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Program Evaluation and Assessment of Vital Sign Measurement at Student-Run Free Ophthalmology Clinics

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Abstract

Background: Uninsured patients (8.6% of the United States population) are more likely to have poorly controlled diabetes and hypertension, which can lead to altered vision or even blindness. Checking vital signs regularly is important in monitoring chronic diseases to prevent poorer health outcomes, especially in populations with limited access to care. HOPES (Health Outreach Partnership of Eastern Virginia Medical School Students) and CCE (Clínica Comunitaria Esperanza) are student-run free clinics that serve the uninsured population of Hampton Roads, Virginia. This study describes the services offered and examines trends in measuring vital signs at HOPES and CCE Ophthalmology Clinics to evaluate clinical operations and areas for improvement.
Methods: A retrospective chart review of 347 HOPES and CCE Ophthalmology appointments from January 2015 to June 2021 explored patient demographics, vital sign measurement, reason for visit, diagnoses, and services provided. Chi-square tests were utilized to compare the measurement of vital signs between the two clinics.
Results: 179 appointments met inclusion criteria. Of the 39 different reasons for visit, the most common were blurry vision, diabetic eye exams, floaters, and systemic hypertension. Of the 63 distinct diagnoses made, the most common were cataracts, diabetes with or without retinopathy, and presbyopia. A total of 175 services were provided, including 61 custom frames and glasses, 48 prescriptions for glasses, 54 medications, and 26 referrals to other providers. Vital signs were obtained during 113 appointments (63.10%) and the frequency of vital sign measurement differed significantly between the two clinics (68.80% at HOPES and 50.00% at CCE), $p = 0.02$.
Conclusion: Vital signs were not consistently obtained at the HOPES and CCE Ophthalmology clinics despite diabetes and hypertension, diseases with known ophthalmologic sequelae, representing primary reasons for visit. Findings are a call to action for quality improvement measures in clinics to enforce vital sign measurement during every encounter.

Introduction

According to the 2020 United States Census Bureau, 8.6% of the United States population (approximately 28 million people) did not have health insurance at any point during the year.[1] Uninsured patients with chronic diseases like diabetes and hypertension are less likely to receive needed care to manage their health conditions.[2] Long-term uncontrolled diabetes can lead to diabetic retinopathy, which causes floaters, blurred vision, and vision loss.[3] According to the Centers for Disease Control and Prevention, diabetic retinopathy is the leading cause of blindness among working-age Americans (ages 20-74).[4] Similarly, long-term hypertension can lead to retinopathy, choroidopathy or optic neuropathy which include symptoms such as blurred vision, distorted vision or permanent loss of vision.[5] Hypertension and diabetes share a significant overlap in complications and underlying risk factors.[6] In fact, 73.6% of individuals with diabetes aged 18 years or more have hypertension and patients with hypertension alone often show evidence of insulin

resistance indicating that diabetes and hypertension tend to be comorbid conditions.[7] Given that careful management of diabetes and hypertension is the best way to prevent blindness and that vital sign abnormalities can indicate disease progression, it is important to monitor these conditions by checking vital signs regularly, especially in vulnerable populations with limited access to healthcare.[3,8] For example, blood pressure measurements detect and monitor hypertension, which when uncontrolled leads to end-stage organ damage including hypertensive retinopathy.

HOPES (Health Outreach Partnership of Eastern Virginia Medical School (EVMS) Students) and CCE (Clínica Comunitaria Esperanza) are student-run free clinics based in Norfolk, Virginia (VA) that provide care to the uninsured patients of the Hampton Roads community. HOPES Clinic was established in 2011 to provide free primary and specialty medical services to the community and expanded in 2016 with the creation of CCE, a subsidiary clinic which provides care to the Spanish-speaking uninsured patients of Hampton Roads. Although the patients of both clinics share the burden of the lack of medical insurance and low socioeconomic status, CCE patients face additional health barriers including English literacy and immigration status which further limits their access to care. Additionally, previous studies have shown that Spanish-speaking patients tend to receive compromised clinical care.[9,10] The purpose of the current study was to describe the services offered at both the HOPES and CCE Ophthalmology clinics and evaluate the clinical program by examining potential differences in vital sign measurement. This data exploration identifies areas of improvement to ensure quality eye care for the uninsured patients of student-run free clinics.

