

Analysis of Sexually Transmitted Diseases Within the Patient Population at a Student-Run Free Clinic

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Context: Uninsured patients living in rural areas of North Carolina have been inordinately affected by the increasing prevalence of sexually transmitted diseases (STDs) in the midst of severe budget cuts to treatment programs and a shortage of rural primary care physicians. The Campbell University Community Care Clinic, a self-funded, student-run clinic, provides free health care to uninsured residents of rural Harnett County. As a relatively new clinic serving a unique population, epidemiologic research is paramount to the clinic's continued efficacy.

Objective: To determine which STDs are present in this patient population and to identify demographic groups at higher risk of contracting STDs.

Methods: This study was a retrospective analysis of patient medical records from March 1, 2015, to March 6, 2018. Records were evaluated to identify STD cases based on diagnostic information, such as primary diagnoses, positive laboratory results, and clinical indicators.

Results: A total of 449 patient records were analyzed, revealing an STD incidence rate of 5.3%, which represents a higher STD frequency than the national average of 2%. Our results identified human papillomavirus infection and gonorrhea as the most frequent STDs (n=7 [29.2%] and n=6 [25%], respectively), followed by chlamydia (n=4 [16.7%]), herpes simplex virus (n=4 [16.7%]), syphilis (n=2 [8.3%]), hepatitis C virus (n=2 [4.2%]), trichomoniasis (n=1 [4.2%]), and HIV (n=1 [4.2%]) infections. Among racial/ethnic groups, Hispanics had a slightly higher relative risk (RR) for STDs by a factor of 1.3 when normalized to the average frequency. Patients aged 26 to 29 and 30 to 39 years had a significantly higher RR for STDs: 2.1 and 2.0, respectively. Furthermore, female patients had an STD frequency 3 times that of male patients.

Conclusion: This study reveals noteworthy health risks in a rural uninsured population, including a higher rate of gonorrhea compared with national rates and a higher RR for STDs in certain demographic groups. These findings form a foundation for improvements in care through earlier STD diagnoses, effective treatment, and enhanced patient education.

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National rates of sexually transmitted diseases (STDs), such as syphilis, chlamydia, and gonorrhea, have steadily increased since 2009, with 2,094,682 cases total reported in 2016.¹ In addition to the negative effects on a patient's social and emotional welfare,² STDs left untreated can have long-term, severe sequelae

including infertility, pelvic inflammatory disease, and damage to internal tissues and organs.³ Although STDs are readily transmissible, transmission can be significantly reduced by engaging in protected intercourse, such as using latex condoms, and antibiotics easily resolve many STDs. Despite the efficacy of STD prevention and treatment measures, multiple state and local STD programs have experienced budget cuts in the past decade.¹ The increase in prevalence of STDs combined with cuts to these programs presents an alarming picture, particularly for uninsured patients with limited access to health care.

Despite the rising demand for primary care physicians, North Carolina ranks below the median of active primary care physicians per state.⁴ Furthermore, while 45% of North Carolinians live in rural counties, only 18% of North Carolina physicians practice in rural settings, highlighting the need for an increase in rural health care providers.⁵ To meet this need, the Campbell University School of Osteopathic Medicine (CUSOM) was founded in 2011 to train and prepare community-based osteopathic physicians to serve rural communities and, ultimately, to improve the quality of health care for these underserved populations.⁶

The Campbell University Community Care Clinic (CUCCC), founded in February 2015 by CUSOM students, is a direct embodiment of the school's mission.⁷ This self-funded health clinic provides free health care to uninsured residents of the surrounding rural agricultural community in Harnett County, North Carolina.⁸ A substantial number of the patients are migrant and seasonal agricultural workers and their families. This population is largely uninsured and has previously reported cost being one of the top barriers to health care.⁹

In this regard, CUCCC is uniquely positioned to mitigate these challenges in the community by providing STD diagnoses, treatment, and education. The current study aimed to identify the STD rate among CUCCC patients and to provide a basis for improvements in community health and operations at the CUCCC.

Methods

This retrospective study, approved by the institutional review board of Campbell University, reviewed 449 de-identified records of patients seen at the CUCCC between March 1, 2015, to March 6, 2018. Infections with highest prevalence within this patient population were determined by screening the data within CUCCC's electronic health record system. Patients with STDs were identified on the basis of clinical indicators, positive laboratory testing results, and primary diagnoses. Pathogens identified included *Neisseria gonorrhoeae* (gonorrhea), *Chlamydia trachomatis* (chlamydia), *Trichomonas vaginalis* (trichomoniasis), *Treponema pallidum* (syphilis), human papillomavirus (HPV), herpes simplex virus (HSV), hepatitis C virus (HCV), and HIV. Co-infections with both chlamydia and gonorrhea were also identified; no other STDs were documented. Patients lacking any evidence of STD diagnosis were excluded from further analysis. Demographic information was analyzed and grouped by age (<16, 16-29, 30-39, 40-49, 50-59, and ≥60 years), gender (male and female), and race/ethnicity (black, Hispanic, white, and not determined [ie, race/ethnicity was not indicated in the patient record and, therefore, unknown]).

