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BASIC MEDICAL APPARATUS; STETHOSCOPE & SPHYGMOMANOMETER. A VECTOR FOR NOSOCOMIAL INFECTION

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Abstract:

Background: *Nosocomial infections (NI) are a common cause of morbidity and mortality in hospitalized patients. Approximately 5-10% of patients may acquire infections while in hospital. Medical apparatus have long been considered as major vector in transmission of NI. Staphylococcus epidermidis is the most common bacteria isolated from the diaphragm of the stethoscopes and cuffs of sphygmomanometers.*

Objective: *Basic medical apparatus; stethoscopes and sphygmomanometers are widely used by the health care professionals however, it is largely not known, how frequently, if at all, the healthcare professionals clean and/or disinfected the said apparatus. This study, thus hopes to determine whether health professionals follow hygienic practice of cleaning and/or disinfecting the apparatus to prevent spread of infections.*

Methodology: *This observational, cross-sectional analysis was conducted upon a total of 249 healthcare professionals (60 males and 189 females) at a tertiary care hospital using non-probability, convenience sampling. Data was collected from January 01, 2016 to March 31, 2016, using structured self-administered questionnaires after taking written informed consent. The data obtained was analyzed using SPSS v. 19.0 and Microsoft Excel 360.*

Results: *Among the total subjects enrolled in the study, 163 were medical students (studying in clinical years with ward assignment), 14 were house-officers, 23 were post-graduate trainees, 19 were consultants and 30 were nurses. Results of the inquiries were made regarding their sanitization and disinfection practices were not very heartening despite the healthcare professionals being largely aware of the potential hazards to the patients of not practicing hygiene in this regard.*

Conclusion: *After careful consideration, it can be concluded that healthcare professionals, despite being aware of the potential hazards of using un-sanitized and non-disinfected basic medical apparatus, do not pay much heed to the practice of sanitization and disinfection of even simple basic apparatus, such as the cuffs of sphygmomanometers and or the diaphragms of stethoscopes.*

Keywords: *Basic Medical Apparatus, Sphygmomanometer, Stethoscope, Nosocomial infections and Staphylococcus epidermidis*

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INTRODUCTION:

Nosocomial infections (NI) are a common cause of morbidity and mortality in hospitalized patients. [1-4] approximately 5-10% of patients may acquire infections while in hospital. [5] In addition to the increased morbidity and mortality, this inevitably results in increased financial burdens on the healthcare system. Medical apparatus have long been considered as major vector in transmission of NI. Staphylococcus epidermidis is the most common bacteria isolated from the diaphragm of the stethoscopes and cuffs of sphygmomanometers. [3] Outbreaks of NI have also been linked to other sources such as electronic thermometers, latex gloves, computer terminals and Doppler probes.

Although the cleaning process is fairly easy and the disinfection method, even more so, the reason why health professionals shy away from cleaning the apparatus under their use, in particular, stethoscopes and sphygmomanometers, eludes us all. Literature too, does not offer much insight into the matter regarding, how frequently, if at all, the healthcare professionals clean and/or disinfected the said apparatus.

Despite the succession of technological advancements that have been made over the last decade, clinicians still use stethoscopes on a regular basis. [6] It is still one of the cheapest and most convenient tools to assess a patient. [7-9] Recent publications [10-13] have suggested that stethoscopes might be a vector for infection due to their constant contact with many patients.

Blood pressure (BP) cuffs, as with other noninvasive items, have been shown to be involved in the transmission of NI. [13-20] However, most publications concern observational case reports [11, 12] or small studies often restricted to specific contexts. [14, 17-20] In practice, the role of BP cuffs in the dissemination of nosocomial infections is frequently overlooked. [18, 20]

This study, thus hopes to determine whether health professionals follow hygienic practice of cleaning and/or disinfecting the apparatus to prevent spread of infections.

