

Cross Sectional Study to Determine the Factors Associated with Stethoscope Hygiene Among the Health Care Providers in Tertiary Care Center.



Medical Science

KEYWORDS : Stethoscope, Bacteria, Hospital, Health care providers.

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ABSTRACT

Background: Stethoscopes are commonly used to assess the health of patients and have been reported to be potential vectors for nosocomial infections in various parts of the world.

Aims: (1) To determine the frequency of stethoscope cleaning by medical practitioners in tertiary care center. (2) To determine the factors associated with stethoscope cleaning. (3) To determine the methods of cleaning of stethoscope.

Setting & Design: It is the hospital based cross-sectional study.

Methods & Materials: Data was collected through pretested questionnaire given to health care providers by the investigators. Data collected were analyzed using statistical package for social sciences (SPSS) 17.0 software.

Results & Conclusions: A minority of the respondents (37.7%) reported having ever cleaned their stethoscope. Following normal clinical use, wiping with a dry cloth was the most frequently reported method of cleaning (53.2%). After contamination of diaphragm with blood or secretions, cleaning with an alcoholic swab was the most common method (64.3%).

Introduction:

The stethoscope is a commonly used tool in clinical practice. Bacteria can be cultured from the diaphragms of the majority of stethoscope in clinical use and can be as innocuous as normal skin flora or as potentially deadly as methicillin-resistant. *Staphylococcus aureus* (MRSA) [1]. Regular cleaning of stethoscopes with alcohol-based disinfectants can reduce the presence of harmful bacteria on diaphragms, thus reducing the potential for nosocomial infection [2,3]. Studies from developed countries have shown that a majority of doctors do not clean or disinfect their stethoscopes on a regular basis[1-3].

No studies have specifically explored clinical factors associated with stethoscope cleaning practices either in India.

This aim of this cross-sectional study was to determine the frequency and factors associated with self-reported ever cleaning of stethoscopes among medical students and physicians at a medical college & tertiary care center.

Methods & Materials:

The study was carried out in tertiary care center. The hospital with bed strength of 1200, serve as referral center. List of the physicians working at the hospitals were obtained. All doctors on duty at the departments of general surgery, internal medicine, gynecology and obstetrics, pediatrics, radiology and pathology were conducted in person, and given the pre-tested questionnaire which was collected 1 hour later. Investigator visited the hospitals during office hours for 3 consecutive days to contact physicians who had not been available on previous day (s). From a listed combined departmental strength of 344, a total of 328 physicians (95.3%) were provided with the questionnaire. Another group of 231 medical students of Medical College who attended clinical classes at these hospitals, were given the questionnaire during a lecture, to be completed and collected after 1 hour. Fully complete questionnaire were returned by 73.2% (240/328) physicians and 72.7%(168/231) medical students, for a total of 408 respondents. The data were managed and analyzed using SPSS, version 17.0. Ethical approval for the study was granted by the ethics committee of the medical college.

Results:

Use of a stethoscope on a daily basis was reported by 59.8% respondents (244/408), while all others had used a stethoscope at least once during the last month. Regarding ownership of the

stethoscope they used the last time, 89.0% (363/408) utilized their personal stethoscope, while the rest had used a common (ward) stethoscope. Only 17 respondents (4.2%) had ever received information or advice regarding cleaning or disinfection of their stethoscope.

Only 154 respondents (37.7%) reported having ever cleaned their stethoscope diaphragm. Among these respondents, regular cleaning was reported by 38(24.7%), while the rest did it on an irregular basis (Table 1). Among those who reported ever cleaning their stethoscope, the favored method of cleaning following normal clinical use was with a dry cloth (53.2%). After contamination with blood or body fluids 64.3% used alcohol swabs (Table 2).

Table 1:Frequency of cleaning stethoscope diaphragm by physician and medical students.

Frequency of cleaning	No.	% of ever cleaned (n=154)	% of total (n=408)
Regular cleaning	38	24.7	9.3
After every patient	0	0.0	0.0
Daily	19	12.3	4.7
Weekly	10	6.5	2.5
Monthly	4	2.6	1.0
Yearly	5	3.2	1.2
Irregular Cleaning	116	75.3	28.4
Weekly	30	19.5	7.4
Monthly	60	38.9	14.7
Yearly	14	9.1	3.4
Once every few years	12	7.8	2.9
Total (ever cleaned)	154	100.0	37.7

Univariate analysis found statistically significant associations between ever cleaning of stethoscope and receiving any information on cleaning of stethoscopes (OR= 4.21, 95% CI: 1.45-12.19), regular use of stethoscope (OR= 2.47, 95% CI: 1.60-3.79 personal stethoscope utilized at last use (OR= 3.06, 95% CI: 1.44-6.54) and affiliation with the department of internal medicine (OR=3.50, 95% CI: 1.93-6.36). No association was noted between sex and

porting ever cleaning of stethoscopes.

On multivariate logistic regression analysis, receiving information on cleaning (OR=3.34, 95% CI: 1.45-12.19), use of personal stethoscopes at last utilization (OR=3.38, 95% CI: 1.24- 9.20), affiliation with medicine (OR= 2.27, 95% CI: 1.10-4.67), and affiliation with radiology or pathology (OR= 2.78, 95% CI: 1.11-6.97) were independently associated with ever cleaning of stethoscopes (all P<0.05) (Table 3).

