

# Effectiveness of a Medical Student-Organized Community Vision Screening Initiative

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**Undetected eye diseases and visual loss** are significant problems in the United States (US). Collected data indicate that as many as 14 million Americans (6.4%) aged 12 years or older and 3.3 million Americans (2.8%) aged 40 years or older are visually impaired.<sup>1,2</sup> Rhode Island (RI) has one of the highest rates of visual impairment in those 40 years or older at 3.3%.<sup>3</sup> Because visual impairment increases with age, estimates are projected to double by 2020 as the US population ages.<sup>2</sup>

Common etiologies of visual impairment include refractive errors in younger persons and cataracts, macular degeneration, diabetic retinopathy and glaucoma in older persons. Since many conditions causing visual impairment are amenable to treatment, vision screenings are an important tool for detecting individuals at risk. However, in order for screening programs to be successful, referral to and follow-up for appropriate eye care are essential.

Herein we present the one-year results of a community-based free vision screening program in Providence, RI, with particular attention to follow-up rates and the barriers to further eye care. Our hypothesis was that trained, non-physician screeners could identify undetected visual problems and enhance referral for eye care.

## METHODS

This study was approved by the Rhode Island Hospital (RIH) Institutional Review Board. Free vision screenings were held at the Rhode Island Free Clinic (RIFC), twice a month, from January 2008 to January 2009. Screenings were performed by volunteer medical students from the Warren Alpert Medical School of Brown University and college students from Brown University. All volunteers initially received a 5-hour training session by an ophthalmologist to perform vision screenings and were given detailed instructions by the study investigators (NCC, PGB, KLA) about the study protocol. A designated medical stu-

dent was assigned to each screening and continued to oversee and provide feedback to all volunteers as necessary to ensure consistency of screening technique.

Participants were receiving medical care at RIFC and were referred for screening by medical personnel at the clinic or by patient request. Participants were 18 years or older, uninsured and residents of RI. Participants were asked for information about their age, race and level of education. We used a validated questionnaire of eight risk factors for eye disease, adapted from the Hoffberger Program for the Prevention of Eye Disease,<sup>4</sup> including information about age, family history of glaucoma, personal diagnoses of glaucoma or diabetes, past medical history of prescription eye drops use or previous eye surgeries and date of last eye exam. (Table 1) Distance visual acuity was tested using a 10 ft Snellen chart in each eye separately with habitual eyeglasses. Pinhole correction was performed with distance visual acuity worse than 10 out of 15 in either eye. Near visual acuity was tested using a 14 inch acuity card with habitual glasses. Macular disease was tested in each eye separately using an Amsler grid. Extraocular muscles were tested using a confrontation H pattern. Visual fields were tested in each eye separately using confrontation testing.

Referral for further eye examination to the RIH ophthalmology clinic was recommended if any of the following criteria were met: (1) two or more positive answers to risk factor questions; (2) worse than 10 out of 15 distance acuity despite pinhole improvement or worse than 20 out of 40 near acuity; (3) any abnormalities such as distortions, blind spots or irregularities with the Amsler grid; (4) any deviation with movements of eyes in the H pattern; and (5) any abnormalities with visual fields. Referred participants were given the phone number, directions, map and parking information to the RIH ophthalmology clinic. Referred participants were also instructed to call the RIH ophthalmology clinic to make an appointment as soon as possible. In addition, a referral

form on behalf of the participant was faxed to the RIH ophthalmology clinic. Upon receipt of the referral form, the RIH ophthalmology clinic attempted to contact the participant to make an appointment. Referred participants were given information and instructions on how to sign up for the Community Free Services program at RIH in order to receive free or low cost care at the RIH ophthalmology clinic, depending on income.

Telephone interviews were conducted 2 to 4 months after the vision screening for all referred participants, who were asked if they had completed their appointment at the RIH ophthalmology clinic. Participants who had completed their appointments were not asked any further questions. Participants who failed to complete appointments were asked to state their primary reason for failure to pursue care. A total of five attempts were made to contact participants to inquire about follow-up status.