METHODOLOGY:

This observational, cross-sectional analysis was conducted upon a total of 249 healthcare professionals (60 males and 189 females) at a tertiary care hospital using non-probability, convenience sampling. Data was collected from January 01, 2016 to March 31, 2016, using structured self-administered questionnaires after taking written informed consent. The data obtained was analyzed using SPSS v. 19.0 and Microsoft Excel 360.

RESULTS:

Among the total subjects enrolled in the study, 163 were medical students (studying in clinical years with ward assignment), 14 were house-officers, 23 were post-graduate trainees, 19 were consultants and 30 were nurses. The cleaning/disinfection practice of the healthcare professionals & medical students is tabulated below.

How often do health professionals clean/disinfect sphygmomanometer cuff?

Missing		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	61	24.5	70.9	70.9
	Once a Week	6	2.4	7.0	77.9
	Twice a Week	5	2.0	5.8	83.7
	Once a Month	11	4.4	12.8	96.5
	Twice a Month	3	1.2	3.5	100.0
	Total	86	34.5	100.0	

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How often do medical students clean/disinfect sphygmomanometer cuff?

Missing		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	119	47.8	73.0	73.0
	Once a Week	8	3.2	4.9	77.9
	Twice a Week	6	2.4	3.7	81.6
	Once a Month	18	7.2	11.0	92.6
	Twice a Month	12	4.8	7.4	100.0
	Total	163	65.5	100.0	

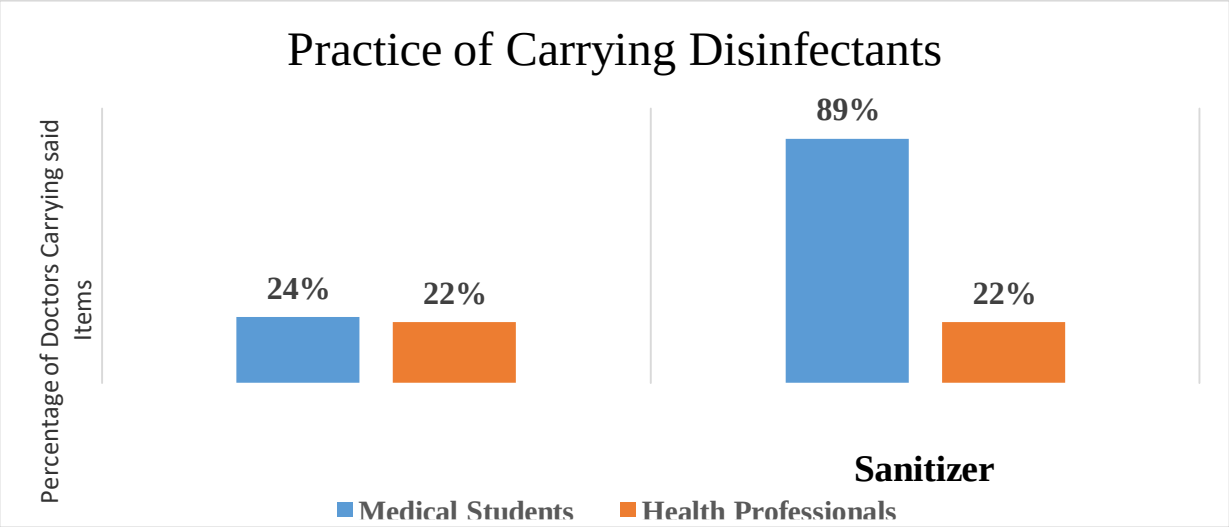
How often do medical students clean/disinfect stethoscope diaphragm?

Missing		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	97	39.0	59.5	59.5
	Once a Week	22	8.8	13.5	73.0
	Twice a Week	11	4.4	6.7	79.8
	Once a Month	24	9.6	14.7	94.5
	Twice a Month	9	3.6	5.5	100.0
	Total	163	65.5	100.0	

How often do medical students clean/disinfect stethoscope diaphragm?

