



ORIGINAL-RESEARCH-ARTICLE



Improving Ear Exams via a Focused Pathology-based Lecture

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Abstract

Introduction: Medical professionals require a thorough understanding of the appearance of common ear pathologies. However, the otologic examination may not be effectively taught throughout medical school. We hypothesize that providers at all levels will benefit from a focused lecture on recognizing otopathologies. **Methods:** Medical students, residents, and attendings within Cooper University Hospital watched a lecture discussing common otopathologies. A pre- and post-test were given to and the results were compared using a paired t-test. A 1-month post-test was offered to assess for retention of knowledge. **Results:** Across all participants, the mean pre-test score was 7.39 +/- 2.21 and mean post-test score was 11.30 +/- 2.52 (p<0.001). Among medical students, mean pre-test score was 7.22 +/- 1.93 and mean post-test score was 10.33 +/- 2.70 (p<0.001). Among residents, mean pre-test score was 6.96 +/- 2.07 and mean post test score was 11.96 +/- 2.39 (p<0.001). Among attending physicians, mean pre-test score was 10.75 +/- 1.50 and mean post-test score was 11.75 +/- 0.96 (p=0.092). A difference score was also calculated for each group using a one-way ANOVA. For medical students, the mean difference score was 3.11 +/- 2.93, for residents it was 5.00 +/- 2.09, and for attending physicians it was 1.00 +/- 0.82 (p=0.004). **Discussion:** Based upon our results, a focused, pathology-based lecture was sufficient in increasing short-term ability to diagnose common otopathologies. Our intervention was more useful for medical students and residents. Perhaps the results for attending physicians were not statistically significant due to their higher baseline scores. Long-term retention results were inconclusive due to lack of follow-up. Further studies should evaluate the long-term efficacy, as it may have the ability to improve clinicians' diagnostic skills.

Keywords: "Otolaryngology," "Otoscope," "Lecture," "Education, Medical," "Simulation"

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1 | INTRODUCTION

The otologic examination is a difficult aspect of the physical that may not be effectively taught throughout medical school, as evidenced by the fact that only 5% of medical students are confident in

their ability to perform this skill after the end of their third year of education⁽¹⁾. Prior studies have consistently shown that self-rated confidence in otoscopic skills is poor - as low as 2.76 on a 1-10-point scale - while others have suggested that students are only briefly or inadequately exposed to

otologic disease throughout their training (2). Another study identified that both times to teach during direct patient care and personal teaching skills themselves as barriers to otoscopy proficiency (3). This study also found an overwhelming agreement among physician instructors that a standardized otoscopy curriculum would enable them to be more effective at teaching. Given that otolaryngologic disorders comprise as high as 50% of case presentations in certain populations, such as pediatrics, this is an area of interest that deserves more focus (1). Misdiagnosis of common otologic pathologies often leads to unnecessary treatments, such as prescription of antibiotics, which can contribute to the rising problem of bacterial resistance. This is especially true in the case of otopathologies considering that children are most often prescribed antibiotics for acute otitis media (3). Whether or not this issue stems solely from a lack of confidence, lack of exposure, or lack of knowledge remains an interesting area of study.

Simulation-based teaching tools are a validated method of medical education, especially for areas that are not conducive to practicing or learning on real patients. Previous studies that used otoscopic simulators or high-resolution images of ear pathologies have been successful in increasing diagnostic accuracy in various populations. A recent study that used a pre-intervention survey consisting of several images of otopathologies, followed by a video and didactic lecture on correct otoscopy techniques and multiple otoscopic images of common pathologies, showed a 13% increase in correct diagnosis in the immediate post-intervention survey (4). Long term retention has been more difficult to assess due to the study design's susceptibility to attrition. However, it appears that this skill is likely to deteriorate if not frequently used, as evidenced by a decrease in 3-month retention from residents in pediatrics, family medicine and otolaryngology (5). Regardless of outcome, this teaching tool was able to significantly increase participants' confidence in otoscopic skills (1).

In order to provide better care to patients, medical students and physicians require a thorough understanding of the appearance of common ear pathologies. With this in mind, our study hopes to replicate the results of prior research, while also shining light on ways to improve the efficacy of the teaching intervention, better evaluate the effects on long-term retention of skills, and gain insight on the populations that this intervention will provide the most benefit for. We hypothesize that providers at all levels will benefit from a lecture on recognizing otopathologies as

demonstrated by an increase from pre-lecture scores on a questionnaire.