Data were recorded on a Microsoft Excel file and evaluated using chi-squared and imputed regression analysis. For referred subjects who were unavailable for inquiry, regression imputation was used to estimate the probability that they attended a follow-up visit. Probabilities were generated using logistic regression

Table 1. Screening Questionnaire

1. Are you over the age of 65?
2. Was your last eye exam greater than 1 year ago?
3. Are you receiving regular eye care now?
4. Have you ever been diagnosed with diabetes?
5. Have you ever been diagnosed with glaucoma?
6. Do you have a family history (blood relative) of glaucoma?
7. Have you ever had eye surgery?
8. Have you ever used prescription eye drops?

**Table 2. Demographic Information**

	<b>Screened</b>	<b>Referred</b>	<b>Completed Follow-up</b>	
<b>Number</b>	111	80	31	
<b>Mean age (SD)</b>	47.2 (11.9)	49.7 (11.7)	53.2 (9.6)	
<b>Median age</b>	49	50	52.5	
<b>Gender</b>	n	%	n	%
Male	49	44%	36	45%
Female	62	56%	44	55%
<b>Race</b>			n	%
White	27	24%	20	25%
Black	8	8%	8	10%
Hispanic	64	58%	43	54%
Other/Not Given	12	11%	9	11%
<b>Education</b>			n	%
College and Above	36	32%	27	34%
High School	47	42%	32	40%
Below High School	17	15%	12	15%
Other/Not Given	11	10%	9	11%

with age, gender, education, number of problems of whom each person was referred for, and number of attempted phone calls as predictor variables. For those with missing follow-up attendance data and who had a predicted probability for attendance greater than 0.5, we imputed that they attended a follow-up visit while we imputed non-attendance for those with a probability less than 0.5.

## RESULTS

In the study period, 111 persons were screened. Of these, 80 (72%) met referral criteria and were instructed to schedule a definitive ophthalmic examination at the RIH ophthalmology clinic. Of those referred, 31 completed follow-up appointments, 25 did not complete follow-up appointments and 24 were not reachable for inquiry about their follow-up status. Of those persons whom we were able to contact and inquire about their status, our follow-up rate was 31 of 56 (55%).

Demographic data for those screened, referred and completed follow-up are shown in Table 2. No statistically significant differences were found in age, gender, race or education among those screened and referred, in addition to those who completed follow-up and did not complete follow-up. However, study participants who were referred and completed follow-up tended to be older and of higher educational status than those who did not seek follow-up care.

Of those study subjects referred and reachable for inquiry, 25 of 56 did not pur-

sue further care. Each person was asked for the primary reason why they did not complete the follow-up appointment at RIH ophthalmology clinic. (Figure 1) The most common reasons were no appointment was given (28%), cost (28%) and no convenient appointment times (20%). The fourth reason we grouped as personal reasons (16%). These included finding an appointment elsewhere (n=2), too busy (n=1), and did not want to pursue further (n=1). Other reasons cited were difficulty with filling out forms for the Community Free Services at RIH (4%) and lack of transportation to the RIH ophthalmology clinic (4%).

## This study suggests that student-organized community vision screenings have success rates comparable to larger, funded programs.

## DISCUSSION

Visual impairment is common and highest among those who are Hispanic, poor, lack health insurance, are less educated or have diabetes.<sup>1</sup> High prevalence among the underserved population sug-

gests that health care access and resources are important barriers. By screening and providing referrals for a definitive ophthalmic evaluation at a free clinic, our initiative hopes to provide the underserved and uninsured population with access to the health care system in an effort to improve vision outcomes and quality of life. Almost three-quarters (72%) of our sample required follow-up for eye care, underscoring the burden of undetected eye disease in this underserved population.

In this community vision initiative, about half of those persons screened and referred for a definitive ophthalmic examination completed follow-up. This is comparable to the 41% completion rate reported from the Hoffberger Program, which screened over 5000 participants in Baltimore for eye disease.<sup>4</sup> The Hoffberger program also offered multiple incentives including free ophthalmic exams, transportation and inexpensive glasses if needed.