Missing		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	97	39.0	59.5	59.5
	Once a Week	22	8.8	13.5	73.0
	Twice a Week	11	4.4	6.7	79.8
	Once a Month	24	9.6	14.7	94.5
	Twice a Month	9	3.6	5.5	100.0
	Total	163	65.5	100.0	

The most effective ways of cleaning the said apparatus is alcohol wipes and sanitizers. The practice of carrying such cleaners/disinfectors is graphically represented below.



DISCUSSION:

In 1972, **[3]** Gerken and colleagues from a British teaching hospital, showed that coagulase-positive staphylococci were isolated from 21% of the stethoscopes. In 1992, Breathnach and colleagues **[4]** demonstrated that most stethoscopes used by physicians were contaminated with staphylococci and speculated that they could serve as vectors of infection. More recently, Marinella and colleagues **[5]** showed that 40 randomly selected stethoscopes were colonized by potential pathogens. To the best of our knowledge, no large-scale studies with a large series have been published looking at the prevalence of bacterial contamination of stethoscopes in a hospital setting.

The results of this study demonstrated that the majority of stethoscopes, an almost universal tool of the medical and nursing community, at our institution were contaminated owing to the practice of non-cleaning/disinfecting. The results of this study also indicate an urgent need to alert and educate hospital staff about the potential health risks associated with use of BP cuffs, because many healthcare personnel appear to be unaware of these risks. The findings reported herein, in particular the link between contaminated BP cuffs and nosocomial infections; also strengthen the case for developing and implementing validated standard operating procedures for the use and maintenance of BP cuffs in all hospital units. Although we did not do serial testing, we suspect that contamination would be present within the apparatus and that, to be effective, decontamination would have to be performed after each application of the stethoscope. However, cleaning may be more important between certain high-risk patients.

We believe that poor cleaning of the apparatus can turn these tools into a vectors of infection. If left uncontrolled, this could cause important nosocomial outbreaks. The prevalence of antibiotic resistant nosocomial infections is increasing in an exponential manner. Whether or not the stethoscope or BP cuff plays a role as an actual source of infectious diseases is a question that needs to be further investigated. The limited number of published reports on this topic might encourage further studies in this area, particularly in closed units such as the neonatal intensive care and infectious diseases units, where the control of nosocomial infection is extremely important.

CONCLUSION:

After careful consideration, it can be concluded that healthcare professionals, despite being aware of the potential hazards of using un-sanitized and non-disinfected basic medical apparatus, do not pay much heed to the practice of sanitization and disinfection of even simple basic apparatus, such as the cuffs of sphygmomanometers and or the diaphragms of stethoscopes.

RECOMMENDATIONS

Based on the results and the eventual conclusions, it is recommended that healthcare professionals should adopt the practice of regularly cleaning and disinfecting the basic medical apparatus in their use,

via any of the processes, mentioned below.

For cleaning/disinfecting the cuff of sphygmomanometer:

1. Wipe with mild detergent and water solution (1:9 solution). Rinse with water.
2. Wipe with any enzymatic detergent, per manufacturer's instructions. Rinse with water.
3. Wipe with .5% bleach and water solution. Rinse with water.
4. Wipe with 70% isopropyl alcohol.
5. Launder with mild detergent in warm water, normal wash cycle. (Note: Remove bladder first. Cuff is compatible with 5 wash cycles).

For cleaning/disinfecting the stethoscope:

1. Remove the bladder from the cuff. Prepare any enzymatic detergent according to the manufacturer's instructions. Spray detergent solution liberally onto cuff and use a sterile brush to agitate the detergent solution over entire cuff surface for five minutes. Rinse continuously with distilled water for five minutes.
2. To disinfect, first follow the cleaning steps above, then spray cuff with 10% bleach solution until saturated, agitate with a sterile brush over entire cuff surface for five minutes. Rinse continuously with distilled water for five minutes. Wipe off excess water with sterile cloth and allow cuff to air dry.

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