ORIGINAL RESEARCH

Standard precaution knowledge and adherence: Do Doctors differ from Medical Laboratory Scientists?

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Abstract

Background

Doctors and laboratory scientists are at risk of infection from blood borne pathogens during routine clinical duties. After over 20 years of standard precautions, health care workers knowledge and compliance is not adequate.

Aim

This study is aimed at comparing adherence and knowledge of standard precautions (SP) among Medical Laboratory Scientists (MLSs) and doctors.

Methods

It was a cross sectional study done at University of Nigeria Teaching Hospital, ItukuOzalla. A semi structured pre-tested questionnaire was the study instrument.

Results

General knowledge of SP was high,76.2% in doctors and 67.6% in MLSs although there were differences between the two groups on the knowledge of components of SP. Safe injection practices, use of personal protective equipment as well as safe handling of contaminated equipment or surfaces was higher amongst doctors. Even though more than half of respondents in both groups, 53.1 % among doctors and 58.1% among MLSs had received training on standard precautions, this did not reflect in the practice. MLS reported more use of personal protective equipment such as gloves and coveralls (100% in MLS and 35% of doctors), P<0.001. Recapping of syringes was higher amongst doctors (63.6%) than MLS (55.1%).The doctors practiced better hand hygiene than MLS (P<0.001). Constraints that affected SP included non-availability of PPEs and emergency situations for both groups.

Conclusion

SP knowledge and practice are still low, and as such, there is a need to train doctors and MLS on the components of SP. Policies on SP need to be enforced and facilities for practice regularly supplied.

Introduction

Careful adherence to standard precautions (SP) can protect health care workers and patients from infections. Health worker surveys and observations in Nigeria and Africa document that health workers often fail to practice standard precautions consistently and correctly[1,2]. Medical doctors and laboratory scientists are some of the health care workers that are significantly at risk of direct exposure to blood and other body fluids during the course of their normal clinical duties[3]. Blood borne infections acquired during clinical and laboratory services have remained a major health issue worldwide, particularly in low income countries where there is high morbidity and mortality associated with such infections[4]. Some studies have shown that there is selective adherence and non-adherence to universal and standard precautions in daily medical practice and these differences in knowledge and adherence by health care workers may be influenced by their varying type of training[5].

Standard precautions are a set of infection control practices used to prevent transmission of diseases that can be acquired by contact with blood, body fluid, and non-intact skin including rashes and mucous membranes. They are the basic level of infection control precautions which are to be used as a minimum in the care of all patients. The standard precautions emphasize the major features of universal precautions (designed to reduce the risk of pathogens from moist body substances) and apply them to all patients receiving care in hospitals regardless of their diagnosis or presumed infection status. Compliance with standard precautions has been shown to protect health care workers from different infections like human immunodeficiency virus, hepatitis B, hepatitis C from sharps injuries and contact with body fluids[6]. WHO estimates that about 2.5% of HIV cases and 40% of Hepatitis B and C cases among health care workers are the result of these exposures[7].

Standard precautions consist of: hand hygiene before and after every episode of patient contact, use of personal protective equipment, safe use and disposal of sharps, routine environmental cleaning, reprocessing of reusable medical equipment and instruments, respiratory hygiene and cough etiquette, aseptic non-touch technique, waste management and appropriate handling of linen[6]. Several hospitals have instituted standard precaution policies for all employees for all patients which include all the aspects of barrier use like hand washing, use of PPE like gloves, protective face and eye wear, gowns, protective apparel as well as patient placement and precautions when handling laboratory specimens.

Marcus et al reported that 37% of exposures to risks to blood borne infections might have been prevented if infection control precautions are adhered to and concluded that adherence to infection control precautions reduced exposure significantly[8]. several studies on knowledge and compliance to SP have been done in Nigeria but professional differences have not been established[9,10].

This study was done to determine if the knowledge and adherence to standard precautions differ amongst these two groups of health workers. The study would help management to know the different aspects of standard precautions to emphasize for the different groups.

