



Original Article

The effect of student-run vision screenings on ophthalmic education and recognition of visual impairment

Justin Chin^{1*}, Patrick J. O'Toole¹, Jun H. Lin¹, Julie M. Lavalliere¹, Narcisse Amine¹, Amanda Milam¹, Grace Huang¹, Mahnoor Asghar¹, Junsanto Bahri², Sonu Sahni^{3,4}

¹Touro College of Osteopathic Medicine-Harlem, NY

²Department of Basic Sciences, Touro College of Osteopathic Medicine, Harlem, NY

³Department of Primary Care, Touro College of Osteopathic Medicine, Harlem, NY

⁴NYIT College of Osteopathic Medicine, Department of Clinical Specialties Old Westbury, NY

Corresponding author and reprints: Justin Chin. Touro College of Osteopathic Medicine 230 West 125th Street, New York, NY 10027. Phone: (646) 9814747. Fax: (212) 678-1748

Email: jchin2@student.touro.edu

Accepted for publication: 16 Aug 2018

Abstract

Background: For many in the United States, standard health insurance does not cover eye care, leading to lapses in care and exacerbations of pre-existing conditions. Touro College of Osteopathic Medicine (TouroCOM) recognizes the importance of ocular health and offers the opportunity to engage the community through student-run vision screenings. This study aims to assess the effect of medical student-run vision screenings in supplementing pre-clinical education and to review health fair data on common vision pathologies seen in Harlem, New York.

Methods: Pre- and post-surveys were administered to medical student volunteers to assess their comfort in performing a basic vision screening. Training was given in regards to screening protocols and applied at health fairs.

Results: Of all medical students 18 (90%) indicated discomfort in performing a basic vision screening when solely relying on their preclinical coursework. In comparison, after a training session and use during a health fair, all of the participants indicated that they were comfortable with performing a vision screening. Among the health fair participants, 116 (60%) met referral criteria for further testing or follow-up care. All the participants had some degree of refractive error, with 7 (6%) having concomitant color vision abnormality and 11 (9%) with macular abnormalities.

Conclusion: Osteopathic medical students are better equipped to perform basic vision screenings and recognize visual disease with additional training and practice at health fairs. This engagement allows for early clinical experience, osteopathic outreach, and interprofessionalism. Furthermore, this provides an opportunity for community members to receive information that may guide future health decisions.

Keywords: Medical Student; Ophthalmic Education; Osteopathic Physicians; Vision Disorders; Vision Screening

Cite this article as: Chin J, O'Toole PJ, Lin JH, Lavalliere JM, Amine N, Milam A, Huang G, Asghar M, Bahri J, Sahni S. The effect of student-run vision screenings on ophthalmic education and recognition of visual impairment. *SDH*. 2018;4(3):117-123. DOI: <https://doi.org/10.22037/sdh.v4i3.22316>

Introduction

With an aging population, undetected ocular diseases pose significant long-term health

detriments in the United States. In just New York state, greater than half of the population have some form of degenerative

eye disease (1). For many, however, eye care falls outside of standard medical insurance coverage, leading to lapses in care and exacerbation of pre-existing conditions.

For ethnic minorities, additional circumstances such as lack of knowledge, limited resources, and language can further facilitate barriers to obtaining ocular health care (2). Community vision screening programs provide an opportunity for participants to receive information that may guide their health decisions and priorities (3). Various studies have noted the utility and value of medical student-run vision screenings, primarily in homogenous, rural communities (4-6). Many of these programs were created due to perceived needs in the community and augmented the original ophthalmic curriculum in their respective medical school.

The Harlem community, however, is a heterogeneous population that mimics the metropolitan nature of New York City, with several large enclaves hailing from the Caribbean, South America, and Africa (7). Limited research exists on the effects of medical student-run community vision screenings in an urban environment, especially in heterogenous, immigrant communities. Similarly, little is known about the effect of such programs on medical student comfort and familiarity in performing an ophthalmic exam due to deemphasis in many allopathic and osteopathic medical school curriculums (8-10).

