

# Knowledge, Attitude and Practice of Stethoscope Disinfection among Health Care Providers in Karachi

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## Abstract

**Introduction:** The stethoscope has been found to be a potential vector for spreading nosocomial infection all over the world. Most commonly contamination of stethoscope occurred when medical practitioners used the same stethoscope to auscultate many patients without disinfection. Strict adherence to stethoscope disinfection practices by health workers can minimize cross-contamination and ensure improved patient safety in hospital environments. This study was carried out to assess the knowledge, attitude and practices regarding stethoscope disinfection among students, trainee and residents doctors at Jinnah Postgraduate Medical Center.

**Methodology:** This was a cross sectional study, conducted among medical students, trainee and resident doctors of Jinnah Sindh Medical University and Jinnah Postgraduate Medical Centre respectively from July 2019 to December 2019. Sample size calculated for the study was 316. Data was collected by circulating a self-administered questionnaire made after careful literature review. Data was analyzed using SPSS version 20.0 and descriptive analysis was performed.

**Result:** Among the study participants 174(55.02%) had never cleaned their stethoscope. A lot of respondents 257(81.3%) thought stethoscope as a potential vector for infection. The majority 135(42.7%) considered diaphragm was the most commonly infected part. A lot of participants 145(45.9%) thought that Methicillin Resistant Staphylococcus Aureus (MRSA) could spread through stethoscope. Alcohol swab was regarded as the most suitable disinfectant for sterilization of stethoscope by 260(82.2%) participants.

**Conclusion:** Our study concluded that there is a lack of practice by medical providers to disinfect their stethoscope in spite of considering stethoscope as a potential vector for nosocomial infection. Therefore measures should be taken to elevate practice of stethoscope disinfection to reduce the nosocomial infection effectively.

**Key words:** Stethoscope, Disinfection, Cross Infection.

## Introduction

In medical practice the most commonly used instrument is the stethoscope. Contamination of stethoscope with infective microorganism is very common due to aberrant contact with huge number of patients(1). Stethoscope has been found to be a potential vector for spreading nosocomial infection all over the world(2). During auscultation stethoscope contamination is common; if the same stethoscope is used for the next patient without disinfection, it might bring risk of infection to the patient and may continuously impose the risk serially to all patients(3). It is estimated that every year directly 19,000 and indirectly 80,000 deaths occur because of hospital acquired infections(4). In every 100 admitted patients, 5-10 patients acquire nosocomial infection annually(5). Recent work has shown that contamination of stethoscope diaphragms could be 100%(6).

The most frequent microorganisms obtained from stethoscope are Methicillin Resistant Staphylococcus Aureus [MRSA], Pseudomonas species, Clostridium difficile, Escherichia coli and Vancomycin Resistant Enterococci(1,7,8). Most commonly contamination of stethoscope occurred when medical practitioners used the same stethoscope to auscultate many patients without disinfecting it(9). Stethoscope contact with infected skin such as near colostomy openings, sternotomy wounds and onto the chest of newborn without disinfection can result in colonization of pathogenic bacteria residing on the diaphragm of the stethoscope(10). It has been noted that there is great significance of disinfecting a stethoscope. In some settings it has been observed that students, doctors and residents clean their stethoscope after every clinical procedure or examination(11). Strict adherence to stethoscope disinfection practices by health workers can minimize cross-contamination and ensure improved patient safety in hospital environments(12).

Isopropyl alcohol has been found to be the most common disinfectant used to disinfect stethoscopes by health care providers. It has been reported that alcohol kills 94% of bacteria on the stethoscope diaphragm in contrast to antiseptic soap, removing 74% bacteria on diaphragm. Remarkable variation has been found in frequency of stethoscope disinfection(10). Results show significant reduction in bacterial counts after cleaning with 70% isopropyl alcohol. Hence cleaning with alcohol based swabs or at least one of the disinfectants or hand sanitizers should be used to ensure reduction in the number of microbes after consulting/use of stethoscope to avoid nosocomial infections (13). According to a study conducted in Greece the findings supported the evidence that Stethoscope contamination following a single physical examination is not negligible and is associated with a level of contamination of the patient's skin(14). Prevention of pathogen dissemination is needed. Frequency of disinfecting stethoscope has been found to decrease bacterial growth on stethoscope diaphragm and in that way could minimize spread of hospital acquired infection(5).

Therefore this study was carried out to assess knowledge, attitude and practice of residents, doctors and students regarding stethoscope disinfection at Jinnah Postgraduate Medical Center and Sindh Medical University, Karachi.