The study was descriptive cross-sectional done in October,

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Table 1: Socio - Demographic distribution of doctors

	Doctors	Lab Scientists
Demographic variables	Frequency N = 143 (100.0%)	Frequency N = 136
Gender		
Male	111(77.6)	67 (49.3)
Female	32 (22.4)	69 (50.7)
χ^2 = 24.271; P Value = < 0.001		
Age range		
20 – 29	27 (18.9)	32 (23.5)
30 – 39	62 (43.4)	46 (33.8)
40 – 49	33 (23.1)	44 (32.4)
50 – 59	21 (14.6)	14 (10.3)
χ^2 = ; P Value = 5.593; P value = 0.133		
Marital Status		
Married	86 (60.1)	77 (56.6)
Single	49 (34.3)	47 (34.6)
Widow/Widower	6 (4.2)	9 (6.6)
Divorced/Separated	2 (1.4)	3 (2.2)
χ^2 = ; P Value = 1.164; P = 0.762		
Religion		
Christianity	131 (91.6)	128 (94.1)
Islam	6 (4.2)	6 (4.4)
African traditional religion	6 (4.2)	2 (1.5)
Likelihood-ratio χ^2 = 1.952; P Value = 0.377		
Location of work		
ICU	6 (4.2)	2 (1.5)
Theatre	23 (16.1)	5 (3.7)
Ward	39 (27.3)	7 (5.1)
Lab	4 (2.8)	112 (82.4)
Casualty	14 (9.8)	5 (3.7)
Outpatient dept.	50 (35.0)	0 (0.0)
Blood bank	1 (0.7)	5 (3.7)
Others	6 (4.2)	0 (0.0)
χ^2 = 199.264; P ; P Value = <0.001		
Years of service		
1 – 5	61 (42.7)	57 (41.9)
6 - 10	31 (21.7)	39 (28.7)
11 - 15	21 (14.7)	22 (16.2)
16 - 20	16 (11.2)	12 (8.8)
21 - 25	6 (4.2)	5 (3.7)
26 – 30	7 (4.8)	0 (0.0)
31 – 35	1 (0.7)	1 (0.7)
χ^2 = 11.268; P Value = 0.080		

Age range: 23 – 58 years;Years of service: 1 – 34 years

2014 among doctors and laboratory scientists at University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu. These groups of HCWs are known to come in contact with hospital hazards. UNTH is located in Ituku Ozalla, a semi-urban community about 30 minutes - drive from the state capital. It is the biggest teaching hospital in the South east and South-south of Nigeria and gets referrals from most parts of these two regions. The departments studied were those ones that handle biohazards namely: Intensive Care Unit (ICU), Theatre, Wards, Laboratories, Casualty, Out-patient Department and Blood bank.

Ethical Permit

Ethical permission was obtained from the Ethics Committee of University of Nigeria Nsukka while informed consent was obtained from the management of University of Nigeria Teaching Hospital and the respondents.

Data Collection

The doctors and MLS who work in these departments were invited to be part of the study. Pre-tested self-administered questionnaires were used to collect data from respondents. Contents of the questionnaire include demographical variables, knowledge and adherence to SP and associated factors.

Data Analysis

Data was entered and analyzed in Statistical Package for Social sciences (SPSS) version 17.

Results

One hundred and forty three doctors (77.6% Males) and 136 MLS (49.3% males) participated in the study. The age range was 23- 58years for both groups. Majority (65% of doctors and 70.6% of laboratory scientists) had between 1and 10 years of service(Table 1).

Most of the respondents (93.7% of doctors and 96.3% of MLS) had heard of SP but only 76.2% of Doctors and 67.6% of MLS could correctly define SP (Table 2).

All the doctors (100%) correctly identified the use of PPE compared to 76.5% of MLS. Similarly, Safe injection practices were correctly identified by 100% of doctors and 75% of MLS while identification of safe handling of contaminated equipment was done by 100% of the doctors and 79.4% of MLS. Knowledge of anal and peri-anal hygiene was poor among the MLS with only 16.9% compared to 76.2% in the doctors. Respiratory etiquette was only reported by 50.3% of doctors and 41.2% of the MLS. Almost 73% of doctors and 48.5% of MLS had knowledge of hand hygiene before aseptic procedures. On the other hand, 51.7% of doctors

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Table 2: Knowledge and Information on standard precaution

