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To study the microbes and their resistance pattern on dresses and stethoscope of health care workers in a tertiary care hospital.

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Abstract : Background Objectives This study was conducted to determine the type of microbial contamination and the resistant pattern of the microbes present on the dresses and stethoscope of health care workers in order to assess the risk of transmission of pathogenic micro-organisms and its implications for patient safety and control of hospital-acquired infections. Materials and Methods Swabs were taken from diaphragm of the stethoscopes and dresses of healthcare workers (4 different areas - collar, pocket, sleeve and sides of the dress) for bacteriological analysis using standard techniques. Each participant answered an anonymous study questionnaire regarding his or her specialtyunit, cadre and white-coat usage practices (e.g., length of usage, frequency of washing, type of washing and frequency of usage in the hospital). Observations The collar and pockets were the more contaminated areas. 40 and 45 of Staphylococcus aureus was isolated from the dresses and stethoscopes of health care workers respectively followed by Coagulase negative Staphylococci and Gram negative bacilli. Most of the Gram positive cocci were resistant to Cotrimoxazole and Penicillin.Conclusion Organisms isolated from the dresses and stethoscopes of health care workers can be a source of infection. Scrupulous hand washing and use of sanitizers should be practiced before and after attending the patients. Frequent washing of the uniform and strict adherence to stethoscope disinfection practices by health workers will minimize cross-contamination and ensure improved patient safety in the hospitals.

Keyword : Microbial contamination, dresses of health care workers, stethoscope.

INTROCUTION:

Infection transmission in the hospital environment remains a significant hazard for hospitalized patients1. Patients can shed infectious microorganisms into the healthcare environment and healthcare workers by virtue of their constant contact, patients can transmit those microorganisms to other patients. There has been growing concern that dresses of the health-care workers and devices such as stethoscopes may actually play a role in transmitting pathogenic microorganisms in a hospital setting. This concern has yet to be studied in developing countries as there is increasing incidence of Hospital acquired infections in these parts of areas and the dire need to introduce effective patientsafety initiatives7. This study aimed to identify the occurrence of the microbial contamination in the dresses and stethoscope of health care workers and to highlight the importance of these microorganisms related to Healthcare Associated Infections.

METHODS:

In this study one hundred health care workers of different grades and specialties participated and 100 stethoscopes were sampled from a tertiary care hospital. A brief, structured questionnaire was given to all the participants and this was used as a tool to assess the personal hygiene. Swabs were taken from four different areas of the health care workers (collar, pocket, sides and sleeve) and from diaphragm of their stethoscope. The swabs which were used were plain, cottontipped and sterilized swabs. Normal saline was used to moisten the swabs and samples were taken by passing the swabs up and down twice on the desired areas and are transported immediately to the laboratory. They were streaked on to 5% blood agar and MaC conkey agar plate and left for overnight incubation at 37°C in air. Next day the plates were examined for the presence of possible pathogens and antimicrobial resistant test were determined by standard laboratory methods.

RESULTS:

TABLE:1 Basic variables

Basic variables	N=100	Samples	Culture positive	Percentage
Gender				
Male	59	236	165	70%
Female	41	164	120	73%
Designation				
Doctors	47	188	157	83%
Nurses	31	124	109	87%
Paramedical staffs	22	88	19	21%
Total	100	400	285	**71%**

The prevalence of contamination in the dresses of health care workers was 71%.