## Materials and method

This was a cross-sectional study, conducted at Jinnah Postgraduate Medical Center and Sindh Medical University, Karachi from July 2019 till December 2019. A total of 316 participants were included in the study using Non-probability convenience sampling technique. All students of Third, Fourth, Final Year MBBS studying at Sindh Medical College, House officers and Trainee residents posted in different wards at Jinnah Postgraduate Medical Centre, Karachi irrespective of gender and age were included. All those not willing to participate in the study were excluded.

The data was collected by circulating a structured questionnaire among the study participants. The questionnaire was validated through a pilot study done on 30 participants and Cronbach's Alpha value was also calculated which was found to be 0.75. The questionnaire was comprised of three parts. The first part consisted of questions assessing knowledge of the participants regarding stethoscope disinfection, the second part included questions determining their attitude and the third part was formulated to determine stethoscope hygiene practices of the medical students, doctors and residents. Written and verbal informed consent was taken from all the participants. Prior approval from the college ethical committee was also obtained.

Data collected was analyzed using IBM SPSS V 20.0. Descriptive analysis was done for the variables. Quantitative data was presented in mean and standard deviation while qualitative data was presented in frequencies and percentages.

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## Result

In our conducted study, total respondents were 316. Among them, 158 (50%) were students, 79 (25%) were house officers and 79 (25%) were trainee residents (see Figure 1). When asked about awareness regarding stethoscope cleaning protocol, 165 (52.2%) said they did not know while 151 (47.8%) responded in the positive. Among those who replied yes, the majority, 59 (39.0%) were students, 54 (35.8%) were house officers and 38 (25.2%) were trainee residents. Many participants 235 (74.4%) considered sanitizing and disinfecting the stethoscope as disinfection of stethoscope while 44 (13.9%) did not know what it meant. Others also saw heating 33 (10.4%) and washing 4 (1.3%) as stethoscope disinfection. Talking about parts of the stethoscope getting infected, 135 (42.7%) thought the diaphragm was the most commonly infected part. Ear piece 60 (19%), bell 36(11.4%), whole

stethoscope 27 (8.5%) and tubing 26 (8.2%) were the other parts viewed to being infected by other participants. People who thought the diaphragm as the part to be infected most frequently included the majority of students 72 (41.9%), trainee residents 53 (30.8%) and 47 (27.3%) house-officers. Alcohol swab/propyl alcohol was thought to be the most suitable disinfectant by the majority 260 (82.3%) of those taking part. Other disinfectants thought useful were hand-sanitizers 26 (8.2%), soap 3 (1.0%) and cloth 10 (3.2%). The majority of respondents 259 (82.0%) believed the stethoscope to be a potential vector of infection while others 57 (18%) had an alternative opinion. Among the participants the majority of the students 142 (44.9%), house-officers 68 (21.5%) and trainee residents 66 (20.8%) believed that regular cleaning of stethoscope would result in reducing nosocomial infections. On the other hand 16 (5.1%) students, 12 (3.8%) trainee residents and 12 (3.8%) house-officers thought otherwise. A lot of participants 145 (45.9%) thought that MRSA could spread through stethoscope while in others' opinion *Clostridium Difficile* 7 (2.2%), *Escherichia Coli* 31 (9.8%), *Pseudomonas Aeruginosa* 21 (6.6%) could also spread and 112 (35.4%) opted that they did not know about it. Regarding importance of stethoscope cleaning an overwhelming number of the participants 305 (96.5%) responded in agreement contrary to only 11 (3.5%) who regarded it as unimportant. The majority of the participants 295 (93.3%) considered stethoscope cleaning a good practice, 10 (3.1%) regarded it as time consuming and 7 (2.2%) thought it as harmful. Masses of students 172 (54.4%), house-officers 73 (23.1%) and trainee residents 74 (23.4%) recommended that stethoscopes should be cleaned/disinfected.

