

Stethoscopes and Infection Control

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As healthcare professionals, we have many tools of the trade to help us care for our patients. All the tools of the trade have direct or indirect contact with pathogens that are spreadable by contact or airborne. According to the Centers for Disease Control (CDC), “1.7 million American patients are infected with Hospital Acquired Infections (HAI’s) every year, resulting in 99,000 deaths and an estimated \$20 billion in healthcare costs” (CDC, 2008). Most infections occur via contact. Unfortunately, there are multiple reasons as to why cleaning of medical equipment is not done effectively. Such times that give rise to the error are that of being too busy, heavy patient load, carelessness, ineffective cleansing product, ineffective contact time it takes for cleansing product to properly cleanse. In regards to infection control, stethoscopes are regarded as a common vector for transmission of viruses and bacteria. Isn't cleaning after each use and/or using stethoscope covers a great way to kill pathogens as well as decrease risk of transmission? If we wash our hands before and after patient use, shouldn't we cleanse our stethoscope too? In particular, infection control departments in hospitals, infectious disease doctors, and clinics will be interested in this article as it provides research that pertains to their discipline.

Anyone who uses a stethoscope to assess and care for their patients should have interest in this study because they should want to be proactive in knowing what is best practice. Patient population for this topic would be the entire patient population. The patients that are most at risk for infection would be pediatrics, those who are immuno-compromised, diabetics, and patients with multiple co-morbidities. The assumed outcome for this topic is for a zero percent rate of bacteria/viruses to be colonized on stethoscopes. This can only be done if meticulous stethoscope cleaning is practiced before and after patient interaction.

Type and Quantity of Research Available

The type of research that is available to guide nursing interventions intended can be of both conceptual and theoretical frameworks. Theoretical framework can be used to review other researcher's work to base opinions on what our hypothesis should be for our own study and research. We can form our own opinions to formulate our own hypothesis that is completely different from what has been studied and base it off our nursing judgment and practice and use a more conceptual framework. Using the two frameworks together will allow for a more comprehensive study of our own using views of old and new knowledge.

Research Articles

Our first article, "The Stethoscope in the Emergency Department: A Vector of Infection" states that the dual purpose of the study is to determine if microorganisms on stethoscopes can be isolated, and if the degree of bacteria can be reduced using different cleaning methods. The dependent variables are 122 stethoscopes, and the independent variables are the three antiseptic agents (ethyl alcohol, isopropyl alcohol, and antiseptic soap). The data for this article is quantitative using randomly controlled trials. To prevent bias, staff from an emergency department was told that the evaluation was to help design a new scope. Three days a week for three months, ten scopes were collected from different staff members and cultured. Eight separate microorganisms were found including bacteria that cause diphtheria, anthrax, and endocarditis, just to name a few. Independently, forty-nine membranes were randomly selected to establish the effects of three separate antiseptic agents. Each agent was applied for ten seconds with sterile cotton gauze, allowed to air dry for ten seconds, and then cultured. As expected, isopropyl alcohol and ethyl alcohol were significantly more effective than soap. Out of the two alcohols used, isopropyl was the better performer for reducing colonies, and it is less expensive

than ethyl alcohol. Those who have a basic concept of microorganisms probably would not be shocked by the findings of this study. What may be surprising was a poll of stethoscope cleaning habits from forty-three of the same clinicians in this trial. Thirteen admitted that they have never cleaned their scope, others stated they clean their stethoscope monthly or weekly. “Whether or not the stethoscope plays a role as an actual source of infectious diseases is a question that needs to be further investigated” (Nunez et al.). It seems to be clear from this article that stethoscopes do harbor organisms, and may pose a risk to our patients. For disinfection to be effective, we need to clean common use patient items, including our scopes, after every use.

