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Descriptive Report

Establishing an Ophthalmic Screening Event for Refugee Populations in Columbia, Missouri

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Abstract

Background: Access to ophthalmic care is a persistent challenge for underserved populations, including refugees, immigrants, and uninsured individuals, leading to untreated ocular conditions that significantly impact quality of life. To address this need, we launched the first student-run ophthalmic screening event in Columbia, Missouri, providing free, comprehensive dilated eye exams and vision screenings.
Methods: The location of this one-day screening event was determined by partnership with the University of Missouri's already-established free student-run community health clinic, MedZou and Catholic Charities of Central and Northern Missouri and use of their space. Patients from the refugee community were identified and registered by Catholic Charities and scheduled into fifteen-minute time slots. Both walk-ins and scheduled appointments were created. Data was collected through a cross-sectional survey conducted at the event and descriptive statistics were performed.
Results: Among the 52 participants of the study, the majority were refugees referred through Catholic Charities. Regarding ophthalmologic diagnoses, 5 (9.6%) were diagnosed with glaucoma, 3 (5.7%) with cataracts, 7 (13.5%) with hypertensive retinopathy, 28 (53.9%) with refractive errors, and 9 (17.3%) with dry eye syndrome. Notably, 17 participants (32.6%) required follow-up care, which highlights the urgent need for ongoing ophthalmic services.
Conclusions: The high rate of refugee participants underscores that these screening events address a significant gap in care for these populations and providing data on the prevalence of ocular health conditions among this cohort. By providing tailored education, referrals to affordable follow-up care, and comprehensive screenings, we demonstrated the feasibility of integrating ophthalmic services into student-run clinics. This initiative offers a replicable model for reducing disparities in eye health, improving early detection of ocular diseases, and promoting equitable access to essential ophthalmic care, and we hope to establish this as an annual clinic event.

Introduction

Visual impairment remains a significant global health challenge, with uncorrected refractive errors (URE) and non-refractive errors such as cataracts and glaucoma ranking among the leading causes worldwide. Refractive errors, including myopia, hyperopia, presbyopia, and astigmatism, are often correctable with simple interventions such as glasses or contact lenses.[1] However, when left untreated, UREs significantly contribute to reduced educational and economic opportunities, decreased quality of life, and increased mortality.[1-3] Non-refractive errors, such as cataracts and glaucoma, further exacerbate the burden of vision impairment. Cataracts, glaucoma, age-related macular degeneration, and diabetic retinopathy are the leading causes of vision impairment and blindness globally.[4,5]

Ophthalmic care disparities continue to persist due to barriers to screening services. Particularly, patients in underserved regions rarely receive ophthalmic care and many suffer from

visual impairment. These groups face numerous barriers, including lack of insurance coverage, limited access to vision screening services, and logistical challenges such as language and cultural differences.[1] Refugees are at a heightened risk for both refractive and non-refractive errors due to limited healthcare access in their countries of origin and resettlement.[6,7] Despite the clear need, there is limited data on the ocular health of refugee communities in the United States. A study in San Diego compared the health and eye care utilization of refugee/migrant participants to that of controls and found that when adjusting for age, history of ophthalmic procedure, and surgery, refugee status was associated with fewer encounters with ophthalmologists.[8] Another study on recently resettled Syrian refugees in Philadelphia, Pennsylvania, revealed increased rates of ocular pathologies and inadequate utilization of eye care services with cost and lack of knowledge about available resources being the most cited barriers.[9] These studies illustrate the need for continued surveillance and awareness for ophthalmic care in refugee populations.

The city of Columbia, Missouri has an ever-growing refugee population, including nearly 300 Afghan refugees who have resettled in the area since the fall of Kabul and the final evacuation airlifts in August 2021.[10] Despite this influx, the region remains underserved in terms of general health care as well as specifically ophthalmic care. Recognizing this unmet need, we established a student-run ophthalmic screening event to provide free, comprehensive eye exams to refugees and immigrants in collaboration with MedZou, an existing free community health clinic, and Catholic Charities of Central and Northern Missouri.