Among the respondents the majority of the students 98/158 (62%) and house-officers 41/79 (51.9%) had never cleaned their stethoscopes. In contrast the majority of trainee residents 43/79 (54.4%) claimed to clean their stethoscopes. Among the respondents who never cleaned their stethoscope, 146 (46.2%) gave no response as to why they don't clean their stethoscopes, 113 (35.7%) said that they don't know how to clean their stethoscope, 43 (13.6%) replied they don't get time to do it, 8 (2.5%) considered it a useless practice and 6 (1.8%) believed that it would damage their stethoscope. When asked which part of the stethoscope they clean the majority 117 (37%) of the respondents answered diaphragm (see Table 1). Most of the participants 157 (49.6%) claimed that they use alcohol swab for stethoscope disinfection. This was followed by 46 (14.5%) of the participants using hand sanitizer, cloth being selected by 19 (6.01%) and soap was picked by 10 (3.16%) for disinfecting purpose. Regarding how frequently the participants clean their stethoscope a large number of students 32 (10.1%), house-officers 16 (5.1%) and trainee residents 31 (9.8%) responded when they get time to clean their stethoscopes. Disinfection of stethoscope after each examination was reported by 17 (5.4%) students, 11 (3.5%) house-officers and 4 (1.3%) trainee residents. Stethoscope was cleaned after every shift by 6 (1.9%) students, 9 (2.8%) house-officers and 4 (1.3%) trainee residents. Few of the house-officers 7

(2.2%), students 11 (3.5%) and trainee residents 5 (1.6%) said that they don't remember the last time they cleaned their stethoscopes. Interestingly a lot of students 92 (29.1%), house-officers 36 (11.4%) and trainee residents 34 (10.8%) opted not to give any response to this question also (see Figure 2).

Most of the participants 305 (96.5%) uttered that they have never attended any awareness program regarding stethoscope disinfection while 11 (3.5%) claimed that they had attended such programs. For arranging awareness sessions regarding stethoscope disinfection, 301 (95.2%) of the participants were in favor while remaining 15 (4.8%) were against. The majority of the participants 300 (94.9%) reported that they were not provided with any material for disinfecting stethoscope while 16 (5.1%) responded in affirmation.

