



Follow-Up Rates at a Free Ophthalmology Clinic at a Homeless Shelter

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Abstract

Objective Eye health among the homeless community is important, as poor vision makes this population vulnerable and adds significantly to the social and health burden. There is limited knowledge on patient follow-up rates for their eye conditions and barriers to accessing care in this population. The purpose of this retrospective chart review study is to examine follow-up rates and barriers to care for patients referred from a free, medical-student run ophthalmology clinic at a homeless shelter.

Methods All patients evaluated at a free ophthalmology clinic from September 2017 to September 2018 were included; no patients were excluded. If indicated, patients were referred for advanced ophthalmologic care at a local county hospital and free eyeglasses at a nonprofit organization. Primary outcomes were follow-up rates at the county hospital and nonprofit organization. Secondary outcomes included prespecified baseline variables hypothesized to be associated with follow-up rates. These categorical variables were compared with Chi-square testing to determine their association with follow-up rates. The hypothesis being tested was formulated before data collection.

Results Of the 68 patients, 84% were males with a mean age of 50 years. Overall, 40 patients were referred for free eyeglasses and 17 to the county hospital. Of those referred, 14 patients presented for free eyeglasses and 7 presented to the county hospital. About 79% of patients with a pre-established primary care provider presented to their appointment compared with 20% of those without one ($p = 0.03$). The 44% of patients with a high school diploma presented while all patients without a high school diploma failed to present ($p = 0.04$). Vision-threatening conditions identified at the shelter clinic did not affect follow-up rates ($p = 0.79$).

Keywords

- homelessness
- homeless shelter
- free eye clinic
- follow-up
- medical student education

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Conclusion Less than half of referred patients in our study presented to their appointments. Barriers to presentation included no primary care provider and lower educational status, with no improvement in follow-up rates among those referred for vision-threatening conditions. Interventions such as health coaching with particular attention to educating patients on the effects of vision-threatening conditions may be warranted, particularly for those not looped into the health care system and those of lower educational attainment.

Homelessness is a significant public health problem in the United States.^{1,2} Eye health among the homeless community is important, as poor vision makes this population vulnerable and adds significantly to the social and health burden. Despite this, there is a paucity of literature on the visual needs of the homeless population.³ The homeless population have more eye problems compared with the general population,³ and have been found to have high rates of uncorrected refractive error,^{3–6} cataract,^{5–7} and glaucoma.^{6,7} While many of those living without permanent housing require eye care, it is not clear how homeless individuals access eye care given the limited information about the visual needs in this population.³ Further, visual impairment has been found to be associated with unemployment.^{8,9} Importantly, screening for visual problems and providing free eyeglasses have been shown to improve the quality of life and earning potential of homeless individuals.⁴

The free ophthalmology clinic was created to bridge some of these gaps. The free ophthalmology clinic (1) provides ophthalmologic care and (2) refers patients to the local county hospital for more advanced care and to a partnering nonprofit for free spectacles if indicated. Despite this, there is limited knowledge of the prevalence of ophthalmologic diseases among those without permanent housing, patient follow-up rates for their eye conditions, and barriers to accessing care.

Methods

This retrospective chart review study complied with the Health Insurance Portability and Accountability Act and followed the tenets of the Declaration of Helsinki. This study received institutional review board approval from the University of California San Francisco (UCSF). All patients seen at the monthly UCSF Ophthalmology Shelter Clinic at the St. Vincent de Paul Society Multi-Service Homeless Center in San Francisco from September 2017 to September 2018 were included. The St. Vincent de Paul Society's mission is to offer hope and service on a direct person-to-person basis, working to break the cycles of homelessness and domestic violence. No patients were excluded.

The following demographic information was collected by UCSF medical students: gender, race, ethnicity, date of birth, ophthalmic chief complaint, past medical and ocular history, history of having a primary care provider (PCP) and prior eye examination and family ocular history. Social history included current or prior alcohol, tobacco and recreational drug

use, birth state and country, highest level of education completed, employment status, and amount of time living without a permanent home.