Our second article, “Contamination of Gowns, Gloves, and Stethoscopes with Vancomycin-Resistant Enterococci” directly measures the rate of items contaminated with Vancomycin-Resistant Enterococci (VRE), during routine patient examinations. This quantitative study was done over a two-year period at a large, academic hospital that included forty-nine patients known to test positive for VRE. The scopes were cultured after examination, and re-cultured after cleaning with a 70% isopropyl alcohol wipe. The stethoscopes are the dependent variable, and the disinfectant is the independent variable. Again, this article supports the practice of wiping with alcohol to decontaminate items used in patient care. Thirty-one percent tested positive for VRE after use and only two percent after disinfection. This study also raises concerns that “the risk of contamination identified by surveillance and clinical cases reinforces concerns that patients not known to be colonized with VRE could serve as sources for dissemination” CDC, guidelines call for the use of dedicated instruments for VRE-positive patients. Perhaps, further studies need to investigate why those guidelines are not followed (Zachary et al.).

Our third and final article, “Evaluation of Stethoscopes as Vectors of *Clostridium difficile* and Methicillin-Resistant *Staphylococcus aureus*”, is a quantitative study that was conducted in a laboratory, and during simulated examinations on thirty-five *Clostridium difficile* (C-diff), and fifty-seven Methicillin-Resistant (MRSA), carriers. The dependent variables are the stethoscopes and the independent variables are the disinfectant agents. First, MRSA and C-diff were applied directly onto disinfected diaphragms of stethoscopes. Second, MRSA was applied to processed pigskin, and the C-diff was placed on the forearm of a human volunteer. After ten seconds of application, cultures were obtained. Scopes directly transferred nearly 100% of C-diff spores, where the MRSA spores were fewer than the original inoculum. The data on the indirect transfer shows much less contamination. The article finishes by saying that “our data suggest that direct contact with friction is sufficient to remove more than 90% of C-diff spores from stethoscope diaphragms. Pads or gauze containing alcohol removed 100% of MRSA”. It does note that there were limitations by only studying one strain, and only the diaphragms of stethoscopes (Vajravelu et al.). Healthcare Associated Infections (HAI’s) are a concern for both patients’ health and the direct impact of increased healthcare cost. We as practitioners should ask ourselves, “Are we using the best practice to keep our patient’s healthy?”

Systemic Review Article

In a systematic review called, “Stethoscope hygiene: A best practice review of the literature” by Shaw and Cooper(2014), looks at the results from twenty-seven different studies and their findings regarding stethoscope cleanliness. In this review, researchers found that the “evidence indicated that stethoscopes harbor pathogenic microorganisms, specifically on the bells and diaphragms and ear pieces”(Shaw & Cooper, 2014, p. 31). In addition, Shaw and Cooper (2014) found that 76% of healthcare workers knew that stethoscopes were carriers of

microorganisms but only 24% of those workers actually used disinfectant. Also, in Shaw and Cooper (2014), found that in the evidence that if ethanol based cleaners or isopropyl alcohol wipes are used, it would kill 94% of all bacteria. Currently, there are no guidelines set forth by the CDC or World Health Organization (WHO) regarding the cleaning of healthcare worker's stethoscopes. It was not until about 15 years ago that healthcare workers and scientist started to scrutinize how dirty stethoscope are, so the number of systematic reviews and meta-analysis articles are practically nonexistent.

Recommended Nursing Interventions

In 2014, WHO posted evidence-based recommendations for stethoscope disinfection. Three interventions were suggested for disinfection including, utilizing isopropyl alcohol wipes, alcohol based gel or foams, and ethanol based cleaners after each patient interaction (Longtin et al, 2014). This includes the earpieces, tubing, bell, and diaphragm. This study was a structured prospective study representing level II evidence. Further recommendations in this article are made to improve adherence of health care workers to clean equipment and include maximizing access to disinfection materials and line of sight reminder signs (Longtin et al, 2014). Another intervention suggested by the CDC is hospital provided patient-dedicated stethoscopes in patient's room with VRE (Zachary et al, 2001). CDC recommendations represent level VII evidence from reports of authorities and expert committees. Patient dedicated stethoscopes are also recommended for patients with C-difficile or multi-drug-resistant organisms as described in the article "Evaluation of Stethoscopes as Vectors of Clostridium difficile and Methicillin-Resistant Staphylococcus aureus (Vajravelu, Guerrero, Jury, & Donskey, 2012). This article represents level III evidence of a well-designed controlled trial. Finally, in "Stethoscope Hygiene: A best practice review of the literature", Shaw & Cooper, 2014, recommend to stop use

of decorative fabric coverings of stethoscope tubing and instilling the use of disposable single use covers. This review represents level I evidence.