Methods

This study was a retrospective chart review of 347 HOPES and CCE Ophthalmology appointment charts from the date of inception of the HOPES Ophthalmology specialty clinic (January 2015 to June 2021). Appointments marked as 'seen' were included in the study while 'canceled' and 'no-show' appointments were excluded.

The data were categorized into three variable types: demographic, clinical factors, and outcome. To better understand the demographics of the patient population, the examined data included the patients' city of residence, age, gender, and the clinic they visited. An independent samples t-test and chi-square analysis were conducted to assess whether the two clinics differed by patient age and gender. The clinical variables included reasons for visits, diagnoses, and services provided to predict whether the uninsured patients had chronic conditions such as diabetes or hypertension for which vital sign measurement would be essential. The outcome variables included documentation of vital signs. Measurement of vital signs was recorded as 'yes' if the appointment chart had at least one of the following vital signs obtained: body temperature, pulse rate, respiration rate or blood pressure. Presence of vital signs documentation was then compared between the two student-free clinics to test the hypothesis that additional social barriers faced by CCE patients lead to compromised clinical care.

The frequency of variables was examined between clinics. For further data analysis, the chi-square test was used to compare the presence of vital sign measurement between the HOPES and CCE Ophthalmology clinics. A p-value of less than 0.05 was considered to be statistically significant. The statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) software (version 28, 2022, International Business Machines (IBM), Armonk, NY).

Results

Of the 347 HOPES and CCE Ophthalmology appointments, 209 (60.20%) appointments were seen/completed, 53 (15.30%) appointments were canceled, and 85 (24.50%) appointments were marked as 'no-show'. Of the 179 appointments that met the inclusion criteria, 125 were HOPES appointments and 53 were CCE appointments.

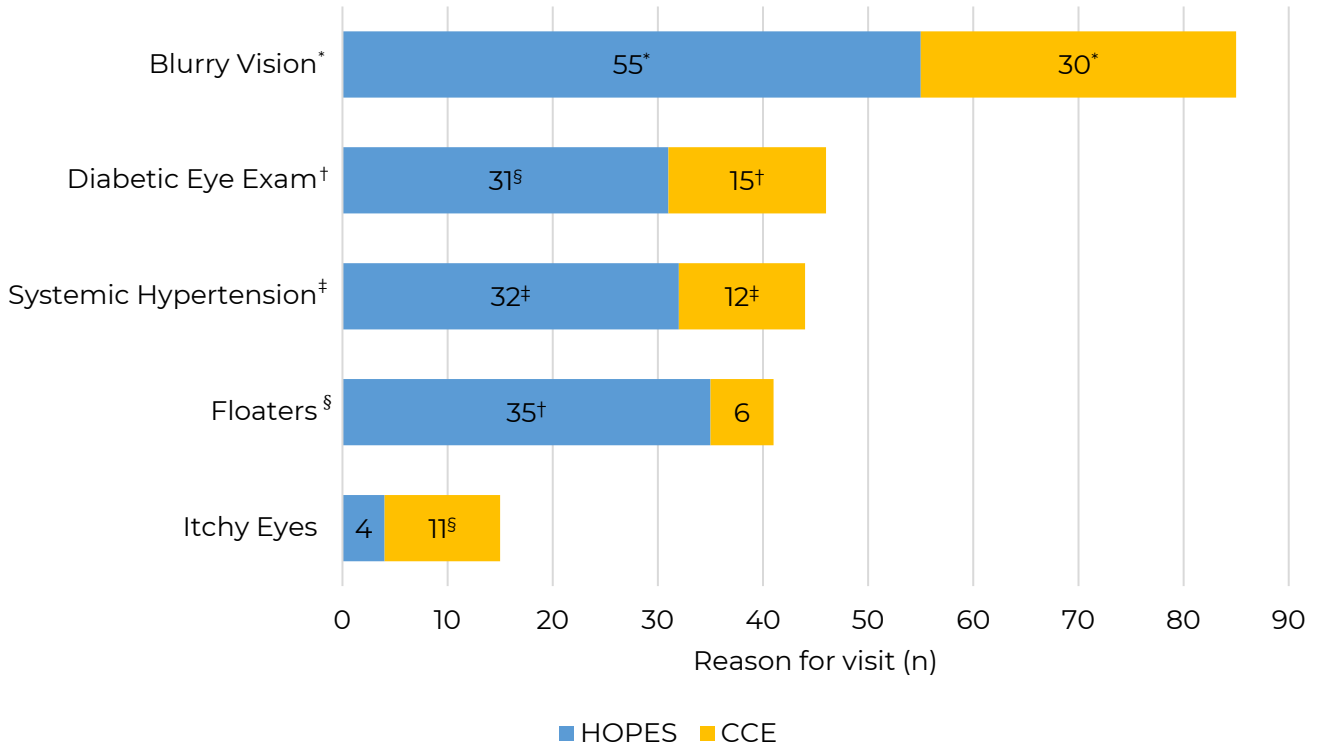
A total of 135 unique patients were seen at the two student-run free ophthalmology clinics. The ages ranged from 9 years old to 76 years old with the mean age of 51.64±13.09. The difference between mean ages of the two clinics was not statistically significant ($t(133) = 0.17$, $p = 0.17$). In total, 46 males (34.10%) and 89 females (65.90%) were seen at the two student-run clinics. A chi-square