Table 2: Methods of cleaning stethoscope diaphragm by physician and medical students who reported they ever cleaned it (n=154)

Method of cleaning	After normal clinical use		If contaminated with blood or body fluids	
	No.	%	No.	%
Alcohol Swab	53	34.4	99	64.3
Soap and water	6	3.9	18	11.7
Plain water	8	5.2	15	9.7
Dry cloth	82	53.2	18	11.7
Other method	5	3.2	4	2.6

Discussion:

This study found that less than 40% of doctors and medical students had ever cleaned their stethoscope diaphragm. Wiping with a dry cloth was the most frequently used method. Having received information about cleaning of stethoscopes showed the strongest association with reporting ever cleaning a stethoscope.

The study was restricted to one medical college and one of its affiliated teaching hospitals, thus generalizability to all medical settings in developing countries would be limited. However, the findings regarding the reported frequency of cleaning of stethoscopes are similar to those noted from another developing country [4] and also from developed countries [1-3]. It has been shown that after a day of not disinfecting a stethoscope in regular clinical use, contaminating bacteria can be cultured from the stethoscope diaphragm and the number of colony forming units increases daily [3,7]. It was noted that less than 5% of all respondents in the present study cleaned stethoscope regularly on a daily basis. Although this frequency was higher than the study by Africa-Purino et al., in which none of the doctors or medical clerks reported cleaning stethoscopes on a regular daily or even weekly basis. [4], it is still very low considering the risk of cross-infection posed by contaminated stethoscopes.

Table 3: Univariate and multivariate analysis of characteristics of physicians and medical students who reported they ever cleaned their stethoscopes diaphragms.

Characteristic	Total No.	Ever cleaned	P-value ^a	Unadjusted OR (95% CI)	P-value ^b	Adjusted OR (95% CI) ^c
Received information on cleaning						
Yes	17	70.6	0.008	4.21(1.45-12.19)	0.033	3.34 (1.10-10.10)
No	391	36.3		Ref.		Ref.
Regular use of stethoscope						
Yes	244	45.9	< 0.001	2.47 (1.60-3.79)	0.105	1.56 (0.91-2.68)
No	164	25.6		Ref.		Ref.
Last used stethoscope						
Personal	363	40.8	0.009	3.06(1.44-6.51)	0.017	3.38(1.24-9.20)
Common	45	13.3		Ref.		Ref.
Physician's sex						
Male	189	38.1	0.892	1.03(0.79-1.31)	-	-
Female	219	37.4		Ref.		
Department/Affiliation						
Medicine	67	52.2	<0.001	3.50 (1.93-6.36)	0.025	2.27 (1.10-4.67)
Surgery	82	42.7	0.012	2.38(1.36-4.19)	0.172	1.67(0.80-3.46)
Pediatrics	34	50.0	0.072	2.35(0.99-5.52)	0.171	1.88 (0.76-4.66)

Obstetrics/Gynecology	26	42.3	0.002	3.20 (1.50-6.84)	0.351	1.62(0.59-4.43)
Radiology/Pathology	31	51.6	0.003	3.41 (1.55-7.51)	0.029	2.78 (1.11-6.97)
Medical student	168	23.8		Ref.		Ref.

^ap-value univariate analysis; ^bp-value for multivariate analysis; ^cAfter multivariate modeling adjusting for regular use. Ref= reference category; OR=odds ratio; CI= confidence interval.

The use of cleaning agents among those who had ever cleaned their stethoscopes was disappointing. Following normal clinical use, the most popular method of cleaning was with a dry cloth would have a major effect on the level of contamination of the diaphragm. Ethyl alcohol has been shown to be a good disinfectant, while soap is also useful disinfection [2,3]. Cleaning of diaphragms using ethyl alcohol swabs was more commonly reported after contamination with blood or bodily secretions (34.4% after normal clinical use and 64.3% after contamination). In the absence of overt contamination, the less frequent use of an effective cleaning method may be due to a lower perceived risk of transmission of infection through the diaphragm in this situation.

The finding that having received previous information on stethoscope cleaning had a strong association with ever cleaning of stethoscopes focuses attention on the role of educating medical professionals regarding cleaning of medical equipment. This finding is important for policy-makers aiming to initiate education programs informing doctors about the risks posed by contaminated stethoscopes. It may also be noted here that due to the cross-sectional design of this study, reverse causation cannot be ruled out (i.e. perhaps the decision to clean stethoscopes led doctors to access information regarding stethoscopes disinfection and not vice versa). Longitudinal studies warranted to determine the effect of education on stethoscope cleaning.

It has been previously noted that common used stethoscopes can have a higher bacterial colony count than personal stethoscopes [5]. Possible strategies to reduce the risk of cross-infection from communal stethoscopes could include reducing the use of communal stethoscopes by urging doctors to buy and use their own stethoscopes, and establishment of protocols for regular disinfection of communal stethoscopes by hospital staff.

In summary, this found that very few of practicing doctors and medical students cleaned their stethoscope diaphragms. Even those who cleaned stethoscopes tended to use an ineffective method of cleaning, i.e. wiping with a dry cloth. Having previous information about stethoscope cleaning, utilizing personal stethoscope at the last use and affiliation with the internal medicine department were notably associated with reporting ever cleaning of stethoscopes. There is need for further exploration of the role of educating health care providers about disinfections of medical equipment in order to encourage regular and effective cleaning of stethoscope used in clinical practice. This has the potential to reduce bacterial colonization of stethoscope diaphragms, and ultimately, nosocomial infection in hospitals settings.

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