The percentage of STD cases represented by each demographic group was calculated by dividing the number of STD cases in the given group by the total number of STD cases ($[\text{No. of STD cases in demographic group}/N] \times 100$). To account for demographic group representation within the entire CUCCC population, the frequency of each demographic group was calculated by dividing the number of STD cases in that group by the number of the matching demographic group among the entire patient population. To compare the STD relative risk (RR) among demographic groups, the STD frequency of each group was normalized by dividing a specific STD demographic case frequency by the average STD frequency across all groups.

Results

Of 449 patients seen at the CUCCC (251 female and 198 male), 24 had an STD diagnosis (18 female and 6

male; aged 16-59 years); thus, the mean STD frequency was 5.3%. The STDs documented were HPV (n=7 [29.2%]), gonorrhea (n=6 [25%]), chlamydia (n=4 [16.7%]), HSV (n=4 [16.7%]), syphilis (n=2 [8.3%]), HCV (n=2 [8.3%]), trichomoniasis (n=1 [4.2%]), and HIV (n=1 [4.2%]) infections. Three patients had both gonorrhea and chlamydia; these patients were included in both STD categories for data analysis.

The frequency of STDs within the total female patient population was 7.2% (18 of 251) and the total male population, 3.0% (6 of 198) (Table), yielding mean gender frequency of 5.1%. Female patients were 3 times more likely to have an STD diagnosis than male patients and a higher-than-average RR for STDs

compared with male patients (1.4 and 0.6, respectively). Even when HPV diagnoses were excluded from the analysis, female patients represented 71% of STD cases and, therefore, were 2.4 times more likely to have an STD other than HPV.

The STD frequency within each racial/ethnic group was 5.5% (4 of 73) for blacks, 6.9% (9 of 131) for Hispanics, 4.9% (9 of 185) for whites, and 3.3% (2 of 60) for patients whose race/ethnicity was not determined (Table). When normalized to the average frequency of 5.2% for all racial/ethnic groups, Hispanics carried a slightly higher RR for STDs by a factor of 1.3. The RR for blacks and whites was close to the average STD risk (1.1 and 0.9, respectively) (Figure 1). The 2 patients whose race/ethnicity was not determined had an RR of 0.6.

The STD frequency among age groups was 8.9% (7 of 79) for 16 to 29 years, 8.4% (7 of 83) for 30 to 39 years, 3.6% (4 of 110) for 40 to 49 years, 5.0% (6 of 119) for 50 to 59 years, and 0 (0 of 13 and 0 of 45) for those younger than 16 and older than 59 years (Table). The average frequency of STDs among all age groups was 4.3%. The groups aged 16 to 29 and 30 to 39 years were the highest-risk age groups, carrying 2.1 and 2.0

Table.
Demographic Data of Patients at a Free Health Clinic: Number of STD-Positive Patients and STD Frequency (N=24)

Characteristic	STD-Positive Patients, ^a No. (%)	STD Frequency, %
Gender		
Male	6 (25)	3.0
Female	18 (75)	7.2
Race/Ethnicity		
Black	4 (16.7)	5.5
Hispanic	9 (37.5)	6.9
White	9 (37.5)	4.9
Not determined ^b	2 (8.3)	3.3
Age, y		
<16	0	0
16-29	7 (29.2)	8.9
30-39	7 (29.2)	8.4
40-49	4 (16.7)	3.6
50-59	6 (25)	5
>59	0	0

^a Three patients had both chlamydia and gonorrhea.

^b Patient race/ethnicity was not identified in the record.

Abbreviation: STD, sexually transmitted disease.

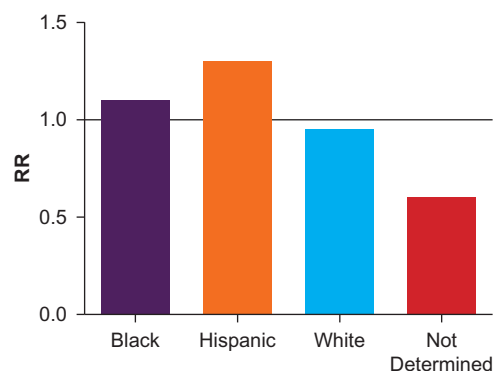


Figure 1.
Relative risk (RR) distribution among racial/ethnic groups. The RR is calculated as frequency of sexually transmitted disease (STDs) within each group normalized to the average frequency across all groups (STD frequency of group/5.2%). The black line (defined at 1.0) represents the normalized average.

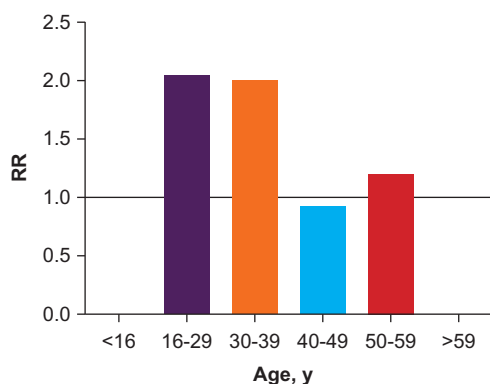


Figure 2.

