

# Stethoscope disinfection



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The problem could have been described better with more background information about the problem of intimidated stethoscopes, but the idea did make sense and the solution is convenient for practitioners to use. There was an abstract present that was structured and identified methods, results and conclusion of the study. The abstract contained enough information to encourage further review of the article. There was no introduction, only short blurb called background that stated the use of alcohol pads are effective in reducing bacteria counts on stethoscopes but have poor availability, lots of waste and are used infrequently.

The study was designed to show how easy and convenient it is to use the alcohol based foam to clean a stethoscope.

It would have been appropriate and offered more support to the research study to have an introduction describing the problem of bacterial contamination on stethoscopes. The study design was not identified but it did give very specific details on the procedures followed to collect the culture samples. Review of Literature The review of literature was poor. The authors do insinuate there were other studies but do not specifically reference them in this paper.

Only one reference was found under the heading, an often neglected source of bacteria. The authors cited an earlier study by a member of their research team conducted in 2007 but was unpublished.

This study showed rubbing stethoscopes with alcohol pads versus rubbing with alcohol based foam was comparable in reducing bacterial counts. There are 19 references listed but none cited within the work. Methodology No

methodology was identified in this research paper. The main attributes of this study include; randomization, cause and effect, specific variables, numbers and statistical reporting.

All of these indicate a quantitative methodology.

The subtype is experimental which establishes the cause-effect legislations among a group of variables that make up a study. An independent variable was manipulated to determine the effects on the dependent variable. In this case the effects of the alcohol based foam on reducing the bacterial counts on stethoscopes. Data Analysis Data was collected by randomly assigning ID numbers to 200 agar plates and placed in a box and drawn out two at a time to give to the practitioner.

The practitioner then imprinted their stethoscope head on one of the agar plates and handed it back to the researcher who labeled it prepares.

The practitioners then performed hand washing with the alcohol based foam and multitudinously used the foam to clean the diaphragm of their stethoscope. They repeated the stethoscope imprinting on the agar plates after use of the alcohol based foam and handed the agar plate back to researcher who then labeled it post wash. All agar plates were incubated for 48 hours at 35 degrees Celsius. Validation of the bacterial types was performed by the supervisor Of the hospital laboratory who randomly sampled the agar plates. The researchers noted that he had 20 years of experience examining cultures.

It was agreed upon before study if any of the counts varied by seven a second investigator would need to intervene. There were no discrepancies. Prior to the actual study a pilot study was performed to estimate the average and variance of the bacterial counts in a control group of stethoscopes primarily to establish if the act of imprinting the stethoscope itself would change the bacterial counts found. There was no statistical change. The study did identify the statistics used including; linear regression analysis, a paired t test, random effects model and a signed rank test in order to confirm the validity of the study.

The use of the statistics helps to identify this research as quantitative research. The authors state they used the following statistical measures; mean, median, 95% confidence interval, and P values to report the results. This article had good external and internal validity. Internal validity was established by use of the control or pilot study, the use of supervisor of the hospital laboratory to validate cultures, and the varied participants including doctors, nurses, and medical students.

External Validity indicated that this study could be carried out across other settings such as outpatient settings and other hospitals.

Conclusion The findings of this study does support the hypothesis that alcohol-based mom can be used effectively to reduce bacterial counts on stethoscopes when simultaneously assonating hands. The conclusion was very short and included only a few sentences re-stating the hypothesis. The researchers do state the limitations of the study. Limitations included lack of control over the hand washing techniques and acknowledgment that the

practitioners may have changed their normal hand washing procedures because they were in a study. The researchers also indicate further research and study is needed.

A. Evidence This study does provide adequate evidence of reduction of bacterial elimination after use of the alcohol based foam. The introduction needed to identify and give more background information on the problem of bacterial colonization on stethoscopes. There is poor evidence of the researchers literature review prior to the study. There is some lack of evidence as to when the practitioners provided the cultures. The method section of the paper indicates the researchers recruited participants from a grand rounds program.

It does not indicate when the participants were asked to take give cultures.

Were the cultures provided at the grand rounds program or were he practitioners given notice and cultures performed at a later date? If given at a later date the results may have been altered due to the practitioners' knowledge of the research project. The data analysis section was very strong and included a great deal of statistical data to substantiate the hypothesis. The conclusion was poor and only re-stated the hypothesis but did include insight from the researchers of the limitations of the study. AAA Ethical Issues This study was approved by the hospital institutional review board.