	Doctors	Lab Scientist	χ^2 (P Value)
Variables	Frequency N = 143 (100.0)	Percent N = 136 (100.0)	
Those who have heard of standard precaution	134 (93.7)	131 (96.3)	1.002 (0.317)
Main Source of information for those who have heard of SP			Likelihood-ratio χ^2 = 6.156; (0.188)
-Formal training	78 (54.5)	85 (62.5)	
-Colleague/Friend	39 (27.3)	38 (27.9)	
-Media	11 (7.7)	7 (5.1)	
-Others	6 (4.2)	1 (0.7)	
-Have not heard	9 (6.3)	5 (3.8)	
Correct knowledge of standard precaution			41.266
Definition of standard precaution	109 (76.2)	92 (67.6)	(<0.001)
Components of standard precaution			
-Hand hygiene	124 (86.7)	114 (83.8)	
-Use of personal protective equipment	143 (100.0)	104 (76.5)	
-Safe injection practices	143 (100.0)	102 (75.0)	
-Safe handling of potentially contaminated equipment or surfaces	143 (100.0)	108 (79.4)	
-Respiratory hygiene etiquette	72 (50.3)	56 (41.2)	
-Anal/perineal hygiene	109 (76.2)	23 (16.9)	
When are standard precautions indicated	117 (81.8)	97 (71.3)	
The examples of body fluids to be guided against	111 (77.6)	103 (75.7)	
Advantages of standard precaution			4.923
-Protects both health workers and patients	130 (90.9)	114 (83.8)	(0.085)
-Not associated with stigma and discrimination	86 (60.1)	99 (72.8)	
-Reduced spread of communicable disease	143 (100.0)	107 (78.7)	
Indications for hand hygiene include			5.315
-Before touching a patient	55 (38.5)	51 (37.5)	(0.257)
-Before exiting the patient's care area	76 (53.1)	52 (38.2)	
-After contact with blood, body fluids or excreta	143 (100.0)	87 (64.0)	
-Prior to performing any aseptic procedure	104 (72.7)	66 (48.5)	
-After glove removal	74 (51.7)	65 (47.8)	

and 47.8% of MLSs knew about hand hygiene after glove removal. (Table 2). Only 12.6% of doctors and 19.1% of the MLSs reported knowledge of a hospital policy that enhances compliance to SP. There is however no formal hospital policy on standard precautions in the study area. (Table 3)

MLS reported perceived nosocomial infections more than the doctors (20.6% and 13.3% respectively). Only about half (53.1% of doctors and 58.1% of MLS) received any training on SP. Regarding availability of PPE 42% of doctors and 39.7% of MLS reported that PPE were sometimes available (Table 4).

There were little or no access to measures to limit respiratory infections (21% doctors and 17.6% in MLS). Hand hygiene was significantly practiced more by doctors than MLS (43.2% for Doctors and 20% for MLS, p =0.001). Majority of both groups (79.7% of doctors and 67.6% of MLS) have been exposed to patients' blood or body fluids during work. Use of PPEs (gloves and coveralls) was significantly higher amongst MLS (14.7% for Doctors and 45.6% for MLS, p=0.001). Both groups (63.3% doctors and 55.1% of MLS) still practice recapping of needles before discard. Management of an infected person was the major enabling situation that made both groups comply with SP (74.1% and 72.1%). Major constraint to use of SP identified by both groups was the non-availability of PPEs (46.9% in doctors and 50.0% of MLS). Provision of PPE and regular training were suggested by both groups for improvement of compliance with SP.

Discussion

SP studies have revealed that health care workers have varying degrees of compliance[10,11].This study has attempted to differentiate between the knowledge and practice among two health care professionals: doctors and MLS.

Despite the SP guidelines, knowledge and compliance vary among health workers and have been found to be inadequate in both developing and developed countries[11]. Despite reports of high knowledge in previous studies over several years in Nigeria, there has not been a reflection on the practice of SP[12,3]. Adherence to SP is poor in public health facilities in resource limited settings due to limited organizational support[9]. The knowledge of SP in our study was high amongst both groups (93.7% in doctors and 96.3% in MLSs) as was also reported in other recent studies in Nigeria[12,13].