This study aimed to present a model for medical student-run vision screenings in an urban population and analyze the three-year results of said program and to assess the effect of additional training programs in advancing ophthalmic education for osteopathic medical students.

Methods

Due to the dual nature of this study's aims, the key elements of the research design will cover both aspects. In developing medical student-run vision screenings in an urban

community, free vision screenings were held at the Touro College of Osteopathic Medicine (located in Harlem-New York) biannually in conjunction with the *Fall into Health* and *Spring into Health* fairs from September 2015 to November 2017. Health fairs lasted 3 hours, with each eye exam requiring approximately 10 minutes from intake to referral. Congruent with Touro College's Health Sciences Institutional Review Board for the Protection of Human Subjects (HSIRB #1728E), eligibility criteria for selection and inclusion in the study encompassed: signed consent upon entering the health fair, age greater than 18, ability to communicate and follow instructions, and completion of the entire screening. Participants had the option to receive the screening and were not incentivized to undergo a vision screening. Recruitment in Harlem occurred 1 month prior to the health fair and included, but was not limited to, general advertisements in local media and a canvassing team on the day of the health fair.

All protocols and procedures have previously been reviewed by a licensed ophthalmologist and medical advisory committee prior to implementation. Screenings were performed by first and second year osteopathic medical student volunteers from the Touro College of Osteopathic Medicine in conjunction with a Touro student organization, OOPTIC (Otolaryngology and Ophthalmology Touro Interest Club). All medical student volunteers received a 1-hour training session by OOPTIC executive board members and were overseen by a licensed medical physician. Pre- and post-training surveys given to assess comfort with performing a vision screening (Table 1).

Exposure, data collection, and follow-up occurred during the vision screening process on the day of the health fair. Demographic information was asked such as age, sex, and race, as well as a 10-question survey (Table 2). Past history of eye disease, family history, surgical history, and other pertinent questions were also

elicited to further guide discussion of ocular health and the need for further medical Snellen chart in each eye separately with use of habitual eyeglasses. Macular degeneration and color abnormalities were assessed using Amsler grids and Ishihara plates respectively. Exam findings abnormalities were defined as (1) 2 or more positive answers to risk factor questions, such as no past history of ocular exams or a

follow-up. Distance visual acuity for central vision was tested using a 20 feet positive history of eye diseases; (2) visual acuity that tested greater than 20/40; (3) greater than 1 incorrect answer in the Amsler grid or Ishihara plate testing, in which referral for further work-up at a local hospital was recommended.

Table 1. Pre- and Post- Vision Screening Training Questions

Questions
How would you rate your knowledge of how to perform a vision screening?
<input type="checkbox"/> Very Unknowledgeable
<input type="checkbox"/> Somewhat Unknowledgeable
<input type="checkbox"/> Neither Unknowledgeable or Knowledgeable
<input type="checkbox"/> Somewhat Knowledgeable
<input type="checkbox"/> Very Knowledgeable
How would you rate your comfort in performing a vision screening?
<input type="checkbox"/> Very Uncomfortable
<input type="checkbox"/> Somewhat Uncomfortable
<input type="checkbox"/> Neither Uncomfortable or Comfortable
<input type="checkbox"/> Somewhat Comfortable
<input type="checkbox"/> Very Comfortable
How would you rate your ability to interact with a screening participant?
<input type="checkbox"/> Very Uncomfortable
<input type="checkbox"/> Somewhat Uncomfortable
<input type="checkbox"/> Neither Uncomfortable or Comfortable
<input type="checkbox"/> Somewhat Comfortable
<input type="checkbox"/> Very Comfortable
How likely would you be able to perform a vision screening?
<input type="checkbox"/> Very Unlikely
<input type="checkbox"/> Somewhat Unlikely
<input type="checkbox"/> Neither unlikely or likely
<input type="checkbox"/> Somewhat Likely
<input type="checkbox"/> Very Likely

Table 2. Vision Screening Discussion Questions

Questions
1. When was your last eye/ocular health visit?
2. Do you wear any corrective eyewear?
3. Do you currently have any eye problems?
4. Have you ever been diagnosed with an eye problem?
5. Do you have a family history of eye diseases?
6. Have you ever had eye surgery
7. Do you have diabetes? If so, how long?
8. Do you have hypertension? If so, how long?
9. Any hobbies/jobs that are hazardous to eyes?