The literature on free health clinics demonstrates that these clinics can play a vital role in addressing gaps in visual impairment for underserved populations. The Kansas City Free Eye Clinic provides free comprehensive eye exams and glasses to individuals experiencing homelessness. An analysis done on their clinic revealed 57.8% of their patients experienced homelessness 68.6% were uninsured.[11] Similarly, a Minneapolis student-run clinic identified ophthalmology as the most highly requested specialty among its surveyed patients.[12] Additionally, a study in Augusta, Georgia demonstrated the feasibility of integrating vision screening using Snellen eye chart and Amsler grid into free health clinics. Their study found that over 17 months, 79.1% of patients offered vision screening were accepted, and half were referred for further evaluation.[13] These findings underscore the willingness of underserved populations to undergo vision screenings and the potential benefits of such services in identifying and addressing vision impairments in resource-limited settings.

This study builds upon previous findings by addressing both refractive and non-refractive errors through the implementation of free dilated eye exams for a refugee population. Without comprehensive eye exams, refugee patients may experience a prevalence of UREs, glaucoma, cataracts, and retinal diseases alike that may remain undiagnosed without screenings. By documenting the development and execution of a student-run ophthalmic screening event that incorporates dilated eye exams, this study provides a replicable model. In addition, there is limited data on the ocular health of refugee populations. This initiative not only provides the prevalence of certain ocular diseases in a refugee population but also sets a framework for advanced ophthalmic services to improve eye health equity.

Methods

Establishing the Clinic Day

To ensure successful outreach to individuals with limited access to ophthalmic care, event coordinators collaborated with Catholic Charities of Central and Northern Missouri and the University of Missouri–affiliated student-run free clinic, MedZou. The clinic was intentionally designed as a free, one-day ophthalmic screening event for uninsured and underinsured individuals, regardless of immigration or refugee status. Catholic Charities assisted with identifying and pre-registering patients who faced barriers to accessing routine eye care, while additional participants were accommodated through walk-in appointments. Patients were scheduled into fifteen-minute time

Table 1. Demographics of refugee patients (N = 52)

Characteristics	N (%)
Sex	
Male	22 (42.3%)
Female	30 (57.7%)
Age (years)	
Less than 18	20 (38.5%)
Greater than 18	32 (61.5%)
Ethnicity	
Arab	9 (17.3%)
Slavic	5 (9.6%)
Hispanic	8 (15.4%)
Pashtun	15 (28.8%)
Pakistani	4 (7.7%)
Indian	3 (5.8%)
Congo	5 (9.6%)
Sudan	2 (3.8%)
Gambian	1 (1.9%)
Insurance type	
Private	5 (9.6%)
Employer-provided	10 (19.2%)
Medicaid	9 (17.3%)
Medicare	2 (3.8%)
None	26 (50.0%)

slots, with flexibility built in to allow for unscheduled visits. To further expand access, multilingual flyers advertising free dilated eye examinations were distributed throughout the Columbia community, with targeted outreach in underserved neighborhoods and recently resettled refugee communities. Flyers were translated into Arabic, Spanish, Burmese, and Pashto to reduce language barriers and promote inclusive participation.

In preparation for the event, essential ophthalmic equipment was secured. A grant was used to secure funding for two portable slit lamps, and the rest of the equipment was borrowed from Mizzou's ophthalmology department. Equipment included an indirect ophthalmoscope, gonioscopy, tonopens, Snellen chart as well as mydriatic eye drops. A team of student volunteers and healthcare professionals, including resident and attending ophthalmologists were recruited to staff the clinic. Educational materials about common ophthalmic conditions, such as glaucoma and cataracts, were prepared in multiple languages to enhance patient understanding.