Majority of the respondents could define SP properly. Similarly, a study in Northern Nigeria also found that 77.9%

Table 3: Attitude of doctors and laboratory scientists to standard precautions

Attitude	Strongly disagree (%)		Disagree (%)		Indifferent (%)		Agree (%)		Strongly agree (%)	
	Drs	Lab Sci.	Drs	Lab Sci.	Drs	Lab Sci.	Drs	Lab Sci.	Drs	Lab Sci.
Do you agree that employers should always provide training on Standard Precaution	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.4)	6 (4.4)	41 (28.7)	40 (29.4)	100 (69.9)	90 (66.2)
Standard precautions are useful in protecting against hazards in workplace	4 (2.8)	0 (0.0)	0 (0.0)	0 (0.0)	3 (2.1)	3 (2.2)	41 (28.7)	47 (34.6)	95 (66.4)	86 (63.2)
Standard precautions are not really necessary in hospitals	93 (65.0)	71 (52.2)	44 (30.8)	49 (36.0)	3 (2.1)	14 (10.3)	1 (0.7)	1 (0.7)	2 (1.4)	1 (0.7)
Standard precautions are meant only for theatre workers	92 (64.3)	75 (55.1)	42 (29.4)	51 (37.5)	2 (1.4)	8 (5.9)	4 (2.8)	2 (1.5)	3 (2.1)	0 (0.0)

Table 4: Presence of Nosocomial Infection and Control measures provided by hospital management

	Doctors	Lab Scientists	χ^2 (P Value)
Variables	Frequency N = 143 (100.0%)	Frequency N = 136 (100.0)	
Presence of hospital acquired infection among workers since being employed			2.684 (0.261)
No	110 (76.9)	95 (69.9)	
Yes	19 (13.3)	28 (20.6)	
Don't know	14 (9.8)	13 (9.6)	
*Aware of hospital policy that enhances compliance to standard precaution	18 (12.6)	26 (19.1)	2.238 (0.135)
Received training on standard precaution	76 (53.1)	79 (58.1)	0.689 (0.406)
Received training on wearing or removing PPEs (gloves, gowns, etc)	21 (14.7)	100 (73.5)	98.275 (<0.001)
Frequency of supply of personal protective equipment by hospital			0.147 (0.929)
Always	79 (55.2)	78 (57.3)	
Sometimes	60 (42.0)	54 (39.7)	
Never	4 (2.8)	4 (3.0)	
Access to hand hygiene			3.512 (0.173)
-Always	93 (65.0)	75 (55.2)	
-Sometimes	49 (34.3)	58 (42.6)	
-Never	1 (0.7)	3 (2.2)	
Measures put on ground in the department to limit spread of respiratory infections			5.164 (0.271)
-None	30 (21.0)	24 (17.6)	
-Signs at entrances with instructions to cover mouths and noses when cough or sneezing	37 (25.9)	50 (36.8)	
-Provide tissues and non touch receptacles for disposal of tissues	48 (33.6)	35 (25.7)	
-Offer masks to coughing patients	3 (2.1)	5 (3.7)	
-Triage patients and ensure that coughing patients are among the first to be seen	25 (17.5)	22 (16.2)	

***No known policy document in the study area.**

of health workers could define SP properly[14]. Concerning the components or elements of SP implying in depth knowledge of SP, Ogoina et al found that among professional groups, the median knowledge scores differed[15]. Similarly, another study reported that physicians were found to have insufficient knowledge of standard precautions[16]. In this study, doctors had significantly more knowledge. Knowledge on hand hygiene indications was low for both groups. This compared favorably with findings in Ilorin where only 56.7% of health workers knew of hand washing before and after patient care[10]. Similarly, Ogoina reported that 58.5% , 28.1% and 63.6% washed after touching patients, after touching patients surrounding and after removing gloves respectively[15]. The level of knowledge concerning hand hygiene is surprisingly low considering recent epidemics of Ebola in West Africa and the public health education campaigns where hand hygiene is continually being emphasized. The practice of hand hygiene was equally poor due to inadequate access to hand hygiene resources. Similar poor access has been reported[17]. Slightly above half of both groups reported to have received training on SP. A previous study in North Eastern Nigeria revealed that 55.2% of health workers received training from seminars and 27.6% from classroom lectures[10]. It would seem like SP is being taught formally in the MLS course content unlike for the doctors since their main source information was formal training. Other studies have reported that the main source of information was material taught during the curriculum, and nursing students were found to have a better mean overall score compared to medical students[18]. They concluded that knowledge levels were different by area and curriculum. Another study also reported their main source of information was self-learning and informal bedside practice[19].