A comprehensive eye examination was performed by UCSF medical students with the assistance of UCSF ophthalmology residents or fellows. The UCSF attending then examined and confirmed all examination findings and diagnoses. At each monthly clinic, visual acuity (near and distance by Snellen), intraocular pressure (by Tonopen), extraocular movements, confrontation visual fields, pupillary assessment, anterior segment, dilated fundoscopic examination with indirect ophthalmoscopy, and autorefractometry (Righton Retinomax 3) were performed. The diagnosis was confirmed by the UCSF attending. Emmetropia was defined as the spherical equivalent (SE) of -0.50 diopters (D) to $+1.00$ D, myopia as $SE < -0.50$ D, and hyperopia as $SE > +1.00$ D. A diagnosis of glaucoma was made if the patient reported a history of being diagnosed with glaucoma by an eye provider. A diagnosis of glaucoma suspect was made if the patient had an intraocular pressure of greater than 21 with a glaucomatous optic nerve appearance.

If indicated, patients were referred to (1) a partnering nonprofit organization Project Homeless Connect (PHC) which provides free spectacles to patients based on the spectacle prescription released at the end of the visit, and (2) the local county hospital Zuckerberg San Francisco General Hospital for more advanced ophthalmologic care and/or follow-up (i.e., intravitreal injections, laser, surgery, etc.). Patients were offered a prearranged, specific follow-up appointment date and time at the time of referral. If the patient agreed to sign a release of information form, their examination findings and referral information was emailed to the staff at PHC and the county hospital to ensure adequate communication of findings. The spectacle prescription could include single vision lenses or bifocals.

The primary outcomes were follow-up rates for (1) free spectacle correction at the partnering nonprofit organization and (2) advanced ophthalmologic care at the local county hospital. Secondary outcomes included prespecified baseline variables that were hypothesized to be associated with follow-up rates, including a history of having a PCP, current or prior alcohol, tobacco and/or recreational drug use, highest level of education completed, employment status, diagnosis of a psychiatric illness, number of years without housing, and the presence of vision-threatening eye conditions.

Follow-up rates were calculated by using Microsoft Excel. Prespecified categorical variables were compared with Chi-

square testing to determine their association with follow-up rates using Stata/SE version 15.0 (StataCorp, College Station, TX).

Results

A total of 68 patients were included in the study. No patients were excluded. The baseline characteristics of 68 patients included in this study are summarized in ►Table 1. The majority of patients were middle-aged (mean age = 50 years), unemployed (78%), and men (84%). The most common race was African American (43%) followed by Caucasian (27%). Of the patients included in the study, 9% of patients were Hispanic. The majority of patients consumed tobacco (79%) and 18% of patients reported intravenous drug use. About 80% of patients reported a birth country of the United States and 53% of these patients reported that they were born in California.

Table 1 Baseline characteristics

	Study subjects (<i>n</i> = 68)
Age (y)	50 (48–53)
Gender (male), <i>n</i>	57
Ethnicity (Hispanic), <i>n</i>	6
Race	
Caucasian, <i>n</i>	18
African American, <i>n</i>	29
Asian, <i>n</i>	5
Hawaiian, <i>n</i>	1
American Indian, <i>n</i>	1
Multiple races, <i>n</i>	3
Other, <i>n</i>	5
Past medical history	
Diabetes mellitus, <i>n</i>	10
Hypertension, <i>n</i>	28
HIV, <i>n</i>	7
Tobacco use, <i>n</i>	54
Alcohol use, <i>n</i>	24
Marijuana use, <i>n</i>	30
Intravenous drug use, <i>n</i>	12
Duration of time at shelter (d)	184 (52–315)
Duration of time homeless, (y)	5 (3–7)
Current employment status	
Employed, <i>n</i>	7
Unemployed, <i>n</i>	53
Retired, <i>n</i>	5
Disability, <i>n</i>	1
Prefer not to disclose, <i>n</i>	2

Note: Numbers in the table are means (95% CI) and *n* represents the sample population.