Clinic Flow

The clinic workflow was designed to optimize efficiency while maintaining a patient-centered approach. All examiners (including student volunteers and ophthalmologists) were trained before the event to ensure uniformity in screening and documentation procedures. Upon arrival, patients were greeted and checked in with intake forms. A medical student volunteer walked the patient through the survey which asked standard questions on demographics, insurance status, medical history, and any existing ocular complaints were recorded, with additional assistance of official medical interpretation services used for non-English-speaking participants if necessary. Following registration, there were essentially two stations patients proceeded to next.

The first station focused on assessing refractive errors. A standard Snellen chart was used at 6 feet. Patients were instructed to read the chart from the farthest distance possible, first with both eyes open, then with the left eye closed, and finally with the right eye closed . Vision was recorded as the lowest line on the Snellen chart that the patient was able to correctly identify. The corresponding designation of "20/__" was then documented for each eye and binocular vision. Pinhole correction test was done using a pinhole occluder to assess if the patient's refractive error could be corrected. A volunteer medical student at this station administered the test and documented the findings, including visual acuity with and without pinhole correction. For pediatric patients, a special Snellen chart of common shapes was used.

The next station assessed intraocular pressure (IOP) using a handheld tonometer. Anesthetic eye drops were administered to each eye, and patients were instructed to blink several times. A new protective cover was placed on the tonometer's tip before the device was held perpendicular to the patient's cornea. The cornea was gently tapped multiple times to obtain a reading, with the device displaying IOP in millimeters of mercury (mmHg) after a preset number of taps, accompanied by a beep indicating a successful measurement. A medical student recorded the IOP readings for each eye under the supervision of a resident ophthalmologist.

The last station was a dilated slit lamp examination conducted by an attending or resident ophthalmologist. Mydriatic eye drops were administered, and the application time was noted on a wristband given to the patient. Patients were then directed to a dimly lit room to allow sufficient time for pupil dilation, on average 15 minutes. After the dilation period, patients proceeded back to the main room for their slit lamp exam. Findings were documented on the patient's Eye Exam sheet which included a table format with sections for detailed assessments of the lid/lashes, conjunctiva/sclera, cornea, lens, iris, anterior chamber, and vitreous humor. The exam allowed for evaluation of the optic nerve, macula, vessels, retinal periphery, and overall retina. These evaluations were critical for identifying conditions such as cataracts, diabetic retinopathy, hypertensive retinopathy, and macular abnormalities. Diagnoses were based on established American Academy of Ophthalmology (AAO) guidelines.

Table 2. Subjective visual acuity (N = 52)

Problems seeing	**N (%)**
No visual complaints	9 (17.3%)
Distance	34 (65.4%)
Close	7 (12.8%)
Close and Distance	2 (3.6%)

Table 3. Visual acuity in better-seeing eye with pinhole correction (N = 52)

Visual Acuity	**Presenting Visual Acuity, N (%)**	**Presenting Visual Acuity After Pinhole Correction, N (%)**
Not Impaired		-
CSM	9 (17.3%)	-
20/20 or better	7 (13.5%)	13 (25%)
20/25-20/30	12 (23.1%)	16 (30.8%)
20/30	4 (7.7%)	3 (5.8%)
Low vision		
20/50-20/100	10 (19.2%)	2 (3.8%)
Blind		
20/200 or worse	1 (1.9%)	0 (0.0%)

CSM: central steady and maintained

Diagnoses and findings were thoroughly discussed with each patient, and education was provided regarding their eye health and potential interventions. For those requiring further evaluation or treatment, referrals were arranged with low-cost or free specialty care providers. Efforts were made to ensure patients understood the next steps in their care, with official interpreters available.

Following the clinic event, survey and clinical data were recorded in a de-identified database for analysis. Descriptive statistics were used to summarize demographics, visual acuity, prevalence of refractive and non-refractive errors using Graphpad Prism 10 software (GraphPad Software, San Diego, CA, USA). Institutional Review Board of the University of Missouri – Columbia approval was obtained to ensure ethical standards were upheld in the collection and use of patient data.