Data availability for the past 3 years and the need for assessment of vision screenings relative to the United States Department of Health and Human Services' Healthy People 2020 program collectively determined the study size (11). Missing data was addressed at the time of collection by designating a volunteer to view all fields to ensure that all parts were done correctly.

Results

20 osteopathic medical student volunteers participated in the training: 5 second year students and 15 first year students. Using a pre-training survey, 18 of medical students (90%) indicated discomfort in performing a basic vision screening when solely relying on their preclinical coursework. In comparison, after a training session and use during a health fair, 20 (100%) of medical student volunteers indicated that they were comfortable with performing a vision screening on post-survey (utilizing the same questions asked in the pre-survey). In the study period, 193 health fair participants were screened, with 116 (60%) that met referral criteria and were instructed for definitive care/follow-up with an ophthalmologist. Of the total screened, 54 participants (27%) indicated the use of some kind of corrective devices such as glasses or contact lenses. In the population, all 116 had some degree of refraction error with 7 (6%) having a concurrent color vision abnormality and 11 (9%) having a concurrent abnormality on Amsler grid

testing for macular degeneration. Demographic data for participants are detailed in Table 3.

Discussion

When relying solely on preclinical knowledge and what is taught in the ophthalmology section of medical school, medical students overwhelmingly exhibit discomfort and unease in performing a vision screening as seen in the pre-training surveys. Many medical schools do not have an extensive ocular/ophthalmology curriculum, instead relying solely on coverage either in head, eyes, ear, nose, throat (HEENT) in a physical diagnosis/clinical systems class or during clinical rotations (10, 12). Research has shown that relying on such singular instances to serve as the sole background for clinical or community service endeavors does not result in high confidence nor likelihood of quality performance. Furthermore, studies of the cognitive load and spiral curriculum theories also support the need and value of additional opportunities for subject exposure (13, 14). Post-training survey results indicate that such endeavors are useful in solidifying and reinforcing skills outside of an examination atmosphere as medical students indicated that they were more comfortable in performing the screening compared to if they never received the screening.

Table 3. Demographic Information

	Screened	Referred for follow-up care
Number	193	116
Mean age (SD)	55.9 (15.45)	61.1 (13.73)
Median age	57	63
Gender	N (%)	N (%)
Male	109 (56%)	60 (52%)
Female	84 (44%)	56 (48%)
Race	N (%)	N (%)
White	8 (4%)	8 (7%)
Black	134 (70%)	91 (78%)
Hispanic	35 (18%)	16 (14%)
Other/Not Given	16 (8%)	1 (1%)

In the vision screenings that were performed, refractive errors were the most common eye disease noted, which parallels statewide data (1). There were no significant differences between the race or gender in distribution of eye pathologies, with demographics roughly approximating the racial distribution in Harlem. As evidenced in these screenings, visual impairment and disease are common in the Harlem community, which can be further extrapolated to the greater area of Manhattan. Despite the close proximity to 3 medical schools, high prevalence of ocular diseases in underserved, immigrant communities of Harlem suggests that greater outreach and networking needs to be done. Through health fair screening and referrals, medical student-run vision screenings aim to provide the underserved and uninsured population with improved access to a seemingly complicated health care system in an effort to improve vision outcomes and quality of life. 60% of health fair participants required follow-up for eye care or evaluation, which underscores the burden of undetected eye disease in the Harlem community.