Upon review of this article no ethical concerns surfaced. There were no patients involved, only practitioners allowing their stethoscopes to be cultured before and then after the alcohol based foam was applied. The researchers may have needed informed consent from the practitioners but

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this is not documented in the research study. There are strict guidelines in place with every research study established to protect human rights. All participants in a study have the right to be informed of the study process, any risks and can withdraw from the study at any time.

The Emergent Code, the Belmont Report and the Declaration of Helsinki are the established guidelines that outline appropriate conduct for ethical research.

Unfortunately, these guidelines were established because of past atrocities committed against people, such as the human testing that took place during the Hitler reign in Germany (Houses, 2008, p. 54-73). A. 5 Type of research  
No methodology was identified in this research paper. The article contains attributes that identify its methodology as quantitative with a subtype of experimental.

Quantitative research studies generate a hypothesis that is to be proved or disproved.

Does the use of alcohol based foam reduce bacterial contamination on stethoscopes'? This is a black and white study, either it goes affect the outcome or it does not. The cultures were assigned randomly and the results were reported with statistical analysis. These factors support quantitative as the research methodology. The subtype is experimental.

The main attribute of the experiment subtype is cause and effect. Cultures were taken before and after the treatment with the foam.

Measurements were taken before the study started, the intervention was applied and measurements were taken again. There are many different research methods and subtypes. For example, qualitative research studies are the collection of non-numeric data like words and pictures. It is the study of the whole group, not specific variables.

The researcher develops a theory based on the data that is collected. This study may be able to be looked at from an entirely different perspective. One subtype of qualitative research methodology is phenomenology.

This is a descriptive study of how individuals experience a phenomenon.

Perhaps the entire group of health care workers could be interviewed to determine what their perceptions are regarding the disinfection of stethoscopes. Researchers could then look for a commonality across the individuals. The study would need to be expanded to not only give evidence that bacterial contamination of stethoscopes exist and that disinfection works to reduce this but also may address why health workers do not disinfect (Houses, 2008, p. 395-426; 473-511 ) Bal. Problem Statement.

Nurses are not disinfecting their stethoscopes despite growing evidence of bacterial colonization causing health care associated infections (HCAI). All hospital equipment is a potential vector. Stethoscopes are at the top of the list because of frequency of use, and the likelihood of contact with broken, injured or surgically repaired skin. Stethoscope disinfection is one of the most neglected procedures in medical care (Nuke, Endure, Unsnap, Nab, Grownup, parasol-plainer, 2014). Statistical evidence indicates that

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monoclonal infections contributed to the deaths of 99, 000 people in 2002 and this number continues to increase.

In 20 hospitalizing are complicated by HCl (Elect, Crop, McCoy, Healer, 2009). Nurses identify hand washing as infection prevention but do not fully recognize the role that the stethoscope plays in patient to patient bacterial transmission. Studies show that pathogenic bacteria such as Nonmetallic assistant staphylococcus erasures (MRS.) can and do colonize on stethoscopes.

The MRS. incident rate is 31. 8 per 1 00, 000 patients and the mortality rate 6. 3 per 100, 000. Elderly patient over the age of 65 are the highest risk group (Elect, et 2009). 2 Matrix (Please see Attachment) BE Annotated Bibliography Grecian, S.

, Mammalian, O. , & Acquire, C. (2008) The Effect of an Educational Intervention on the Contamination Rates of Stethoscopes and on the Knowledge, Attitudes, and Practices Regarding the Stethoscope Use of Healthcare Providers in a Tertiary Hospital. *Philippine Journal of Microbiology ND Infectious Disease*, 37(2), 20-33. The study alms to determine if there are potential pathogens present on stethoscopes and to determine what stethoscope care is currently practiced and any reasons for non-compliance with recommendations.

The study found post educational intervention the contamination rate of the stethoscopes dropped from 68.



9% to 27.6%. Practitioners reports high workloads, lack of awareness of problem as the barriers to non-adherence of stethoscope care. Hyde, O.

