile rubber gloves during per rectal examination was assumed to be due to lack of awareness to use sterile gloves during per rectal examination, or utilization of non-sterile gloves which were readily available in their wards. More than half of the respondents adhered to changing gloves between different patients in accordance with the Center of Disease Control guidelines to prevent transmission of infectious material¹⁴. The use of surgical mask for air-borne precaution was found to be similar to the result from the study conducted in India which was 71.4% but for that of droplet precaution the result in this study was much lower than that of the Indian study (61.7%)¹⁸.

Regarding used needle collection container, availability and utilization of WHO safety box was only less than half of that of the results from the Ethiopian study where the use was 78.3%¹⁷. Almost all house officers (96%) recapping the needle before discard showed lower rate in good practice of non-recapping used needles, than 52.4% qualifying medical students of Obafemi

Awolowo University teaching hospitals in Nigeria¹⁹ and 81% of 5th year medical students at a teaching hospital of Karachi, Pakistan²⁰. So this practice of needle recapping might be the major risk factor for needle prick injury among health care personnel and timely alarm would be needed to reduce this practice. The recapping of used needles among the respondents in this study might be due to unfavorable conditions such as lack of bed side waste containers within arm's reach and for prevention of transporting an unsheathed needle to the site of waste containers.

Continuing medical education, regular information from mass media and training courses are needed among the house officers for sustainability of high knowledge which is a major building block for their good practice on infection control measures. Since formal lectures and training are influencing significantly on perception, topics related to infection control measures need to be continuously included in undergraduate medical education. Moreover, on job training with health education session would also be required to inculcate right perception for prevention and control of infections.

Conclusion

For improvement of infection control practice in hospitals, regular distribution of journals, newspapers, magazines, posters and pamphlets to every ward on this topic is important. Because of significant association observed between the supply of surgical masks in the ward and its utilization, its availability in the ward needs to be ensured so that there would be a higher usage. Knowledge, perception and practice of house officers were interrelated and compliance of good practice was mainly influenced by underlying knowledge and availability of resources. So continuous medical education, regular information from mass media and training courses should be promoted for sustainability of high knowledge which is a major building block for good practice on infection control measures. In addition to these, right knowledge, positive perception and good practice were needed to improve among house surgeons not only for prevention of themselves but also to guide and serve the patients in safety manner.

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Table (1) Knowledge, perception and practices of house surgeons / interns (n=150)

Variables	No.	%	Mean, Range and Median
Knowledge			74.09 (5.8), 55-85 and 75
Low (below median)	73	48.7	
High (including median)	77	51.3	
Perception			39.71 (3.8), 29-49 and 40
Low (below median)	62	41.3	
High (including median)	88	58.7	
Practice (Multiple responses)			
(a) Hand washing			
1. Before and after patient examination	120	80.0	
2. During handling of infectious materials	113	75.0	
3. After instrumentation procedures	59	39.3	
(b) Materials for hand washing			
1. Soap and water usually	150	100	
2. Only water sometimes	54	36.0	
(c) Utilization of disposable non-sterile latex rubber gloves			
1. During handling of infectious materials	136	90.7	
2. During per-rectal examination	12	8.0	
(d) Changing gloves between different patients	93	62.0	
(e) Utilization of surgical mask			
1. Airborne precaution	100	66.7	
2. Droplet precaution	42	28.0	
(f) Ever utilization of N95 mask	10	6.7	
(g) Container used for needle disposal			
1. Drinking water bottle	135	90.0	
2. WHO card box	49	32.0	
(h) Place of container for needle disposal within arm's reach	11	7.3	
(i) Practice on recapping needle			
1. Before discard	144	96.0	
2. Handling the cap among those who recap needles	21	14.6	

Table (2) Factors influencing mean knowledge scores

Influencing Factors	Knowledge scores (Mean, 95% CI)	t-test (p-value)
Health talk and seminar Yes (n = 146) No (n = 4)	74.12 (73.50, 75.56) 71.79 (69.76, 73.82)	- 2.150 (0.033)
Radio and TV Yes (n = 110) No (n = 40)	75.04 (73.98, 76.09) 71.50 (69.73, 73.27)	- 3.436 (0.001)
Newspaper and Journals Yes (n = 119) No (n = 31)	74.60 (73.60, 75.59) 72.16 (69.76, 74.56)	- 2.116 (0.036)
Poster and pamphlet Yes (n = 123) No (n = 27)	74.67 (73.71, 75.64) 71.44 (68.77, 74.12)	- 2.687 (0.008)
Information from the internet Yes (n = 91) No (n = 59)	75.15 (74.08, 76.23) 72.46 (70.81, 74.10)	- 2.860 (0.005)
Training Yes (n = 54) No (n = 96)	75.70 (74.13, 77.28) 73.19 (72.05, 74.32)	- 2.612 (0.010)

Table (3) Factors influencing mean perception scores

Influencing Factors	Perception scores (Mean, 95% CI)	t-test (p-value)
Services 3 months (n = 21) 9 months (n = 129)	37.57 (35.66, 39.49) 40.05 (39.43, 40.68)	- 2.863 (0.005)
Lecturer Yes (n = 146) No (n = 4)	39.81 (39.21, 40.41) 36.00 (26.45, 45.55)	- 2.012 (0.046)
Training Yes (n = 54) No (n = 96)	40.61 (39.63, 41.60) 39.20 (38.43, 40.00)	- 2.231 (0.027)

Table (4) Factors influencing the practice of hand washing before and after patient examination

Influencing Factors	Hand washing		Chi-sq (p-value)
	Yes (n = 120)	No (n = 30)	
Newspaper & Journals Yes No	101 (84.9%) 19 (61.3%)	18 (15.1%) 12 (38.7%)	8.549 (0.003)
Poster & Pamphlet Yes No	102 (82.9%) 18 (66.7%)	21 (17.1%) 9 (33.3%)	3.659 (0.056)

Table (5) Factors influencing the utilization of surgical mask during exposure to patients with airborne infection

Influencing Factors	Utilization of surgical mask		Chi-sq (p-value)
	Yes (n = 100)	No (n = 50)	
Radio & TV			4.926 (0.026)
Yes	79 (71.8%)	31 (28.2%)	
No	21 (52.5%)	19 (47.5%)	
Supply of masks in the ward			11.221 (0.001)
Yes	61 (79.2%)	16 (20.8%)	
No	39 (53.4%)	34 (46.6%)	
Supply of masks from medical product company			4.117 (0.042)
Yes	76 (71.7%)	30 (28.3%)	
No	24 (54.5%)	20 (45.5%)	
Knowledge scores			7.058 (0.008)
Low	41 (56.2%)	32 (43.8%)	
High	59 (76.6%)	18 (23.4%)	

Table (6) Factors influencing the utilization of latex rubber gloves during handling of infectious materials

Influencing Factors	Utilization of latex rubber gloves		Chi-sq (p-value)
	Yes (n = 136)	No (n = 14)	
Health talk & seminar			4.465 (0.035)
Yes	117 (92.9%)	9 (7.1%)	
No	19 (79.2%)	5 (20.8%)	
Self purchasing			16.029 (0.000)
Yes	117 (95.1%)	6 (4.9%)	
No	19 (70.4%)	8 (29.6%)	

Table (7) Factors influencing the practice of needle recapping before discarding

Knowledge scores	Needle recapping		Chi-sq (p-value)
	Yes (n = 144)	No (n = 6)	
Low	73 (100%)	0	5.925 (0.015)
High	71 (92.2%)	6 (7.8%)	