Several barriers also exist in continuity of care when analyzing the Harlem community. From a socioeconomic standpoint, many of the participants anecdotally indicated that they were newly immigrated, that English was their second language, and/or that they did not have medical/eye insurance which is similar to other studies (6, 15-17). In several instances, medical interpreters were required as participants spoke other languages such as Spanish, French, and others. As evidenced in the Hoffberger Program, Rhode Island Health Program, and University of Rochester's UR Well Eye Care Program, increased barriers to health care result in decreased likelihood of continued/follow-up care (4-6). Due to limited funding and time-based resources, the Touro-Harlem vision screening program required participants to undertake the responsibility of making referral

appointments to an outside clinic/ophthalmologist. While utilizing a similar strategy of other vision screening programs, the burden of follow-up care shifts to the participant. In particular, the unequal spatial distribution of low-cost ophthalmologic resources and the high population density of Manhattan may adversely affect the patient perception of accessibility to care and result in noncompliance to referral recommendations. In essence, a major limitation of this vision screening and study is the lack of longitudinal follow-up to better qualify and quantify its efficacy in effecting changes in a patient's ocular health.

Sources of discrepancy and error may exist in the administration and implementation of the vision screening as it is conducted entirely by first and second year osteopathic medical students. Despite the benefits of student-run vision screenings in enhancing ophthalmic clinical training and providing care to underserved communities, the minimal time allotted for exposure and practice in examination may lead to false-positives or false-negatives. The predictive value of vision screening has been widely explored, however its strength lies in specialized health professionals (18). Future studies and next steps may include further refinement of screening protocols, increasing support and training for medical student volunteers in vision screenings, and providing follow-up care for health care participants.

Despite the limitations, this study is important in the fact that it highlighted the role that osteopathic medical students can have in disease detection and promoting better health care outcomes. Other studies have shown the impact that osteopathic medical students can have in health fairs and community health, ranging from smoking cessation education to general wellness (19). The effects of health fairs on allopathic medical students and other health professions have been well documented,

but limited studies exist on osteopathic medical students (20-22). With increasing numbers of osteopathic medical students, it is important to discuss the role of community based programs, such as student-run vision screenings, may have on a profession whose tenets acknowledge that “rational treatment is based upon an understanding of the basic principles of body unity, self-regulation, and the interrelationship of structure and function” (23). Osteopathic medical students can serve as an invaluable resource for the American health care system in terms of manpower and community based preventative care.

With early detection, many ocular diseases can be effectively treated, thus avoiding costly care in the future and/or limitations in quality of life. Vision screenings allow for this early detection and help to inform patients of their options for care. Especially in underserved or marginalized communities, both medical students and community members benefit from vision screenings. Medical students are afforded more opportunities in practicing ophthalmology while interacting with their local communities and community members are given the chance to become better informed about their ocular health. The Touro vision screenings utilize these ideas to serve the Harlem community. Despite the limitations and possibilities of errors, the use of trained screeners may increase the number and proportion of individuals receiving eye care who may not originally have had the motivation or knowledge to seek it out.

Conflict of interest

Authors declare no conflict of interests.

Acknowledgment

The authors would like to acknowledge the Harlem community health fair participants and numerous medical student volunteer of the Touro College of Medicine in Harlem, NY that have made these vision screenings possible.