Table 1. Participant demographics

Demographic	HOPES Appointments (n)	CCE Appointments (n)	Total Appointments (n, %)
Gender			
Male	27	19	46 (34.10)
Female	68	21	89 (65.90)
City of residence			
Norfolk	66	23	89 (65.90)
Virginia Beach	4	8	12 (8.90)
Hampton	1	0	1 (0.70)
Newport News	1	1	2 (1.50)
Suffolk	1	1	2 (1.50)
Portsmouth	3	1	4 (3.00)
Chesapeake	0	1	1 (0.70)
Yorktown	0	1	1 (0.70)
No record	19	4	23 (17.00)
Age (mean±SD)	51.77±13.05	51.34±13.18	51.64±13.09
Total (n)	95	40	135 (100.00)

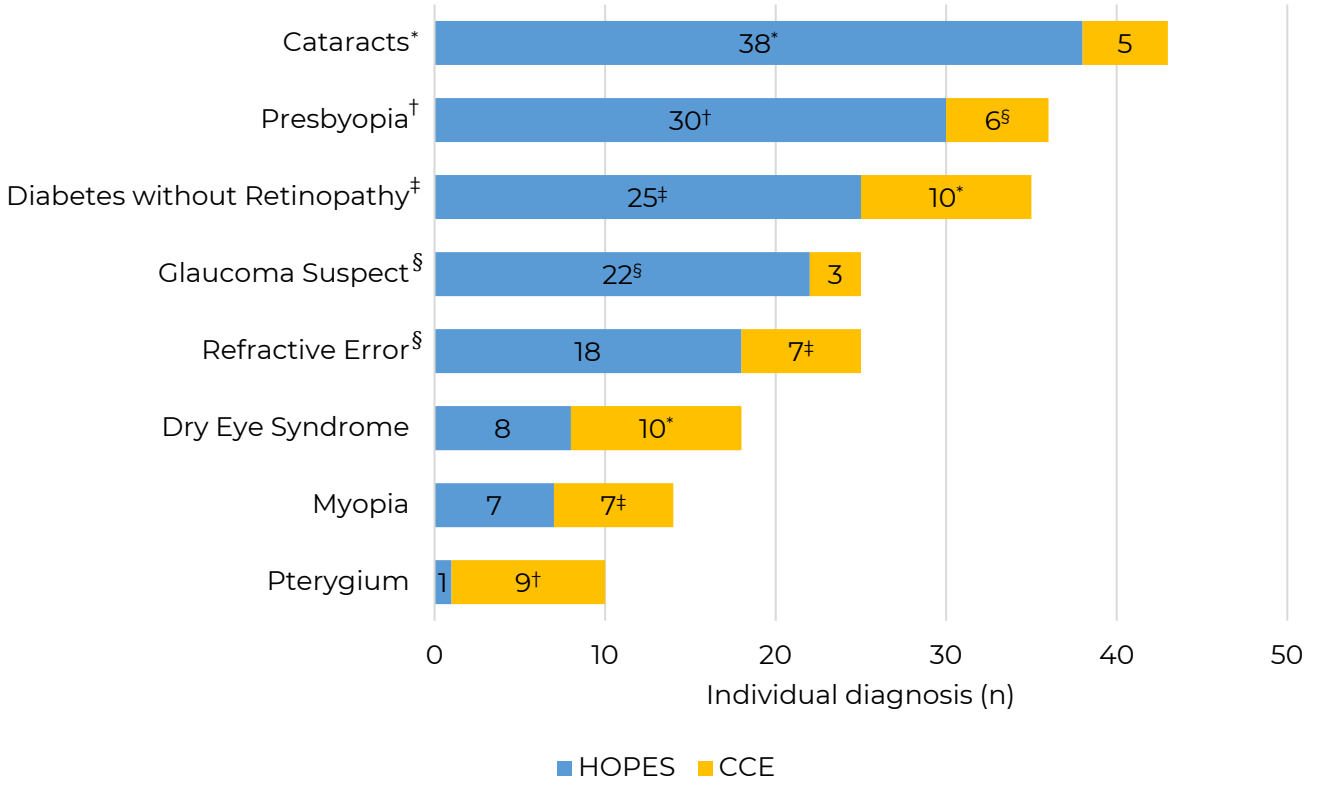
HOPES: Health Outreach Partners of EVMS Students; EVMS: Eastern Virginia Medical School; CCE: Clínica Comunitaria Esperanza; SD: standard deviation