(2012). Cross-sectional study of frequency and factors associated with stethoscope cleaning among medical practitioner in Pakistan. *Eastern Mediterranean Health Journal*, 18(7), 707-711. This article studies the correlation between cleaning stethoscopes and bacterial colonization. 08 medical students and physicians participated in the study in 2 separate teaching hospitals in Pakistan.

37.7% of participants reported never cleaning their stethoscope. 64.4% of practitioners did report cleaning with an alcohol swab after contact with any type of body fluid.

The study did find an increase in cleaning practices among practitioners that had been educated on bacterial contamination but further education is needed regarding disinfection of stethoscopes. Elect, P. , Crop, E. , McCoy, G. , & Healer, N. A.

(2009). Ethanol-based cleanser versus spillover alcohol to decontaminate stethoscopes.

*American Journal of Infection Control*, 241-243. In this article the Authors studied the difference between using Ethanol based cleaners (BBC) versus Spillover alcohol to clean stethoscopes. The sample size was 99 stethoscopes, 49 were treated with the ethanol based cleanser and 50 with the spillover alcohol pads.

The group was comprised Of doctors, nurses, residents and medical students. All stethoscopes cultures were positive before cleaning. Results indicated that OTOH methods were equally effective in reducing bacterial counts. The most important part was the actual cleaning.

Barriers identified were the location of the cleaning supplies, disposal of debris, and the time it took to do it. Limiting, Y. , Schneider, A, Toyshop, C. , Rennin, G. , Gayety-Gagger, A. , Coherence, J.

, & Pipette, D. (2014). Contamination of stethoscopes and physicians' hands after a physical examination. Mayo Clinic Proceedings, 89(3), 291-299.

The objective of this article is to compare the contamination level of physicians' hands and stethoscopes and explore the likelihood of cross contamination. 3 inpatients at a Swiss university teaching hospital were asked to participate in the study.

The physician wore a glove on one hand and went engulfed on the other. After physical examination of a patient, 4 separate sections of both of the physicians' hands and 2 sections of the stethoscope were cultured. The study found that the physicians' fingertips were the most contaminated followed closely by the stethoscopes even after just one examination Merlin, M.

, Wong, M. , Prior, p. , Ryan, K. , Marques-Baptists, A, Permit, R. , & Fallow, T. (2009).

Prevalence of nonmetallic-resistant Staphylococcus erasures on the touchstones of emergency medical services providers.

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Pre-hospital Emergency Care, 13(1), 71-74. This study seeks to determine the prevalence of nonmetallic-resistant staphylococcus erasures (MRS.) on the stethoscopes of emergency personnel pre-hospitalizing. 50 stethoscopes from emergency personnel were swabbed and cultured as they arrived at the emergency department.

1 in 3 were found to be colonized with the MRS. bacteria and 32% of emergency personnel could not remember the last time they had cleaned their stethoscope. Schroeder, A, Schroeder, M. , & Dynamic, F. (2009). What's growing on your stethoscope? And what you can do about it).

The Journal of Family Practice, 58(8), 404-409. This study investigates whether the use of an alcohol based foam can be used simultaneously to disinfect hands and stethoscopes. A total of 184 cultures were taken from 92 stethoscopes. The cultures were taken before and then after the alcohol based foam was applied. The study found a bacterial count of 28. 4 on the prepares cultures and a bacterial count of 3.

2 on the post wash cultures. The finding suggest that the alcohol based foam is effective in reducing bacterial count and can be used simultaneously when disinfecting hands. Nuke, C. Endure, C. , Unsnap, K.

, Nab, R. , Group, C. , & Parasol-Plainer, N. (2014). Stethoscope disinfection campaign in a Nigerian teaching hospital: results of a before-and-after study. The Journal of Infection in Developing Countries, 8(01 86-93.

The purpose of the study was to provide scientific data that could help develop educational programs and guidelines for proper care and

disinfection of stethoscopes in an effort to prevent health care infection (HCI). 202 health care workers consisting of 39 doctors and 263 nurses were given an educational series on stethoscope care.

Prior to the workshop none of the doctors and 39. 2% Of nurses regularly disinfected their stethoscopes. After the intervention 89 of the participants stethoscopes were again cultured and only 20.

2% were found to be contaminated, this was a big reduction from pre - educational contamination rate of 78. 5%. Nuke, C. , Gabon, A. , Bobby, & Non, C. (2010).

