IJIRR

International Journal of Information Research and Review
Vol. 2, Issue, 03, pp. 461-463, March, 2015

Research Article

HABITS OF STETHOSCOPE CLEANLINESS TO PREVENTNOSOCOMIAL INFECTIONS

Dr. Angshuman Jana

IIT campus, Khargapur; West Bengal India

ARTICLE INFO

Article History:
Received 28th December, 2014
Received in revised form
20th January, 2015
Accepted 26th February, 2015
Published online 31st March, 2015

Keywords:
Staphylococcusaureu,
Escherichiacoli,
Acinetobacterbaumanni.

ABSTRACT

Nosocomialin factions remain a significant hazard for hospital izedpatients. Stethoscopes because of their universal use by medical professionals can be a potential source of nosocomialin factions. This study was under taken to determine the stethoscope-cleaning practices among medical health providers, to show whether the stethoscope is a potential source of nosocomialin faction; and to compare the effectiveness of common antiseptics (i.e.70% isopropyl alcohol) in disinfecting stethoscopes. Health care providers were asked how often they clean their stethoscopes. Results show that only 4.5% of health care providers (3of66) cleaned their stethoscope each day and no one clean it between examining each patient. To find out the bacterial contamination of stethoscopes used by health-care staff. Swab samples were taken from the surface of the diaphragm of the stethoscopes used by health personnel and were inoculated on to bacteriological and mycological media. For identification of the microorganisms, conventional methods and Vitek2 (Biomérieux) were performed. We found bacterial and fungal contamination on 92 (76%) of the stethoscopes. 15out90 (16.3%) had potential pathogens including methicillin susceptible *Staphylococcusaureus* (5), methicillin resistance *Staphylococcusaureus* (4), *Escherichiacoli* (3), *Acinetobacterbaumannii, Acinetobacterhaemolyticus* and *Enter ococcus* spp. The statistical difference between the two groups in terms of pathogen and micro organ ismisolation was not determined ($p>0.05$). Although steth oscopesareuncritical medical devices, they could contain path ogenmicroorganisms and they migh tbeapotential source of hospital acquired infections. Thi scontamination can be Greatly reduced by cleansing with soap and water, 70% is opropylalcohol. Were commend the disinfection of stetho scopes regularly. The effect of disinfection of stethoscope on the growth of microorganism has been evaluated by ODD'S Ratio and it was found that cleanliness of stethoscope has significant effect in controlling growth of microorganism. This inference is further strengthened by using chi square statistic which proved that at $p<0.001$, the disinfection of stethoscope significantly reduced the growth of microorganism. The growth of individual microorganisms however, can be assessed using chi square statistic and significant effect of stethoscope cleanliness was attained. Paired t test was applied on the set of data to compare the mean effect of stethoscope cleanliness which was not significant in the present case ($p<0.001$ and <0.05).

Summary: This prospective surveillance has aims to identify stethoscope hygiene habits among hospital medical persons in a Tertiary care teaching hospitals in India. We collect swab from the surface of stethoscope diaphragm after completing the ward visiting end of the each day from the junior and senior resident doctors over first six months. On the next six months resident doctors are using in house stethoscope of the ITU pre disinfection with isopropyl alcohol in between in each patient by the nurse. The swab taken from the stethoscope showing growth of various pathogenic microorganisms. A total 63 junior residents are followed over one year.

INTRODUCTION

No socomial infection (NIs) is one of the major problem and huge burden over healthcare system affecting both developed and developing countries alike. Within India an another study showing HAI rate 8.03%. (Epidemiology of hospital, 2009) Furthermore, the monitoring of HCAIs remains a key indicator of quality and safety within care systems. (House of Commons Public Accounts Committee, 2009) In a previous study showing that 15-30% of all HCAIs could have been prevented had hospital staff undertaken simple improvements in hygiene. (Comptroller and Auditor General, 2000) To date, training and awareness campaigns have focused on the role of good hand hygiene. Previous studies have reported convincing evidence that improvements in hand hygiene reduce rates of HCAIs.

Corresponding author: Dr. Angshuman Jana,
IIT campus, Khargapur, West Bengal India.

(Allegranzi *et al.,* 2009) This has led to many countries financing initiatives at government level to implement nationwide campaigns for the education and implementation of hand hygiene programmes and setting national targets for the reduction in HCAIs. In India many training and awareness campaign have focused on the role of good hand hygine and implement nationwide campaigns for the education and hand hygineprogrammes and setting national targets for the reduction in HAIs. (Pittet *et al.,* 2000; O'Gradye *et al.,* 2002)