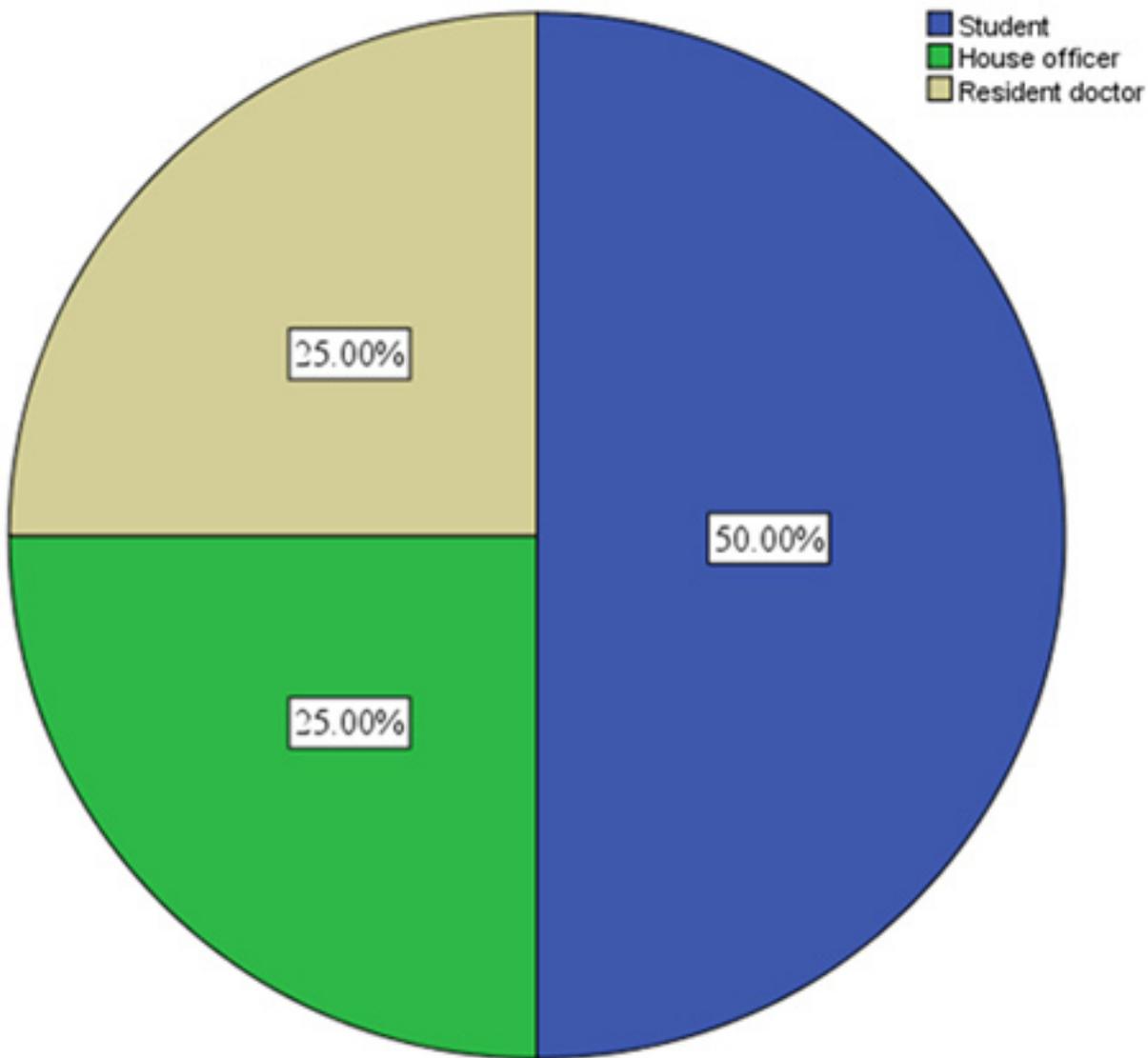


Figure 1: Designation of participants

Part of stethoscope	Students (N, %)	House officers (N, %)	Trainee residents (N, %)
Diaphragm	47(29.7%)	36(45.6%)	34(43%)
Bell	16(10.1%)	10(12.6%)	11(13.9%)
Tubing	2(1.3%)	2(2.5%)	6(7.6%)
Ear pieces	21(13.3%)	11(14.0%)	5(6.3%)
Whole stethoscope	23(14.6%)	12(15.2%)	9(11.4%)
No response	49(31.0%)	8(10.1%)	14(17.7%)