TABLE:2 Questionnaires

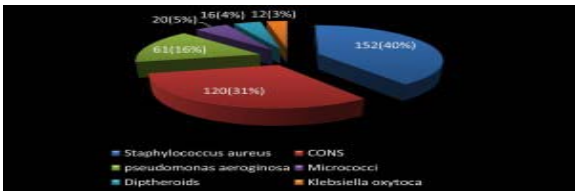
1.	**How often do you wash your coat/ uniform?**	
	a. Daily	17
	a. Twice a week	51
	b. Once a week	11
	c. Once in 15 days	13
	d. Once a month	8
2.	**Where all do you wear your coat/ uniform?**	
	a. Only in wards	28
	a. Within campus including canteen and mess	63
	b. Out the campus	9
3.	**How often do you use sanitizer during working hour?**	
	a. Immediately after handling a patient	31
	b. Before handling a patient	16
	c. Before and after attending patients	29
	d. Never	24
4.	**How do you wash your uniform/coat?**	
	a. Autoclave	-
	b. Self-washing	100
5.	**Do you usually carry articles in your coat/uniform pocket?**	
	a. Yes	89
	b. No	11
6.	**Is your coat half sleeve or full sleeve?**	
	a. Half sleeve	92
	b. Full sleeve	8

51% of the hospital workers washed their dresses twice a week
29% used sanitizer before and after attending patients

TABLE: 3 Isolates from the samples

Organism	Collar n=100	%	Pocket n=100	%	Side n=100	%	Sleeve n=100	%	Tot n=400	%
MONOMICROBIAL										
Staphylococcus aureus	28	37%	27	37%	26	38.2%	15	22%	92	31%
CONS*	18	24%	16	22%	12	17.6%	14	20.5%	60	21%
Pseudomonas aeruginosa	10	13%	9	12.3%	13	19.1%	9	13.2%	41	18%
Klebsiella spp	2	3%	4	5.4%	3	4.4%	3	4.4%	12	4%
POLYMICROBIAL										
Staphylococcus aureus + CONS* + micrococci	3	4%	5	6.8%	5	7.3%	7	10.2%	24	8%
Staphylococcus aureus + Pseudomonas aeruginosa	6	7.8%	7	9.5%	4	5.8%	3	4.4%	20	7%
Staphylococcus aureus + CONS* + micrococci	5	6.5%	3	4%	3	4.4%	9	13.2%	20	7%
CONS* + diphtheroides	4	5.2%	2	2.7%	2	3%	8	11.7%	16	5%
Culture positive	76	26%	73	26%	68	24%	68	24%	285	71%
Culture negative	24	21%	27	23.4%	32	28%	32	28%	115	29%

*coagulase negative Staphylococci. Out of 400 samples 285 (71%) were culture positive. Collar and pocket were more contaminated (26%) Over all prevalence of the isolates in the dresses of healthcare workers



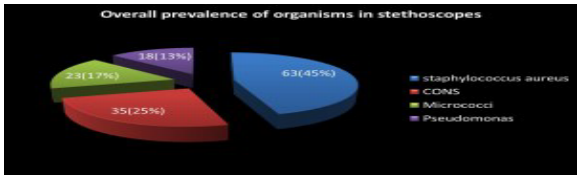
Overall, Staphylococcus aureus was the most commonly isolated organism (40%)

TABLE:4 Isolates from the stethoscopes

Organisms	TOTAL N=100	Percentage
Monomicrobial		
Staphylococcus aureus	31	31%
CONS*	12	12%
Pseudomonas aeruginosa	9	9%
Polymicrobial		
Staphylococcus aureus + CONS* + micrococci	23	23%
Staphylococcus aureus + Pseudomonas aeruginosa	9	9%
Total culture positive	84	84%
Culture negative	16	16%

Prevalence of isolates from stethoscope was 84%

Over all prevalence of isolates from Stethoscopes



Most common isolate from stethoscope was Staphylococcus aureus (45%)

TABLE: 5 Antibiotic resistance pattern of the isolates both in the dresses of healthcare workers and stethoscope in percentage (n=369)

Antibiotics	Staphylococcus aureus N=215	CONS* N=155	Pseudomonas aeruginosa N= 79	Klebsiella Spp N=12
Cotrimoxazole	89	78	NT	83
Penicillin G	78	80	NT	NT
Gentamicin	69	72	40	28
Erythromycin	37	33	NT	NT
Ciprofloxacin	40	45	68	62
Cefoxitin	3	0	NT	NT
Amikacin	NT	NT	36	18
Cefotaxime	NT	NT	NT	0
Ceftriaxone	NT	NT	NT	0
Ceftazidime	NT	NT	0	NT
Piperacillin	NT	NT	0	NT