The evidence indicates that after patient use, stethoscope earpieces, tubing, bell, and diaphragm should be disinfected with isopropyl alcohol wipes. This is also the recommendation of stethoscope manufacturer, Littmann (Alspach, 2014). In review of a local hospital policy regarding stethoscope disinfectant, no specific infection control policy addressed stethoscopes specifically. However, stethoscopes fell under multi-use patient equipment (Sentara, 2014). A “Time for Disinfection” chart was specific to disinfect stethoscopes with alcohol wipes with the contact time of “until dry” (Sentara, 2013). This policy clearly states that all patient care equipment shall be cleaned between each patient and PRN to prevent transmission of organisms (Sentara, 2014). There was no specific mention of using disposable stethoscope or covers in isolation patient rooms in the policy and procedure manuals for Infection Control. Reminder signs and alcohol wipe accessibility is not addressed either. The hospital’s infection control policy is consistent with evidence-based practice regarding disinfection but lacks in the use of disposable scopes and covers as well as reducing barriers for health care workers to disinfect after every patient.

Conclusion

After researching information based on stethoscope infections, it is very evident that cleansing of the stethoscope should be performed after each use. Not only is this necessary to keep your patients safe, it is necessary to keep yourself safe. In the three articles researched, using alcohol based cleansers were much more effective at reducing bacteria than using soap and water. Additional research should be completed to make it known that this is a very serious issue, with hopes that the CDC or WHO will come up with policies regarding the cleansing of stethoscopes, just like there are for hand hygiene.

References

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Honor Code Pledge:

I have neither given nor received unauthorized aid on this examination (or other material turned in for credit) nor do have reason to believe that anyone else has.

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Date: April 10, 2015

(Honor code copied from NURS 490W syllybus)

Grading Criteria

Requirement	Possible Points	Faculty Comments	Points Awarded
<p>Introduction</p> <ul style="list-style-type: none"> • Clearly introduce/identify the topic • Identify the types of organizations or nursing units that would be interested in topic and able to apply EBP recommendations related to this topic • Identify the relevant patient population for this topic 	5		
<p>Identify the usual patient outcomes related to this topic.</p>	5		
<p>Identify the type and quantity of research available to guide nursing interventions intended to accomplish the outcomes identified.</p>	5		
<p>Synthesize at least 3 research articles related to the topic. Discuss individual articles separately, identifying the following:</p> <ul style="list-style-type: none"> • Purpose/Research Question/Hypothesis • Identify variables in the study. If appropriate, label them as independent or dependent. State how each variable is measured. • Sample size • Design: Identify the type of design the researchers used. • Findings: Briefly state in your own words the findings of the study. If multiple research questions are present in the study, state the findings for each. • Implications: Briefly state in your own words what the researchers indicated future 	15		

<p>studies should focus on, what new areas should be researched, or how the findings impact clinical practice.</p> <p><u>Synthesize</u> the findings of all three (or more) articles into a summary of research on your topic.</p>			
<p>Identify and summarize systematic review articles related to the topic.</p> <ul style="list-style-type: none"> • Include a summary of any meta-analysis articles that are related to the topic. • Identify and summarize any practice guidelines related to the topic area. 	15		
<p>Identify specific recommended nursing interventions discussed in the evidenced based literature, systematic review or practice guidelines.</p> <ul style="list-style-type: none"> • Identify the level of evidence for each recommendation. 	10		
<p>For each of the major recommendations identified, discuss whether there is sufficient evidence to warrant a change to policies and procedures according to what is current in Policy and Procedure manuals of where you are employed. Identify which policies or procedures are inconsistent with the recommended nursing interventions.</p>	15		
<p>Conclusion: should be brief but thoughtful.</p> <ul style="list-style-type: none"> • As part of the conclusion, summarize the overall evidence base for this topic. • Identify the areas most in need of additional systematic research. 	10		
<p>Correct grammar, spelling and punctuation.</p>	10		
<p>Correct use of APA format</p>	10		

Total Points	100		
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