Of the patients who were successfully tested for near visual acuity (*n* = 59), 18 patients (31%) were 20/40 or worse (J3 or worse) in the better seeing eye. Of the patients who were successfully tested for distance visual acuity (*n* = 57), 11 patients (19%) were 20/40 or worse in the better seeing eye. Of the patients with an intraocular pressure (*n* = 63), eight patients (13%) had an intraocular pressure of greater than 21. Fifteen patients (22%) had a relative afferent pupillary defect. Nine patients (13%) had abnormal confrontation visual fields. The refractive errors are outlined in ►Table 2. Patient diagnoses are outlined in ►Table 3. Refractive error was most common, followed by glaucoma/glaucoma suspect, dry eye, and then visually significant cataracts.

The follow-up rates for referred patients are outlined in ►Fig. 1. Of 68 patients included in the study, 59% were referred for free spectacles and 25% to the local county hospital for advanced ophthalmologic care. Of those referred, 35% presented to the nonprofit organization for free eye-glasses and 41% presented to their county hospital appointment.

Of those referred, 79% of patients with a pre-established PCP presented to their referral appointment while only 20%

Table 2 Refractive errors

	Study subjects (<i>n</i> = 68)
Presbyopia, <i>n</i>	24
Myopia, <i>n</i>	22
– 0.75 to – 1.00 D, <i>n</i>	2
– 1.25 to – 2.00 D, <i>n</i>	5
– 2.25 to – 3.00 D, <i>n</i>	4
– 3.25 to – 4.00 D, <i>n</i>	2
– 4.25 to – 5.00 D, <i>n</i>	2
– 5.25 to – 6.00 D, <i>n</i>	1
– 6.25 to – 7.00 D, <i>n</i>	3
– 7.25 to – 8.00 D, <i>n</i>	2
– 8.25 to – 9.00 D, <i>n</i>	0
– 9.25 to – 10.00 D, <i>n</i>	1
Hyperopia, <i>n</i>	5
1.25–2.00 D, <i>n</i>	2
2.25–3.00 D, <i>n</i>	2
3.25–4.00 D, <i>n</i>	0
4.25–5.00 D, <i>n</i>	1
Astigmatism, <i>n</i>	3
1.75–2.00 D, <i>n</i>	2
2.25–3.00 D, <i>n</i>	1
Anisometropia, <i>n</i>	1

Note: Numbers in the table are the number of patients diagnosed with each condition in the worst seeing eye, *n* represents the sample population, and D represents diopters. Emmetropia was defined as the spherical equivalent of –0.50 diopters (D) to +1.00 D, myopia as SE < –0.50 D, hyperopia as SE > +1.00 D, and astigmatism as cylinder > 1.5 D.

Table 3 Patient diagnoses

	Study subjects (<i>n</i> = 68)
Refractive error, <i>n</i>	40
Glaucoma/glaucoma suspect, <i>n</i>	15
Dry eye, <i>n</i>	8
Visually significant cataracts, <i>n</i>	7
Nonproliferative diabetic retinopathy, <i>n</i>	5
Proliferative diabetic retinopathy, <i>n</i>	3
Refractive amblyopia, <i>n</i>	2
Diabetic macular edema, <i>n</i>	1
Hypertensive retinopathy, <i>n</i>	1
Corneal epitheliopathy, <i>n</i>	1
Suspicious malignancy of the eyelid, <i>n</i>	1
Aphakia, <i>n</i>	1
Chorioretinal scar, <i>n</i>	1
Bitemporal hemianopsia, <i>n</i>	1
Strabismus, <i>n</i>	1
Diplopia, <i>n</i>	1
Duane's syndrome, <i>n</i>	1
Iris coloboma, <i>n</i>	1
Pingueculitis, <i>n</i>	1

Note: Numbers in the table are the number of patients diagnosed with each condition and *n* represents the sample population.

of patients without a PCP presented to their appointment ($p = 0.03$). Forty-four percent of patients who completed at least a high school education presented to their referral appointment while all patients without a high school diploma failed to present to their appointment ($p = 0.04$).