References

1. Institute NE. Prevalence of Adult Vision Impairment and Age Related Eye Disease by State. *The National Institute of Health* 2016.
2. Gower EW, Silverman E, Cassard SD, Williams SK, Baldonado K, Friedman DS. Barriers to attending an eye examination after vision screening referral within a vulnerable population. *J Health Care Poor Underserved*. 2013;24(3):1042-52.
3. Eifrig DE, Cunningham RD, Aitken PA, Records RE, Barber JC, Gittinger JW Jr. Teaching ophthalmology in medical schools. *Arch Ophthalmol*. 1990;108(10):1378-9.
4. MacLean K, Hindman HB. UR Well Eye Care: a model for medical student ophthalmology education and service in the community. *Clin Ophthalmol*. 2014; 8: 2397–2401.
5. Quigley HA, Park CK, Tracey PA, Pollack IP. Community screening for eye disease by laypersons: the Hoffberger program. *Am J Ophthalmol*. 2002;133(3):386-392.
6. Cheung NC, Greenberg PB, Anderson KL, Feller ER. Effectiveness of a medical student-organized community vision screening initiative. *Med Health R I*. 2010;93(8):239, 242-233.
7. Burden A. Community District Needs. *New York Department of City Planning*. 2012;1:210-243.
8. Higginbotham EJ, Lippa L. Assessing the status of ophthalmic education 100 years after the flexner report. *Arch Ophthalmol*. 2010;128(12):1600-1.
9. Jacobs DS. Teaching doctors about the eye: trends in the education of medical students and primary care residents. *Surv Ophthalmol*. 1998;42(4):383-9.
10. Shah M, Knoch D, Waxman E. The state of ophthalmology medical student education in the United States and Canada, 2012 through 2013. *Ophthalmology*. 2014;121(6):1160-3.
11. American Optometric A. Healthy eyes Healthy People(R) 2020. *Optometry*. 2011;82(3):175-180.
12. Ting DS, Sim SS, Yau CW, Rosman M, Aw AT, San Yeo IY. Ophthalmology simulation for undergraduate and postgraduate clinical education. *Int J Ophthalmol*. 2016; 9(6): 920–924.
13. Harden RM. What is a spiral curriculum? *Med Teach*. 1999;21(2):141-3.
14. Y Young JQ, Van Merriënboer J, Durning S, Ten Cate O. Cognitive Load Theory: implications for medical education: AMEE Guide No. 86. *Med Teach*. 2014;36(5):371-84.
15. Owsley C, McGwin G, Scilley K, Girkin CA, Phillips JM, Searcey K. Perceived barriers to care and attitudes about vision and eye care: focus groups with older African Americans and eye care providers. *Invest Ophthalmol Vis Sci*. 2006;47(7):2797-802.
16. Alexander Jr RL, Miller NA, Cotch MF, Janiszewski R. Factors That Influence the Receipt of Eye Care. *Am J Health Behav*. 2008; 32(5): 547–556.

17. Ammary-Risch N, Kwon HT, Scarbrough W, Higginbotham E, Heath-Watson S. Minority primary care physicians' knowledge, attitudes, and practices on eye health and preferred sources of information. *J Natl Med Assoc.* 2009;101(12):1247-1253.
18. Ivers RQ, Optom B, Macaskill P, Cumming RG, Mitchell P. Sensitivity and specificity of tests to detect eye disease in an older population. *Ophthalmology.* 2001;108(5):968-975.
19. Capozzi B, Chez A, Carpenter T, et al. Osteopathic Medical Student Administered Smoking Cessation Counseling is an Effective Tool. *N Am J Med Sci.* 2016;8(4):187-190.
20. Mohammed D, Turner K, Funk K. Pharmacy student involvement in student-run free clinics in the United States. *Curr Pharm Teach Learn.* 2018;10(1):41-46.
21. Schutte T, Tichelaar J, Dekker RS, van Agtmael MA, de Vries TP, Richir MC. Learning in student-run clinics: a systematic review. *Med Educ.* 2015;49(3):249-263.
22. Sick B, Zhang L, Weber-Main AM. Changes in Health Professional Students' Attitudes Toward the Underserved: Impact of Extended Participation in an Interprofessional Student-Run Free Clinic. *J Allied Health.* 2017;46(4):213-219.
23. American Association of Osteopathic Medicine. Tenets of Osteopathic Medicine. Available from: <http://www.osteopathic.org/inside-aoa/about/leadership/Pages/tenets-of-osteopathic-medicine.aspx>. Accessed 2018.