2 | MATERIALS AND METHODS

The CUH IRB approved this research as IRB exempt. Eligible participants at Cooper University Hospital (CUH) and Cooper Medical School by Rowan University (CMSRU) were sent emails with the opportunity to participate in our study. Eligible participants included attending physicians, fellows, and residents in all departments at CUH and all medical students enrolled at CMSRU. The email contained instructions to follow a link to a pre-lecture questionnaire consisting of demographic, specialty, and educational level data as well as 15 images and multiple-choice answers for the participants to select the diagnosis from. Participants created a unique identifier code to match pre- and post-test attempts together. After completing the pre-lecture questionnaire, participants were instructed to watch a lecture demonstrating how to recognize different otopathology delivered by Donald Solomon, MD, a board-certified otolaryngologist at CUH. Following the lecture, participants were instructed to take a post-lecture questionnaire that had identical questions to the initial questionnaire. The pre-recorded lecture and the survey can be found at the following link:

<https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DDuaoW6h5LT8&data=05%7C01%7Carnold3740studentsrowan.mail.onmicrosoft.com%7C317b3a1938214aac5bf08db8fae91d6%7Ceda8e9bc72cf449ca4e6725e6c6bd0d8%7C0%7C0%7C638261752184218736%7CUnknown%7CTWFpbGZsb3d8eyJWJoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6IklhaWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=TGJz10IWuld83xN5o7vRZ%2FPYLyRBP4BD2afA fzKMI%3D&reserved=0>

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3 | RESULTS

Figure 1 demonstrates that across all participants, the mean pre-test score was 7.39 +/- 2.21 and mean post-test score was 11.30 +/- 2.52 ($p < 0.001$). Among medical students, mean pre-test score was 7.22 +/- 1.93 and mean post-test score was 10.33 +/- 2.70 ($p < 0.001$). Among residents, mean pre-test score was 6.96 +/- 2.07 and mean post test score was 11.96 +/- 2.39 ($p < 0.001$). Among attending physicians, mean pre-test score was 10.75 +/- 1.50 and mean post-test score was 11.75 +/- 0.96 ($p = 0.092$). Results were also compared between residents of different specialties. For pediatric residents, mean pre-test score was 7.60 +/- 1.84 and mean post-test score was 12.50 +/- 1.78 ($p < 0.001$). For IM residents, mean pre-test score was 6.50 +/- 2.18 and mean post-test score was 11.57 +/- 2.74 ($p < 0.001$). A difference score was also calculated for each group, which measured the difference between each individual participant pre- and post-test score, and compared using a one-way ANOVA. For medical students, the mean difference score was 3.11 +/- 2.93, for residents it was 5.00 +/- 2.09, and for attending physicians it was 1.00 +/- 0.82 ($p = 0.004$). When compared between residents of different specialties, mean difference score for pediatric residents was 4.90 +/- 2.13 and for IM residents was 5.07 +/- 2.13 ($p = 0.848$).

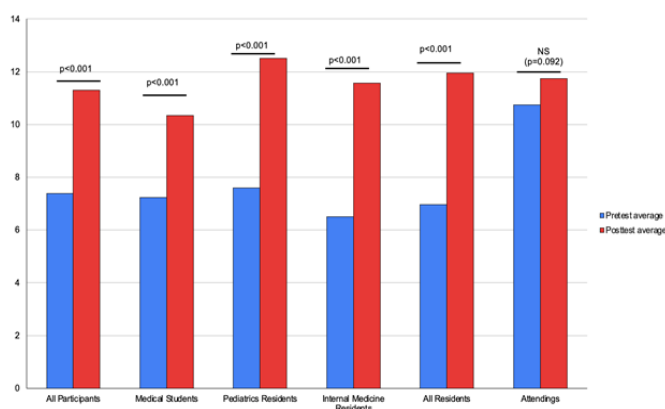


Figure 1: Comparison of average Pre-test to Post-test scores among all participants and stratified by education level and specialty.

4 | DISCUSSION

Prior studies have demonstrated the utility of otoscopic images in improving the diagnostic skills of medical practitioners⁽²⁾. Other studies have shown that focused, pre-recorded lectures are also efficacious in improving physicians' diagnostic capabilities, however these studies did not include medical students or residents of different specialties⁽⁵⁾. Our study appears to align with the results of previous findings, as there was a statistically significant increase in post-test score compared to pre-test scores across all participants after watching the pathology-based, pre-recorded lecture. We found that our intervention seemed to have similar efficacy across residents of different specialties in addition to medical students. This supports our original hypothesis and shows this type of teaching may be a useful method to incorporate into the curriculum of these populations.

When each sub-group was compared separately, the intervention was shown to be less useful for attending physicians, regardless of specialty. One possible explanation for this is that the attending physicians have more clinical experience, and thus increased baseline knowledge of common otopathologies which led to higher pre-test scores, leaving little room for our intervention to improve their diagnostic skills.

One major limitation of our study was the lack of follow-up for our one-month post-test. Given the low response rate for this portion, we were unable to accurately assess the utility of our lecture in increasing long-term retention of these diagnostic skills. This appeared to be a similar issue in other prior publications, so perhaps future studies should focus on ways to improve response rates in order to gain insights on the full potential of this type of intervention⁽⁴⁾. This intervention remains useful because it is a recording that individuals could watch on their own to refresh their skills.

5 | CONCLUSION

Based upon our results, it appears that a focused, pathology-based lecture was sufficient in increasing short-term ability to accurately diagnose common diseases of the ear and tympanic membrane. Our

intervention seemed to be more useful for medical students and residents. Perhaps the results for attending physicians were not statistically significant due to their higher baseline pre-test scores, which may be explained by more frequent clinical exposure throughout their training. We are unable to make any conclusions regarding long-term retention rates due to lack of participant follow-up.

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