However, poor hand hygiene is not the sole means by which infections spread; hospital equipment can also pose an infection risk. Since the original finding of stethoscopes contaminated with staphylococci by Gerken et al. in 1972, there has been repeated evidence showing that stethoscopes often harbour bacteria and could potentially spread HCAIs. (Gerken *et al.,* 1972) Despite this, little attention has been given to this common piece of medical equipment within a clinical or educational setting. To combat this, daily cleaning of stethoscopes has been shown to reduce the number with bacterial contamination from >90% to <35%. Alcohol-based preparations and washing the stethoscope head with soap and water can both significantly reduce colonization and subsequent bacterial growth. (O'Grady *et al.,* 2002) However, it has been suggested that medical students may be deficient in their knowledge of this area and consequently fail to clean their stethoscopes regularly. Washing the stethoscope diaphragm with alcohol based preparation can significantly reduce colonization and subsequent bacterial growth. (Uneke *et al.,* 2008)

Medical personnel however, are deficient in their knowledge in this area and consequently clean their stethoscope regularly and in between examining each patient. The aim of the present study is to determine current stethoscope hygiene habits among medical personnelin an Indian setting and correlate this with a number of factors likely to influence nosocomial infection. Relation between nosocomial infection and organisms found in stethoscope were established and used further targeted intervention to improve cleanliness in the clinical environment.

MATERIALS AND METHODS

Study population

The study population consisted of junior resident in the hospital chosen due to their clinical exposure in the hospital environment. The study fulfilled ethical guidelines issued by the hospital ethical committee and we did not need to seek further independent ethical approval. The stethoscopes hared by all pers onnelin the department were not in cluded. Diaphragm of the stethoscopes were swabbed with sterile normal saline solution and immediately sent for culture using 3mlof Trypti case Soy Broth (TSB). All swabsinoculatedin theTrypti case Soy Broth (TSB), were immediatel yplaced on blood agarand Mac Conkey Agarplates and incubated at 37℃ for 24-48 hours. Another culture done over Sabourauddextros eagar (SDA) for 2-3 weeks to see the fungal growth. All growth was identified using standard biochemical techniques with conventional methods and Vitek 2 (Biomerieux). The methicillin resistance of *Staphylococcusaureus* was in vestigated by using 30ugce foxit in (Oxoid) disc according to CLSI standardization (Wayne, 2007) (Wayne, 2007).

A set of questionnaire were designed using Likert-scale questions, Junior residents were asked how often (on average) they cleaned their stethoscope while on clinical placement and their responses have been reported in Table 1.

Table 1.

Frequency of stethoscope cleaning	No (%)
Never	7 (10.6)
Once in a year	25(37.8)
Once in a month	23(34.8)
Once in a week	8(12.1)
Once in a day	3(4.54)
Between each patient	0(0)

Table 2. Microorganism isolated from stethoscopes of HCW

Microorganism	May 2012- Oct 2012 Number of patients(433)	Oct 2012- April 2012 Number of patients (416)
No growth	65 (15.0)	308 (74.0)
S. epidermidis	216 (49.8)	55 (13.2)
Bacillus spp.	51 (11.8)	17 (4.1)
Staphyloccus aureus	24 (5.5)	4 (0.96)
MRSA	9 (2.1)	3 (0.7)
Corynebacterium spp.	15 (3.5)	6(1.4)
E. coli	5 (1.1)	1 (0.2)
klebciella	3 (0.7)	0(0)
A. baumani	8 (1.8)	2(0.5)
Enterococcus	19 (4.4)	5 (1.2)
Candida spp.	9(2.1)	7 (1.7)
Aspergillus	7 (1.6)	3 (0.7)
Penicilium spp.	2 (0.5)	1 (0.2)

Paired *t* test results

P value and statistical significance:

The two-tailed P value equals 0.9494

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals 1.67

95% confidence interval of this difference: From -54.80 to 58.14

Intermediate values used in calculations:

t = 0.0650

df = 11

standard error of difference = 25.656

Table 3. microorganism isolated from stethoscope

Sample collection	With growth	Without growth
121	92	29

Statistical analyses

Statistical analyses were performed using Pearson's Chi square test, ODD ratio, p value and results were significant at $p< 0.05$ and $p<0.001$. RESULTS: Our study was done in a teaching hospital, where every day in average 3-4 Junior residents were present to cover a 25 bedded ITU. According to the previous questionnaire anyone disinfect their stethoscope on examining each patient. We collect swab sample at the end of the day from the stethoscope of each resident doctor. After six month, total four hundred thirty three samples were collected, which were proceeding further microbiologically. Out of total sample 155 showing no growth and the rest of were showing growth.Thereafter, we have changed our policy and involve the nurses who disinfect the stethoscope, diaphragm by isopropyl alcohol in each time after using it. After another six month a total 418 samples were collected, out of which 328 showing no growth.

DISCUSSION

In one of the previous study showing that 100% of stethoscopes sample from the health care workers found contaminated with CONS and other bacteria. After cleaning with normal saline, isopropyl alcohol were shown to significant reduction of colonization. (Marinella *et al.,* 1997). Our study involve participation of both junior residents and nurses and proof that After cleaning with isopropyl alcohol, bacterial colony counts were shown to be significantly reduced. Our study used a different methodology to show that stethoscopes can be a possible source of pathogenic organismslike E.coli, Klebsiella sp., Acinetobacter sp., Staphylococcus aureus, Enterococcus.