The attitude to SP by both doctors and the MLSs was good. Both agreed that SP are useful to protect against hazards in the workplace, this is in agreement with other

Table 5: Practice of Standard precaution by health workers

	Doctors	Lab Scientists	χ^2 (P Value)
Practice of standard precaution	Frequency N = 143 (100.0%)	Frequency N = 136 (100.0)	
*When do you wash or decontaminate your hands			90.153
-Before wearing gloves	19 (13.3)	13 (9.6)	(<0.001)
-After removal of gloves	51 (35.7)	71 (52.2)	
-Before touching a patient	13 (9.1)	9 (6.6)	
-Before leaving a patient's care area	83 (58.0)	34 (25.0)	
-Prior to performing an aseptic procedure	143 (100.0)	9 (6.6)	
Has your hand or other skin surface been exposed to patient's blood or other body fluids during work?			
-Yes	114 (79.7)	92 (67.6)	5.259
-No/Can't remember	29 (20.3)	44 (32.4)	(0.022)
Action taken during the most recent contact with patient's body fluid	N = 114 (100.0)	N = 92 (100.0)	Likelihood-ration χ^2 = 9.211 (0.056)
-Nothing	4 (3.5)	0 (0.0)	
-Washed off fluid with only water	2 (1.8)	1 (1.1)	
-Washed off fluid with soap and water	42 (36.8)	23 (25.0)	
-Washed off fluid with soap, water and disinfectant	52 (45.6)	53 (57.6)	
-Used only an alcohol-based hand sanitizer	14 (12.3)	15 (16.3)	
Personal protective equipments always worn by health workers	N = 84 (58.7)	N = 136 (100.0)	Likelihood-ration χ^2 = 66.800 (<0.001)
when working		136 (100.0)	
-Gloves or Coveralls	50 (35.0)	0 (0.0)	
-Gloves only	13 (9.1)	0 (0.0)	
-Gown only	6 (4.2)	112 (82.4)	
-Gloves and coveralls	15 (10.5)		
**Most important reason for not always wearing both gloves and coveralls while working (for those not wearing it)*	N = 59 (41.3)	N = 24 (17.6)	Likelihood-ration χ^2 = 7.374 (P = 0.120)
		12 (8.8)	
-Do not have regular access to PPEs	36 (25.2)	2 (1.5)	
-Do not have time to wear them	3 (2.1)	7 (5.1)	
-Can work safely without them	5 (3.5)	0 (0.0)	
-Do not believe they are really protective	2 (1.4)	3 (2.2)	
-Wearing them make it difficult for me to do my work	13 (9.1)		
Disposal of used needle and syringe among doctors			4.697 (0.096)
-Discard both syringe and needle into the safety box without recapping	52 (36.4)	58 (42.7)	
-Recap needle and discard both syringe and needle	91 (63.6)	75 (55.1)	
-Disconnect and discard needle and replace with new needle for another drug administration on the same patient	0 (0.0)	3 (2.2)	

studies in Nigeria where 62.1 %[10] and 95%[15] of the health workers believe that SP protects health workers from getting infections from patients. Studies have shown that HCWs are highly at risk of occupational hazards as they perform their clinical duties in the hospital especially when disposing bacteriological and other laboratory waste[20]. Only 12.6% of doctors and 19.1% of the MLSs reported knowledge of a hospital policy that enhances compliance to SP and this agrees with other reports[14].

Concerning the resources available for practice of SP, our respondents reported lack of resources. Poor supply of PPE was reported in both groups. This is similar to findings in other studies in low income countries[10,15]. Concerning respiratory hygiene, only 36.8% of the MLSs and 25.9% of doctors reported that there were signs at entrances with instructions on cough etiquette however 21% of doctors and 17.6% of MLSs reported no measures were put in place. This has shown that there are inadequate signs in the hospital encouraging SP.