Vision-threatening conditions identified at the shelter clinic did not significantly affect follow-up rates: patients

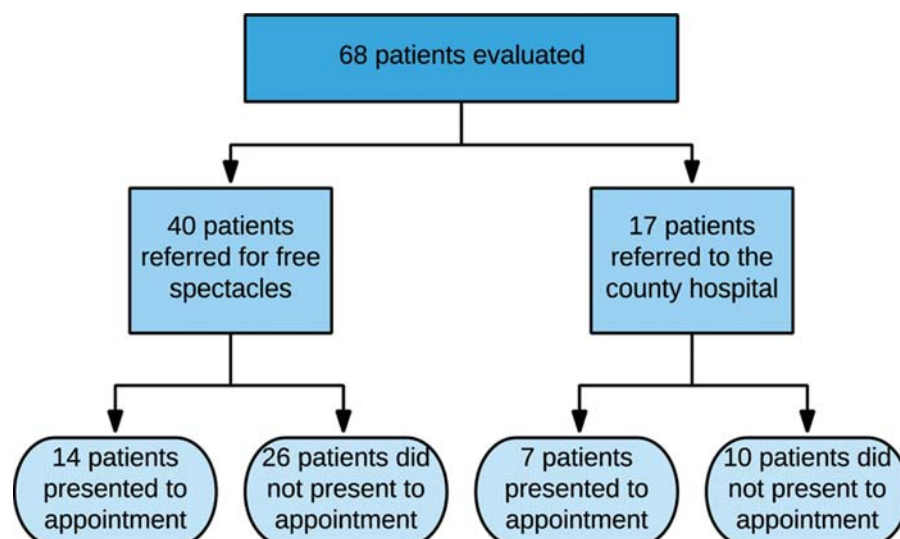
with diabetic and hypertensive retinopathy, diabetic macular edema, afferent pupillary defects, glaucoma/glaucoma suspect, and visual field defects were not more likely to present to their referral appointment at the county hospital compared with those without vision-threatening conditions ($p = 0.79$). Neither employment status, diagnosis of a psychiatric illness, number of years without housing, nor current or prior alcohol, tobacco and/or recreational drug use were significantly associated with follow-up rates.

Discussion

Principle Findings

This study analyzed patient follow-up rates referred from a free ophthalmology clinic at a homeless shelter for (1) free eyeglasses at a nonprofit organization and (2) advanced ophthalmologic care at the local county hospital. Of those referred, only 35% of patients presented to the nonprofit organization for free eyeglasses and only 41% of patients presented to their county hospital appointment. In addition to identifying low follow-up rates in this population, we found that barriers to presentation included the absence of a preexisting PCP ($p = 0.03$) and those without a high school diploma ($p = 0.04$). Further, we found that vision-threatening conditions identified at the shelter clinic did not significantly affect follow-up rates ($p = 0.79$), suggesting that interventions such as health coaching with particular attention to educating patients on the effects of vision-threatening conditions may be warranted.

This study identified a high proportion of patients with uncorrected refractive error (60%) and visually significant cataracts (10%) in the homeless population. This study also identified a high rate of vision-threatening pathology including a diagnosis of glaucoma/glaucoma suspect (22%), afferent pupillary defects (22%), visual field defects (13%), and diabetic retinopathy (12%). This suggests a need for routine eye examinations in the homeless population to identify and manage these vision-threatening conditions.

**Fig. 1** Follow-up rates for referred patients.

Patient Follow-Up Rates

There are no studies to date on follow-up rates for homeless patients referred from a free eye clinic. Over half of our study population warranted referral for spectacle correction, and one-fourth of patients warranted referral for advanced ophthalmologic care; however, less than half of those referred presented to their appointments. It has been postulated that the underutilization of eye care in the homeless population could be secondary to the fact that those living without permanent housing do not know where to go for eye care.¹⁰ While this may be true in some cases, the patients in our study were provided with the referral date, time, and location at the time of referral, making this less likely. Other factors that have been postulated to decrease the utilization of health care services within the homeless population include lack of transportation, financial constraints, secure storage, and social stigma.¹⁰ A history of major depressive disorder and having Medicaid-type insurance (i.e., Medi-Cal) has been shown to be associated with decreased ophthalmic follow-up in socioeconomically disadvantaged groups.¹¹ These factors may have certainly played a role in low follow-up rates within our study population. Patient perceptions of the quality of care received at our clinic may have also influenced their decision to follow-up.