NT- not tested . Cotrimoxazole and Penicillin G had maximum resistance

DISCUSSION:

The high rates of the bacterial contamination in the dresses and stethoscope of health care workers may be associated with the following 2 facts: Firstly, patients continuously shed infectious microorganisms in the hospital environment, and the health care providers are in constant contact with these patients. Secondly, it has been demonstrated that microorganisms can survive between 10 and 98 days on fabrics which are used to make white coats, which include cotton, cotton and polyester, or polyester materials6. Since dresses of health care workers are implicated as major fomites in the transmission of infections, we studied 100 hospital workers of various specialties from a tertiary care hospital. Total prevalence of bacterial contamination was found to be 71% which was similar to the high prevalence observed by Zahra Moravvej et al and C.J. Uneke et al as 94%5 and 91.3%7 respectively. Most of them were male (59%) which was similar to the study results of Asima Banu et al6. Though females were less in number compared to males (41%), had higher bacterial contamination ie., 73% which was similar to the observation made by Muhadi et al 8.Among the total participants, doctors, nurses and paramedical staffs were 47%, 31% and 22% respectively. 87% of the nurses uniform were contaminated. Collar and pocket were equally contaminated (26%) which was slightly more than the contamination of side and sleeves of the dresses (24%). 51% of the hospital workers washed their dresses twice a week. The data from the washing practices of the subjects revealed that microbial contamination vary with the time in the use of the white coats. This was contrary to the findings of Wong et al.,10. Among the subjects 28% of them used their white coats only in the wards, while the other 63% used it within campus including canteen/mess and 9% of them used outside the hospital premises too. Similar reports were observed by Muhadi et al. 76% of the hospital workers claimed to use hand sanitizer and the microbial contamination were found to be much less when compared with the nonusers. In the present study, Staphylococcus aureus was the major pathogen to be isolated (40%), which was similar to the results of Muhadi et al., 8, Treakle et al.,9 and Wong et al.,10 and different from the findings of a study which was done by Uneke et al.,7, in which diphtheroids were the most common organisms which were isolated. As many as 84% of the stethoscope were contaminated by bacteria which was comparable to the observations of previous studies that found 71% to 100% of stethoscopes were colonized by various bacteria 12,13,14. Most common isolate from stethoscope was Staphylococcus aureus (45%) followed by 25% Coagulase negative Staphylococcus. The antimicrobial susceptibility pattern of the gram positive cocci revealed that most of them were resistant to Cotrimoxazole and Penicillin. In our study, 3% Methicillin Resistant Staphylococcus 7Aureus (MRSA) was isolated which was significantly lower than that which was reported Uneke et al., but similar to the findings of a study done by Treakle et al., who reported no MRSA isolation from the white coats9. Coagulase negative Staphylococci (CONS) were isolated (31%), which are skin commensals and Gram negative bacilli like Pseudomonas and Klebsiella species were isolated. These can be infectious to the patients who are admitted in the hospital, as was reported by Zachary, 2001 and Grabsch 20066,11 Although most of the organisms isolated in this study were considered non-pathogenic, a considerable percentage of the isolates were pathogenic.

CONCLUSION:

This hospital-based cross-sectional surveillance study revealed that a large proportion of health care workers clothing and stethoscope were contaminated with microorganisms that can result in infections as well as in the spread of resistant strains in the hospital environment. As a result, there is a pressing need to promote a scrupulous hand washing and use of hand sanitizers before and after attending to patients. Frequent washing of the uniform and strict adherence to stethoscope disinfection practices by health workers will minimize cross-contamination and ensure improved patient safety in hospitals.

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