Bacterial contamination of stethoscopes used by health workers: public health implications. *Journal of Infection in Developing Countries*, 4(7), 436-441. The study was designed to examine the transmission of bacteria by stethoscopes used by health care workers. 7 stethoscopes were cultured, 79% were found to be contaminated by bacteria.

Bacterial isolates included staphylococcus urea's (54%), pseudonymous organisms (19%), intercourse fiscals (14%) and Escherichia coli (13%). All stethoscopes that had never been cleaned had higher levels of contamination than those cleaned with alcohol or soap and water. The study also found contamination of stethoscopes were lower in practitioners that washed their hands frequently. Whetting, A, Whittle, G.

, Wesson, D. , Thomas, C. , & Brett, S. (2009).

Bacterial contamination of stethoscopes on the intensive care nit.

Anesthesia, 646), 620-624. Assessed how often ICC bedside stethoscopes were cleaned and the presence of bacterial contamination. 24 ICC staff and 22 non-CHIC staff participated in the study which included visiting 10 physicians, 9 physiotherapists and 3 medical students.

All of the Non-ICC staff had their own personal stethoscopes. All ICC staff claimed to have cleaned the ICC bedside stethoscopes at least once during shift. Of the 10 visiting physicians only 3 cleaned daily or after each use. 67% of personal stethoscopes and 95% of the bedside ICC stethoscopes were found to be contaminated with bacteria.

Wilkins, R.

, Restorer, R. , Bourne, K. , & Darer, N. (2007). Contamination level of stethoscopes used by physicians and physician assistants.

Journal of Physician Assistant Education, 18(2), 41-43. This study evaluates the degree of contamination on stethoscopes belonging to doctors and physician's assistants (PA) in an outpatient setting. Cultures were taken from 61 stethoscopes and were separated into minimal, moderate and severe contamination. All stethoscopes were found to be contaminated with physician stethoscopes being in the moderate to severe range.

There was no preference in reported frequency of cleaning and 25% of entire group reported never cleaning stethoscope. Study theorizes that the physicians either clean their stethoscopes less frequently than PA's or they come in contact with more bacteria. Bob. Evidence The research studies that were reviewed provide strong evidence of the need for practice change

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among nurses. In one study 184 cultures were taken from 92 different stethoscopes. The percentage of nurses represented in this study was 39%.

Impressions of the stethoscopes were taken before and then after the use of the ethyl based foam. (Schroeder, Schroeder,

Dynamic, 2009). A supervisor from the hospital laboratory examined a random sample of these cultures. Results from the prepares sample had a mean bacterial count of 28. 4 and the post wash sample had a mean bacterial count of 3. 2.

The statistical data clearly indicates the importance of disinfection (Schroeder, et al. , 2009). In a second study, 1 07 stethoscopes, approximately 32% of those belonging to nurses were cultured and 78. 5 % were found to have bacterial colonization.

The analysis indicated that the higher levels of contamination was related to an increased amount of time in between disinfection.

The highest amount of colonization was present on the stethoscopes that had never been cleaned and the least amount was found on the stethoscopes that had been disinfected with in the last week. Interestingly, they also found a correlation between the amount of bacterial contamination on stethoscopes related to how often the practitioners' washed their hands (Nuke, Gabon, Bobby, non, 2010). In a third pilot study, health care workers were interviewed on current knowledge, practices, and attitudes surrounding stethoscope disinfection. All of the health care workers stethoscopes' were cultured at that time.

Several trainings and workshops were implemented to provide information on stethoscope care and maintenance and 202 participants were asked to complete a post educational evaluation.

(Nuke, et al. , 2014). 163 of the 202 were nurses. The results interview indicated none of the doctors disinfected prior to patient care but 39.

2 % of nurses did. Before the educational training contamination was 78. 5 After the educational training contamination decreased to 20. 2% (Nuke, et al.

, 2014). BBC. Tools Instruments are used to measure the variables of the study.

They need o be reliable and consistent in order for the researcher and the reader to have a high level of confidence in the study. In all but one article, a questionnaire was the type of instrument that was used to collect data. A questionnaire is a type of structured survey that is usually self-administered (Houses, 2008, p.