Results

Data was collected through a cross-sectional survey conducted on the clinic's first day of operation. A total of 52 refugee patients participated in the evaluation, consisting of 22 males (42.3%) and 30 females (57.7%). The median age of participants was 35.5 years (Interquartile Range: 10.0-51.0) . Among them, 20 individuals were under the age of 18, while 32 were ages 18 or older.

Regarding ethnic distribution, the largest group identified as Pashtun (n=15, 28.8%), followed by Arab (n=9, 17.3%) and Hispanic (n=8, 15.4%). Other represented ethnicities included Slavic (n=5, 9.6%), Pakistani (n=4, 7.7%), Indian (3, 5.8%), Congolese (n=5, 9.6%), Sudanese (n=2, 3.4%), and Gambian (n=1, 1.9%).

In terms of health insurance coverage, a significant portion of patients (26, 50.0%) reported having no insurance. Medicaid covered 9 patients (17.3%), while employer-provided insurance accounted for 10 patients (19.2%). Private insurance was reported by 5 patients (9.6%), and Medicare by 2 (3.8%). Table 1 shows the demographic characteristics.

Subjective description of vision loss based on the questionnaire highlighted that uncorrected vision problems were observed in 65.4% of patients for distance vision, 12.8% for near vision, and 3.6% for both distance and near vision. The subjective visual acuity data population is presented in Table 2.

Low vision and blindness were assessed using both presenting visual acuity and pinhole visual acuity techniques in the participants' better-seeing eye. The presenting visual acuity was 20/50 or worse in 21.2% (95% confidence interval [CI]: 10.1%-32.3%) of participants in the better-seeing eye. Pinhole correction marginally improved this rate to 3.8% (95% CI: 0.4%-12.1%). The visual acuity data are depicted in Table 3.

Refractive error was found to be the most common cause of ocular problem among this refugee population, which was observed in 28 (95% CI: 40.3%-67.4%). Nonrefractive errors were found in 24 (95% CI: 32.6%-59.7%) of our patients. Cataracts 3 (5.7%), glaucoma 5 (9.6%), hypertensive retinopathy 7 (13.5%) and dry eye syndrome 9 (17.3%) accounted for the nonrefractive errors among all participants. The complications associated with the non-refractive errors are reported in Table 4. Among participants with visual acuity worse than 20/20 in the better-seeing eye (51.9% [95% CI: 38.3%-65.5%]), non-refractive vision disorders accounted for 33.3% of cases. Additionally, 17 participants (32.6%) required referral for follow-up care with a retinal or corneal specialist, including 10 patients who required further treatment for hypertensive or diabetic retinopathy.

Table 4. Suspected causes of abnormal findings in vision screening N = 52)

Cause	N (%)
Cataracts	3 (5.8%)
Glaucoma	5 (9.6%)
Hypertensive retinopathy	7 (13.5%)
Refractive error	28 (53.8%)
Dry	9 (17.3%)

Discussion

The results of this one-day ophthalmic screening demonstrate a high prevalence of both refractive and non-refractive eye conditions among refugees in Columbia, Missouri, with many patients requiring specialty follow-up care. Our results indicate that patients in this cohort benefited from the screening service as nearly 32.6% required a follow-up with a retinal or corneal specialist. For instance, 10 patients required further injections for hypertensive and diabetic retinopathy.

In this study, vision problems were categorized as uncorrected refractive and non-refractive errors. Of the participants who had a visual acuity less than 20/20 (51.9% [95% CI: 38.3%-65.5%]), individuals with non-refractive vision errors accounted for 33.3% of this subgroup. This suggests that the eye care needs of this studies' participants need further management beyond refractive error correction.