Concerning the practice of SP, there was a significant difference between the doctors and the MLSs. The MLSs were more likely to use PPEs than the Doctors regularly, this could be due the fact that majority of the MLSs (73.5%) received training on wearing and removal of PPE compared to only 14.7% of the doctors. Lack of PPE was the major reason for non use among doctors..The low use of PPE among doctors in this study is greatly lower than what was found among doctors in India, where glove use was found to be 85.1%[11]. In contrast,only 2.5% of health workers in Ilorin wore protective aprons[10].

Safe disposal of used needles and syringes was very poor. Recapping was still being practiced by of doctors and MLS. This is similar to what was found in India, where 59.3% of doctors and nurses reported recapping of used needles[11].More doctors practiced recapping than the MLSs similar to what Sadoh reported that recapping was more likely to be done by doctors than nurses or MLS[1]. (Table 5)

The enablers to practice of SP among the two groups was mostly when managing an infected person, whereas the constraints were mostly non-availability of PPE, similar to findings in a study in North East Nigeria where 98.6% reported non compliance due to non-availability of equipment[10]. Poor commitment of hospital management towards provision of basic hospital amenities and personal protective devices have been reported in some studies as a barrier to practicing universal precautions[21,15]. Some respondents also found it difficult to use PPE during emergency situations. (Table 6) This is similar to some other studies where it was reported that during emergencies it was difficult to practice SP as well as during high job demands[21]. Both doctors and

Table 6: Enablers, Constraits and Suggestions on measures to be put in place to enable workers comply with standard precautions

	Doctors	Lab Scientists
Variables	Frequency N = 143 (100.0%)	Frequency N = 136 (100.0)
Enablers: Situations which make the worker comply with SP		
If there is an epidemic	29 (20.3)	27 (19.9)
If I am managing an infected person	106 (74.1)	98 (72.1)
If there are policies to punish non compliance	8 (5.6)	11 (8.0)
$\chi^2 = 0.684$; P value = 0.710		
Constraints: Conditions that make it difficult to comply with SP		
In emergency situation	63 (44.1)	54 (39.7)
If I do not understand how to observe SP	7 (4.9)	6 (4.4)
If PPEs are not available	67 (46.9)	68 (50.0)
If it reduces my job efficiency	6 (4.1)	8 (5.9)
$\chi^2 = 0.887$; P Value = 0.828		
Suggestions on making health workers comply with SP		
Facilities for hand hygiene should be regularly supplied	120 (83.9)	13 (9.6)
Personal protective equipment should always be available	143 (100.0)	27 (19.9)
Disinfectants and other resource for environmental cleaning should always be provided	98 (68.5)	23 (16.9)
Regular training of workers on standard precautions	104 (72.7)	50 (36.8)
Supportive supervision of workers to ensure compliance	62 (43.4)	3 (2.2)
All above	102 (71.3)	20 (14.7)
$\chi^2 = 36.970$; P Value = <0.001		

Table 7: Association of occupation and exposure to patient's serum/use of PPEs/nosocomial infection

Variables	Skin has been exposed to patient's serum while working		Always wear PPEs (gloves or coveralls) while working		Has developed nosocomial infection since starting work		
	Yes N = 206 (%)	No/Can't remember 73 (%)	Yes N = 196 (%)	No N = 83 (%)	Yes (%) N = 48	No (%) N = 205	Do not know N=26 (%)
Doctor	114(79.7)	29(20.3)	84(58.7)	59(41.3)	20(14.0)	110(76.9)	13(9.1)
Lab scientist	92(67.6)	44(32.4)	112(82.4)	24(17.6)	28(20.6)	95(69.9)	13(9.5)
	$\chi^2 = 5.259$; P = 0.022		$\chi^2 = 18.595$; P = < 0.001		$\chi^2 = 2.133$ P = < 0.144		

MLSs have been exposed to serum during the course of their jobs. Exposure to blood and body fluids by health care workers is one of the major occupational hazards and this high level of exposure emphasizes the dire need for them to be educated on SP and the need for hospital policies to be enforced.(Table 7)

Conclusion

Doctors and MLSs have a good attitude to standard precautions but in depth knowledge and compliance is very poor. Hand hygiene, use of personal protective equipment and needle safety need to be re-emphasized. Training on standard precautions and use of personal protective equipment should be done more often and consistently. Standard precautions should be included in the curriculum of all health workers. Hospital policies should be enforced and management should provide materials needed for the practice of infection control.

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