241-292). The questions are all identical for all the participants and can be open or closed questions. All of the research studies in this paper are quantitative studies and follow a closed question format. There is a fixed number of responses and the participants much choose only from the answers provided.

The data collected is easy for the researcher to analyze and questions are easy for participants' to answer (Houses, 2008, p. 241-292).

Bad. How Tools affect results Even though, the bulk of the research studies used questionnaires to collect data, the questions varied from study to study. For example, the goal of one study was to measure the number of years in practice, gender, frequency of stethoscope cleaning and current profession. In a separate study the questionnaire assessed the knowledge, attitude and practices surrounding stethoscopes. There are pros and cons to this type data collection.

The pros include; cost effectiveness, anonymity, ease of application, works well with large groups and can be widely distributed.

The cons include; lack of personalization, bias, low return rates, literacy barriers and time constraints (Houses, 2008, p. 241-292). Tools direct the data collection and the focus of the study. BE. Summary The criteria used to identify articles for review included documentation of review by the Institutional Review Board stating the study was ethically approved. The second criteria included evidence that supported the topic under review.

In this case, identification of the problem of stethoscope intimidation and the importance of stethoscope disinfection for patient safety. The articles reviewed contained information on the presence or colonization of bacteria on stethoscopes, both before and after disinfection, the comparison of different types of disinfects, cross contamination and the development of education programs to teach proper care and sanitation of stethoscopes. There were few differences in these studies, all of the studies looked at the bacterial contamination of stethoscopes and only differentiated in the researchers focus and the methodology type of study.



The population and sample sizes for these studies were all similar and most contained less than 100 participants and included physicians, physician's assistants, nurses, and medical students. Sixty percent of the studies focused only on the degree of contamination present on stethoscopes after use.

The stethoscopes were found to be contaminated or colonized greater than 67% of the time in all the studies and were a result of poor disinfection practices. Two of the studies, by Schroeder (2009) and Elect (2009), measured the bacterial contamination on stethoscopes' before and after a treatment of either alcohol or ethanol based cleanser.

The results indicated that cleaning with either agent was effective in significantly reducing bacterial counts and that the real importance was compliance with disinfection “ Practitioners need to view the stethoscope as an extension Of their hands and should be cleaned as frequently as they wash their hands (Elect, et al. , 2009).

” Two additional studies by Nuke (2014), and Grecian (2008) measured the bacterial contamination before and after educational trainings. The study by Nuke (2014) indicated that none of the doctors and 39. 2% of the nurse cleaned their stethoscopes.

The same study showed having education available directly related to how often practitioners reported cleaning their stethoscopes.

The pre-educational contamination rate was 78.5% and the post contamination rate dropped to 20.2%. The study by Grecian (2008) showed similar results, the pre-educational contamination rate was 68.

9% and the post educational rate of 27.6 showing a positive correlation in education decreasing bacterial contamination rates of stethoscopes. In summary, all ten articles clearly show that health professionals including nurses are not disinfecting their stethoscopes as often as they should.

Monoclonal infections are on the rise, hand washing and disinfection of stethoscopes are important interventions that protect patients' from infection. 85. Nursing Strategy Nurses hold a very important place in patient care.

Perhaps, one of the most important roles is that of advocate. A nurse's main responsibility is to keep patients safe. The disinfection of stethoscopes falls under patient safety. The research is strong and shows the efficacy of disinfection of stethoscopes in between every patient, every time. According to the research there are two main barriers, the time it takes to clean the stethoscopes and lack of knowledge.

The best intervention is education.

The challenge is to get buy in, as nurses are already extremely busy. All hospitals would benefit from collecting random cultures of nursing stethoscopes periodically. Those results could be shared visually for educational purposes by showing nurses the pictures of agar plates that had bacterial growth. On site workshops could be assembled to provide

information on stethoscope disinfection and infection control. A random sample of stethoscopes should also be collected after the educational intervention and the results shared with the nursing staff.

These interventions will increase compliance with stethoscope disinfection and decrease patient infections improving outcomes for the patient and hospital.

BE Theoretical Models. Theoretical Framework is the foundation for the parameters of a research study. A researcher begins with an idea or question and develops a theory of what that answer might be. If a study does not have a good foundation it will lack direction.

Research studies often have poor funding and little time and need focus to keep researchers on track. Theoretical frameworks are crucial to the focus and credibility of the study.