Though these organisms are in very few in number <5% and we were not able to provein our study that stethoscopes directly result in infection to patients but are also commonly foundin some device associated infection in same institute studied by same author. It can be reduced to <1% by use of disinfectant like 70% isopropyl alcohol before examining each patients. (Francis Marie *et al.,* 2000). The other risk likewise, would be the possible dissemination of multi-resistant organisms that may be man if estinal ater out break as has been seen in hospital end emicstraced to the use of contaminated ther mometers, blood pressure cuffsor gloves along with stethoscope. (Saunders *et al.,* 2013)

Conclusion

Stethoscopes are areservoir of infectiousagents that might cause no socomial infections. Although, the fact that even 4-5 minutes contact with patients skin have been shown to transfer organisms to the stethoscopes indicate that strategies to decrease contamination of stethoscopes should be developed. Most of the infection control education is working well for Handwashingandbarrierprotectionbut teaching in other areas may be lacking as illustrated here with stethoscope cleanliness. Although most patients might not be especially prone to infection after contact with contaminated stethoscope in general ward but thosewithopenwoundslikepatientswithburns, like ITU as in our study place where most of the patient are in high risk are also prone to get infection from stethoscope.This study is offered to raise awareness and highlight the issue in important areas of stethoscope cleanliness and stimulate further research into the role of stethoscope as possible transmission of hospital acquired infection and transmission of pathogenic microorganisms and drug resistance. The limitation of our study involves there latively small number of stethoscopes cultured, making us unable to use statistical means to conclude if there is assign if I cant difference in the stethoscope-disinfecting practices of the different medical personnelin our institution. None of the medical personnel surveyed clean their stethoscopes after seeing a patient oreven daily. The residents seem to practiced is infection of their stethoscopes more frequently than the other groups surveyed. Alcohol was the preferred agent used by medical personnel for cleansing their stethoscopes.

REFERENCES

All egranzi, B. and Pittet, D. 2009. Role ofhandhygiene in healthcare- associated infection prevention. *J. Hosp. Infect.,* 73: 305e 315.

Comptroller and Auditor General, National Audit Office. The management and control of hospital acquired infections in acute NHSTrustsin England. London: The Stationery Office; 2000.

Epidemiology of hospital acquired urinary tract infections in a medical college hospital in Goa Umesh S. Kamat, Agnelo Fereirra, Dilip Amonkar, , and Manoj S. Kulkarni. *Indian J Urol.,* 2009 Jan-Mar; 25(1): 76–80.

Francis Marie, C. 2000. Africa-Purino, M.D., Emmanuel Edwin R. Dy, M.D. and Remedios F. Coronel, M. D. Stethoscopes: A Potential Source of Nosocomial Infections* *Phil. J. Microbiol. Infect Dis.*, 29(2):9-13

Gerke, A., Cavanagh, S. and Winner, HI. 1972. Infection hazard from stethoscopes in hospital. Lancet, 299:1214e1215.

House of Commons Public Accounts Committee. Reducing health- care associatedinfection in hospitals in England. Fifty-second report of Session 2008 e 09. London:The Stationary Office; 2009.

Marinella, M.A., Pierson, C. and Chenolieth, C. 1997. The stethoscope: apotentialsourceofnosocomialinfection? *Arch. Intern. Med.,* 157:786-790.

O'Grady, N.P., Alexander, M., Dellinger, E.P., Gerberding, J.L., Heard, S.O., Maki, D.G., Masur, H., McCormick, R.D., Mermel, L.A., Pearson, M.L., Raad, I.I., Randolph, A. and Weinstein, R.A. 2002. Guidelines for the prevention of intravascular catheter-related infections. Centers for Disease Control and Prevention. MMWR Recomm Rep 51 (RR-10): 1-29.

Pittet, D., Hugonnet, S., Harbarth, S., Mourouga, P., Sauvan, V., Touveneau, S. and Perneger, T.V. 2000. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Infection Control Programme. Lancet 356(9238): 1307-1312.

Saunders, C. Hryhorskyj, L. and Skinner. J. 2013. Factors influencing stethoscope cleanliness amongclinical medical students. *Journal of Hospital Infection,* 84. 242-244

Uneke, C.J., Ogbonna, A., Oyibo, P.G. and Ekuma, U.. Bacteriological assessment of stethoscopes used by medical students in Nigeria: implications for nosocomial infection control. *World Health Popul.,* 2008; 10:53e61.

Way ne, P.A. 2007. Clinical Laboratory Standarts Institute. Performance standarts for anti microbial disk susceptibility tests. Approved Standarad M2-A7, 11thedition. USA.

****