Table 1: Disinfection of different parts of stethoscope

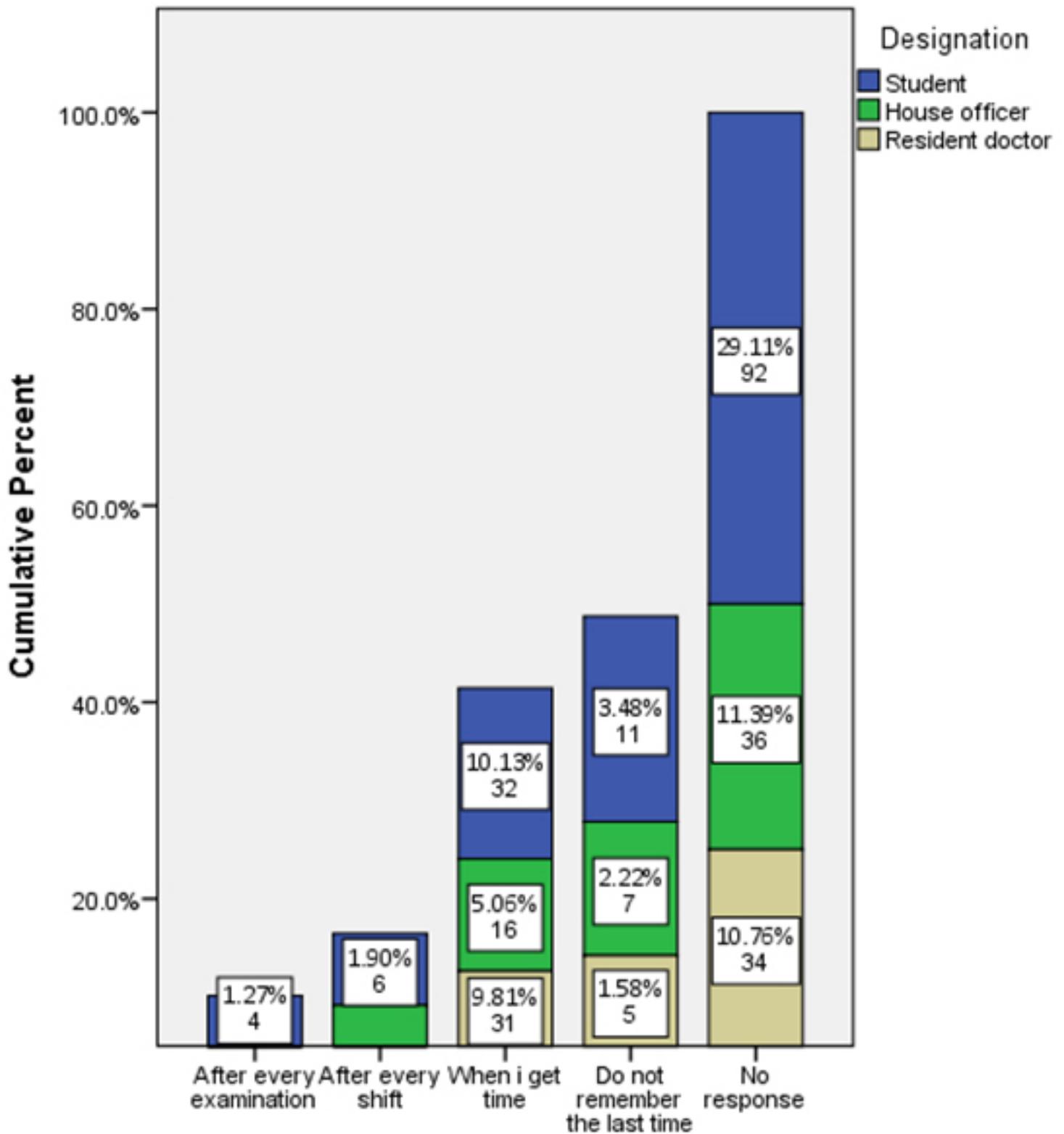


Figure 2: Frequency of stethoscope disinfection

## Discussion

The stethoscope is weighed as the most important and basic clinical instrument used by medical professionals in examining patients. Several studies have highlighted that stethoscope is a potential vector for spread of health-care associated infection(1,2,5,9–11). Our study reported that 80% or more of participants believed that stethoscope is the major source for transmitting nosocomial infection among patients.

This study revealed that the percentage of doctors who had never cleaned their stethoscope was 48.4%. Our results are far worse than studies from India and Saudi Arabia where only 16% and 12% of doctors had claimed to never cleaned their stethoscopes(5, 15). A study from Baghdad had shown poorer results than ours with 58% of the doctors who had never cleaned their stethoscopes(10). In this present study 51.59% of doctors and 60% of students had claimed to disinfect their stethoscopes. This finding was better than a study conducted in Bengal which stated that a considerably low number (16%) of doctors and none of the medical students had cleaned their stethoscope ever(16). Our results were also superior to the study conducted in Rawalpindi which showed 37.7% of doctors had ever cleaned their stethoscopes(16). On the other hand, Fourth and Sixth Year Serbian medical students had reported a very high percentage of 79.8% and 81.8% respectively for students who cleaned their stethoscopes(1). This percentage of students stating they cleaned their stethoscope is higher than our study participant students. Whittington et al in London showed that 91% of Health Care Workers disinfected their stethoscope after every use(3). In contrast to Whittington study results, our study reflected that the participants who cleaned their stethoscope after every patient contact was very low (10.1%). The reason for this could be lack of awareness about stethoscope disinfection among students and doctors as is also reported in our study. Another reason for this result might be that consultants in teaching hospitals are not practicing stethoscope disinfection after every examination. Diaphragm was the part which was most commonly disinfected by our study participants. A study conducted by Gazibara et al also conveyed that the majority of participants cleaned their diaphragms as a part of stethoscope disinfection(1).

The most common disinfectant used by doctors (60.1%) was alcohol swab (Ethyl alcohol) in our study. Similarly, studies by Pal K et al and Sahb et al witnessed that the doctors frequently use Ethyl-alcohol based agents for sterilizing stethoscopes(10, 15). The majority of medical students (83.5%) in our study considered alcohol swabs as the best disinfectant for stethoscopes. While on the other hand Pal K et al unveiled that more than 50% of medical students had no idea regarding the use of alcohol based agents(15). This result indicated that the knowledge regarding appropriate stethoscope disinfectant is good among medical students of our study population.

Quite a few respondents (35.7%) alleged that they don't know how to clean their stethoscopes. This raises a concern and requires work to educate doctors and medical students as to how to clean stethoscopes properly. An overwhelming number of participants (94.9%) said that they were not provided with any material to disinfect their stethoscopes; this might be one of the reasons for a very low number of doctors and students disinfecting their stethoscope frequently. Authorities should look into this matter and provide proper disinfectants so that practice of stethoscope disinfection could be enhanced and nosocomial infections could be reduced.

## Conclusion

Our study concluded that there is a lack of practice by medical providers to disinfect their stethoscope in spite of considering stethoscope as a potential vector for nosocomial infection. Therefore, measures should be taken to elevate the practice of stethoscope disinfection to reduce the nosocomial infections effectively.

### Conflict of interest:

The authors of the study did not have any type of conflict of interest with any person, body or institute.

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