Figure 1. Primary reason for visit



The top 4 complaints are denoted for each clinic within data bars and overall, by type of visit reason.
**Number 1 complaint; †Number 2 complaint; ‡Number 3 complaint; §Number 4 complaint.*
HOPES: Health Outreach Partners of EVMS Students; EVMS: Eastern Virginia Medical School; CCE: Clínica Comunitaria Esperanza

Figure 2. Primary diagnoses



The top 4 complaints are denoted for each clinic within data bars and overall, by type of diagnosis.
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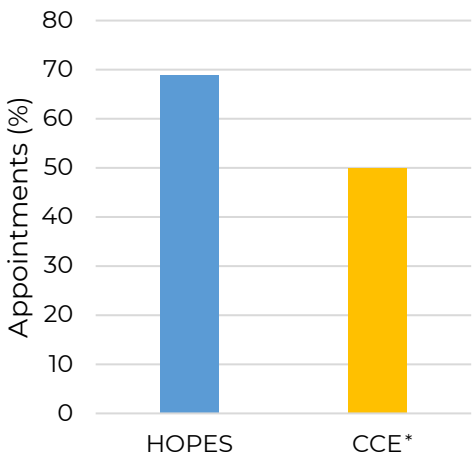
analysis revealed that the HOPES clinic saw a greater percentage of female patients (71.60%) whereas the CCE clinic had a relatively equal number of female (52.50%) and male patients, (χ^2 = 4.56, p=0.03). The city of residence was recorded for 113 of the 135 total individuals and the most common city recorded was Norfolk, VA (78.80%). The demographic variables are summarized in further detail in Table 1.

There were 39 different reasons for visit recorded and the most common chief complaints overall were blurry vision (n=85) and diabetic eye exams (n=46), followed by systemic hypertension (n=44) and floaters (n=41). The most common reasons for visit in each clinic are listed in Figure 1. There were 61 distinct diagnoses. The most common diagnoses overall included: cataracts (n=45), presbyopia (n=36), and diabetes without retinopathy (n=35). The most frequent diagnoses made for each clinic is shown in Figure 2. A total of 175 services were provided, including distribution of 61 free custom glasses and 48 prescriptions for glasses and for 54 medications. Additionally, 26 referrals were made for more specialized ophthalmic care. Of the 26 referrals, most of them were referred to Lions Clinic at Sentara Norfolk General Hospital (50.00%), a large, local ophthalmology clinic with better facilities and infrastructure for specialized vision care.

Vital signs were obtained for 113 of the total 179 appointments (63.10%). When vital sign measurement was compared between HOPES and CCE, it was found that vital signs were obtained for 86 of the 125 HOPES patients (68.80%) while vital signs were obtained for only 27 of the 54 CCE appointments (50.00%). The difference between HOPES and CCE for vital sign measurement was found to be statistically significant (χ^2 = 5.72, p=0.02), with vital signs being recorded more frequently at the HOPES clinic (68.80%) compared to CCE

Figure 3. Percentage of appointments with vital sign measurements taken



**P=0.02 as calculated using a t-test between the clinics. HOPES: Health Outreach Partners of EVMS Students; EVMS: Eastern Virginia Medical School; CCE: Clínica Comunitaria Esperanza*

(50.00%). This data is presented in Figure 3.