Refractive errors are reported by the World Health Organization (WHO) to be the cause of visual impairments for 123.7 million individuals in the world.[14] In our study, 28 patients (53.8%) were diagnosed with a refractive error, illustrating the burden of uncorrected refractive errors in this refugee population. Given the known impact of refractive errors on quality of life, our findings align with previous research by Rajabpour et al. which demonstrated a statistically significant difference be-tween individuals with myopia, hyperopia and astigmatism compared to those without refractive errors[15]. Additionally, Kandel et al. highlighted the broad challenges faced by individuals with uncorrected refractive errors, including difficulties with driving, walking outdoors, cooking and more[16]. These challenges are exacerbated in refugee populations, where access to vision care is often limited. Our clinic addressed this gap by providing resources for corrective eyewear.

Non-refractive errors were found in 46.2% of the patients presenting. Of those, the most common reason for the non-refractive error was cataracts (5.7%) and glaucoma (9.6%). Cataracts remain the number one cause of reversible blindness, and glaucoma remains the leading cause of irreversible blindness worldwide. These conditions disproportionately impact marginalized communities, including refugees, who often face significant barriers to timely diagnosis and treatment. Given the progressive nature of these diseases, early detection and intervention are critical in preventing further vision loss.

Beyond its impact on vision care, this initiative also served as an important step toward improving cultural competency in clinical practice. Recognizing the diverse linguistic backgrounds of the population, we utilized official medical interpretation services to ensure accurate health education. However, cultural competency extends beyond language, and future clinics will incorporate formal cultural sensitivity training for student volunteers to better understand the unique challenges faced by refugee patients. Additionally, this clinic provided hands-on educational experience for medical students, exposing them to real-world applications of public health outreach. Informal feedback and reflections from student volunteers indicated that participation in the event strengthened their ability to communicate with diverse patient populations. Future iterations of the clinic will incorporate debriefing sessions and reflective assessments to evaluate this educational impact.

While this study successfully identified a high burden of refractive and non-refractive errors among refugee patients, several limitations must be acknowledged. A key limitation is the single-day nature of the clinic, which restricts the ability to assess long-term outcomes and sustained patient care. To address this, we are working to establish this initiative as an annual clinic, ensuring continued access to ophthalmic services. Patients requiring follow-up care were scheduled with local ophthalmologists, facilitating continuity of treatment beyond the initial screening. Additionally, this study lacks comparative analysis with similar populations, making it difficult to contextualize findings. Future studies should integrate comparative data and standardized economic measures such as Quality-Adjusted Life Years and the Charlson Comorbidity Index to assess both health and financial outcomes. Despite these limitations, this study highlights a replicable model for addressing vision

care disparities in refugee populations and underscores the importance of community based ophthalmic care.

Conclusion

This student-run ophthalmic screening event revealed a high burden of previously undiagnosed refractive and non-refractive eye disease among refugees in Columbia, Missouri, highlighting both the significant unmet need for accessible eye care and the practicality of incorporating comprehensive ophthalmic services into student-run clinics. Creating a free eye clinic run by medical students and volunteer physicians for the refugee community of Columbia, Missouri offers a meaningful opportunity to address a critical gap in access to ophthalmic care. In this one-day screening event, more than half of participants were diagnosed with refractive errors, some required referral for follow-up care, and cases of glaucoma and hypertensive retinopathy were identified, underscoring the substantial need in this population. Annual free eye clinics play a crucial role in facilitating early detection and timely intervention, which can prevent avoidable vision loss and improve quality of life.

The success of this clinic demonstrates the feasibility of integrating ophthalmic services into student-run clinics and provides a replicable model that may inspire similar initiatives in other underserved communities. Fostering sustainable partnerships and commitment to reoccurring outreach efforts have the potential to create lasting improvements in community eye health that extend well beyond Columbia. Additionally, the clinic stresses the value of community involvement and compassionate treatment in medical education. The clinic's success could inspire similar initiatives in other communities, establishing a support and care network that extends well beyond Columbia. We address health needs and create a long-lasting program for continuous community health improvement by committing to this.

Disclosures

The authors have no conflicts of interest to disclose.

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