Visual Impairment

It has been described that visual impairment in homeless individuals affects their ability to navigate the health care system and acquire health education.¹² Further, visual impairment has been found to be associated with unemployment,^{8,9} and screening for visual problems and providing free eyeglasses have been shown to improve the quality of life and earning potential of homeless individuals.⁴ Our study highlights the high rates of visual impairment in the homeless population. The proportion of patients in our study with uncorrected refractive error (60%) was similar to the total refractive errors found in a homeless population served at a Mobile Eye Clinic in Los Angeles (54.3%).⁷ Our prevalence of uncorrected refractive errors was higher than that found in other studies (34.8³–41%¹²). As presbyopia was the most common uncorrected refractive error in our population (35%), this difference may be explained by the fact that the mean age in our population (50 years) was slightly older than the mean age found in the compared studies.^{3,12} The prevalence of myopia in our study (32%) was similar to that found in other studies (23.5,¹⁰ 29.1,⁷ and 37.0%³). Importantly, 31% of patients in our study had a visual acuity of 20/40 or worse at near in the better seeing eye. This illustrates homeless individuals' limitation in near work, including jobs requiring near work.

In addition to uncorrected refractive error, our study population also had high rates of other etiologies of visual impairment. The presence of visually significant cataracts in our study (10%) was comparable to that found by Pitz et al who evaluated the prevalence of ocular disease, including cataracts (8%), in the homeless population in Germany.¹³ Our prevalence of diabetic retinopathy (12%) was higher than

that found in other studies (1.6¹⁰–2%¹³). This may be explained by a higher rate of diabetes diagnosis at the included homeless shelter, as patients are screened for diabetes upon admission to the shelter. Finally, there were high prevalences of afferent pupillary defects (22%), visual field defects (13%) and glaucoma/glaucoma suspect (22%), supporting a need for eye examinations, work-up and treatment in the homeless population.

Barriers to Accessing Eye Care

Our study found that patients with a preexisting PCP were more likely to present to their referral appointment compared with those without a PCP ($p=0.03$). The PCP provides access to a range of health care services, and it has been suggested that one approach to addressing the health care needs of the homeless population is to increase access to primary care.¹⁴ Patients with PCPs may be more looped into the health care system and thus more likely to present to follow-up appointments. Despite this, homeless individuals have difficulty registering with a general practice.¹⁵ The barriers to primary care access are numerous, including social isolation,¹⁶ transient nature of their living situation,¹⁷ lost faith in the health care system,¹⁸ reluctance from PCPs,¹⁹ and financial incentives of PCPs.²⁰ It is critical to identify solutions that minimize these barriers to better serve the homeless population.

We also found that patients with a high school diploma were more likely to present to their referral appointment compared with those without a high school diploma ($p=0.04$). Higher levels of health literacy have been shown to be associated with high levels of education in the homeless population.²¹ Further, health literacy has been hypothesized to be necessary for making health decisions,²² and health illiteracy may be a barrier for utilizing health services in this population.²¹ In a prospective recruitment study in a socioeconomically disadvantaged population, predictors of inconsistent attendance to glaucoma follow-up visits included lack of knowledge of the permanency of glaucoma-induced vision loss and perception that it is not important to attend all follow-up visits.²³ Coupled with the fact that vision-threatening conditions did not significantly affect follow-up rates ($p=0.79$) in our study, shared decision-making interventions such as health coaching with particular attention to educating patients on the effects of vision-threatening conditions may be warranted.

Limitations

Limitations of our study include the retrospective study design and the small sample size, particularly of patients that followed-up. An additional limitation is that our study was dedicated to a single homeless shelter. This may make our findings less generalizable to the homeless population as a whole, as there may be certain demographic characteristics of patients at this particular shelter that are not representative of those at other homeless shelters. Future prospective studies with larger sample sizes that include patients from multiple homeless shelters would be helpful to further assess barriers to care.

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Conflict of Interest

None declared.

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