Discussion

HOPES and CCE Ophthalmology clinics have provided free vision care for 136 uninsured patients in the Hampton Roads area during the data collection period. The majority of patients reside in Norfolk, VA, the city where the clinic is based. It can be inferred that some of the uninsured patients who reside in distant cities like Chesapeake, Hampton, Newport News, Suffolk, Portsmouth, Virginia Beach, and Yorktown may face transportation barriers to arrive at the free clinic.

The two student-run free ophthalmology clinics have functioned as safety net clinics for eye care in the community since January 2015. The distinctive reasons for visit, diagnoses made, and services offered show that the clinics serve as vital resources for the members of the Hampton Roads area who lack health insurance and/or face barriers to proper healthcare due to English proficiency or immigration status. Although the clinics provide much of the needed ophthalmology care for this community, referrals were made due to the lack of infrastructure and diagnostic imaging modalities necessary for certain diagnoses or treatment plans.

It is important to note that both diabetes and hypertension are included in the top four reasons for visits in both HOPES and CCE Ophthalmology clinics and were also among the most common diagnoses at both clinics. Chronic illnesses like diabetes and hypertension tend to be more common in uninsured patient populations as their lower use of preventive services limits clinical recognition of pre-diabetes and acute hypertension.[11] These issues, when left untreated, become chronic and lead to deleterious systemic effects. Since poorly controlled hypertension and diabetes can lead to blurry vision and complete vision loss, it is crucial to monitor vital signs regularly.

Results of the study showed that vitals are not being regularly obtained at HOPES and CCE despite the knowledge that diabetes and hypertension have known ophthalmologic sequelae. Additionally, it is noteworthy that the difference in obtaining vital signs between the two clinics were discovered to be statistically significant with a lower frequency of obtaining vital signs for Spanish-speaking patients at CCE (50.00%) compared to the primarily English-speaking patients at the HOPES (68.80%) clinic. In ophthalmology, eye vital signs consist of vision, pupillary exam, and intraocular pressure. According to the American Academy of Ophthalmology, most ophthalmic practices opt out of recording systemic vital signs, such as blood pressure, temperature, pulse, and respiration rate if they are not relevant to their scope of practice.[9] However, uninsured or underinsured patients are more likely to forego primary medical care due to lack of insurance and other social determinants of health and are, therefore, unlikely to have vital signs regularly monitored at other medical encounters.[11] Furthermore, the authors were unable to identify any previously published literature about monitoring vital signs in free clinics for uninsured patients, suggesting that the topic merits further investigation. It is consequently important to identify and monitor chronic conditions in vulnerable populations by checking systemic vital signs at every clinical encounter, including at student-run ophthalmology clinic visits. Implementing protocols for vital sign measurement at every clinical encounter in these settings may be effective in detecting undiagnosed diabetic and hypertensive patients as well as monitoring disease

progression.

A possible reason for the low overall frequency of vital sign measurement in the two clinics could be the annual change of student leadership for the ophthalmology clinic coordinator, as this could introduce variation in clinical operations and charting practices. The difference between the frequency of measuring vital signs between the two clinics could be ascribed to the language barrier. Interpreters were added, in addition to the presence of bilingual student clinician volunteers and providers, to assist non-Spanish speaking clinicians at CCE in August of 2019 and it has been shown that a language differential between clinicians and patients, even with assistance of interpreters, may hinder quality of care.[12] Vital sign measurement for every patient encounter in both HOPES and CCE Ophthalmology clinics can help mitigate compromised clinical care experienced by uninsured individuals with chronic conditions.[9,10]

Since the research study is a retrospective chart review, study limitations include inability to include information that is unrecoverable or unrecorded, difficulty in verification of information, and variance in quality of information recorded by student volunteers.[13] Findings from the study are a call to action for quality improvement measures in the clinic to enforce vital sign measurement at each encounter with patients who are known to have decreased access to care and identified risk of chronic diseases. Since June 2021, both HOPES and CCE Ophthalmology clinics have made a concerted effort to measure systemic vital signs for every patient. Although these results may not be applicable to all clinical settings, this study is critical in identifying the need for student-run free ophthalmology clinics to measure classic vital signs for every patient in addition to the eye vital signs to uphold the vision and overall health of vulnerable populations. Future studies may help to demonstrate an association between regular vital sign measurement and improved clinical care in uninsured patients.

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Disclosures

The authors have no conflicts of interest to disclose.

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