The major barriers to follow-up care for participants at risk for vision loss in our study were problems with appointments and cost. Although screenings are free, referral for a definitive eye examination often requires an application to a community program similar to one offered by the RIH, which offers free or reduced cost care dependent on income. The top two barriers cited in the Hoffberger Program were no appointment given (26%) and failure to remember the appointment (20%).<sup>4</sup> Our protocol strategy placed the responsibility of making referral appointments on both the participant and the RIH ophthalmology clinic. Thus, failure to give an appointment in our study stemmed from two sources: failure of the person to make the appointment or the failure of the ophthalmology clinic to reach the person to make the appointment. Several factors may contribute to the prevalence of non-referrals including ineffective explanation by the provider of the importance of follow-up eye care, patient trivialization of their problem, lack of motivation of the participant, perceived difficulty to make an appointment at the ophthalmology clinic and inconvenient clinic hours.

Our study has several limitations. Our sample size is small and only one site was accessed. There may have been statistically significant differences in the demographic data that were undetected due to the

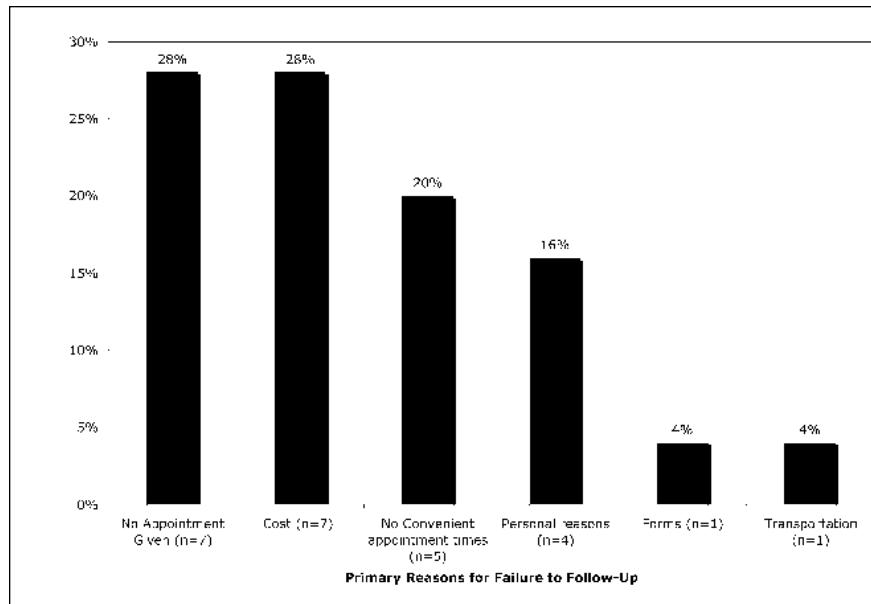


Figure 1. Primary reasons in persons who were referred for a definitive eye exam but did not pursue further care. A total of 25 persons were available for inquiry by telephone interview.

sample size. Another limitation is data missing for 24 persons (30%) of those referred and unable to be contacted. Consequently, the observed percent attending a follow-up may not be representative of all persons referred from RIFC. Imputed regression analysis was used to account for the missing data. Combining the observed and imputed data, we estimate that the follow-up visit attendance among those referred was 53%. The consistency between the observed and imputed estimates gives us some confidence that this accurately reflects the true follow-up attendance rate of referred persons from RIFC. However, we cannot rule out the possibility that those we were not able to contact were systematically different from those we were able to contact.

This study suggests that student-organized community vision screenings have success rates comparable to larger, funded programs. We believe that medical students make good screening persons given that they are highly motivated, knowledgeable about undetected eye diseases and their potential treatments and understand the importance of screening and referrals. Patients may also accept advice from a medical student to obtain further examination with more weight. We speculate that offering scheduled appointment times for a definitive ophthalmic exam at time of screening, after work appointment times and assistance with cost of the exam may improve the effectiveness of referrals for further eye

care. Further research with a more robust sample size is needed to determine the effectiveness of these measures on follow-up rates and determine the individual characteristics of subjects who do and do not follow up.

## CONCLUSION

Since many causes of vision loss are amenable to treatment, screenings are an important tool in identifying those at risk. However, screening initiatives are successful only if referred persons obtain the appropriate eye care. Our student-organized vision screening initiative found that greater than 50% of persons referred for further ophthalmic care kept their follow-up appointments. This study suggests that the success of community vision screenings can be improved by addressing problems with appointments and costs. Utilizing trained, non-physician screeners may increase the number and proportion of individuals receiving appropriate eye care.

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The authors have no financial interests to disclose, other than the Peterson Fund (Acknowledgements).

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