Relative risk (RR) distribution by age groups. The RR is calculated as frequency of sexually transmitted diseases (STDs) within each group normalized to the average frequency across all groups (STD frequency of age group/4.3%). The black line (defined at 1.0) represents the normalized average.

RR, respectively, for STDs, followed by the group aged 50 to 59 years, which had a slightly higher RR of 1.2 (Figure 2). All other groups had a reduced RR.

Discussion

To better serve the patient population at the CUCCC, a student-run free clinic, this study identified the frequency of and demographic risk for STDs. The analysis revealed an STD incidence rate of 5.3%, representing a higher STD frequency than the national average. According to the Centers for Disease Control and Prevention, the notifiable STDs for which there are current control programs—chlamydia, gonorrhea, syphilis, and HIV—demonstrate a national incidence rate of 0.65% compared with an incidence rate of 2.9% for these 3 STDs within the CUCCC patient population.⁹ The rural, uninsured population served by the CUCCC includes both migrant and seasonal farmworkers and their families. Higher STD rates and risk factors have been reported among farmworkers,¹⁰ which may in part account for the higher STD rate seen in the clinic.

The most common sexually transmitted infection in the United States is HPV,¹¹ and the most commonly reported STD (a sexually transmitted infection causing

clinical disease) in the United States is chlamydia, with 3-fold more cases of chlamydia reported than gonorrhea.⁹ The results of the current study identified HPV infection and gonorrhea as the most frequent STDs followed by chlamydia and HSV infection in the CUCCC patient population. Syphilis, trichomoniasis, HCV, and HIV infections each represented less than 10% of STD cases. Cases of HPV were congruent with national statistics; however, the patient population demonstrated a much higher incidence of gonorrhea. The incidence of gonorrhea cases among the CUCCC population was 1.3% (6 of 449); in comparison, in 2015, the North Carolina State Health Department reported an incidence rate of 0.19% new gonorrhea cases, with a slightly lower incidence rate of 0.13% in Harnett county, where CUCCC is located.¹² Although our findings are limited due to a relatively small sample size, the incidence rate of gonorrhea is 10-fold higher than the rest of the county, highlighting the risk of gonorrhea within this population.

In 2015, a larger study¹³ conducted at CUSOM analyzed the incidence rate of gonorrhea and chlamydia among races that included 2606 patients across Harnett county from 2009 to 2013. This study identified blacks as the racial group at highest risk for STDs, followed by whites; Hispanics had a significantly lower risk. In the present study, Hispanics represented 37.5% of STD cases, the highest STD frequency of any racial/ethnic group (6.9%), and had a higher RR of 1.3 in contrast to all other groups. The disparity in STD risk among Hispanics between the 2 studies may be due to the uninsured status of CUCCC patients, whose lifestyle and environmental factors, such as access to preventive health care, may differ considerably from insured populations.^{14,15}

The highest RR for STDs was identified in patients aged 16 to 29 years followed by patients aged 30 to 39 years. National trends indicate that persons aged between 15 and 24 years make up 50% of all STDs¹ compared with persons aged between 16 and 29 years, representing 29% of STD cases at the CUCCC. However, this age group's RR reflects the national trend—demonstrating a 2-fold higher RR than any other age group.

According to the 2017 report¹⁶ on the osteopathic medical profession, 56% of osteopathic physicians are primary care physicians. Therefore, osteopathic physicians often serve as the first line of defense against the spread of STDs through proper diagnosis, treatment, and patient education, thus preventing the development of severe complications from untreated disease. The present study highlights opportunities to improve patient care and education. Previous studies have shown that well-designed sexual health programs can be used to lower STD prevalence in remote communities,^{3,17,18} and interventions such as using electronic health record reminders, reminding patients to get screened, and collecting specimens for testing when applicable have been successful in the early detection of STDs.¹⁷ A different study adopting risk-reduction interventions by enrolling Hispanic and black women in educational counseling sessions about STDs was successful in lowering STD rates.¹⁸ Therefore, physicians practicing in rural areas can have a significant effect on STD rates through the implementation of sexual health programs, simple screening methods, and single-dose treatments. At the CUCCC, we hope to implement similar screening programs and patient education that address the top reported barriers—cost and language⁹—to ultimately reduce the STD incidence observed in this population.

Limitations

Our data analysis is limited to a small sample size owing to the available service hours, size, and resources of the CUCCC. During this study, we initially identified 11 cases from patient records that did not clearly indicate the etiologic agent and, thus, were not included in the analysis. This factor reveals an opportunity to improve medical student training and ensure high-quality care at the CUCCC. A more extensive analysis will be accomplished through continual, long-term data collection.

Conclusion

Overall, our preliminary data revealed a greater prevalence of STDs in the CUCCC patient population com-

pared with national rates and identified unique patient risk profiles. Our findings will be used to improve STD surveillance and education of patients, physicians, and students, ultimately improving patient health outcomes and overall community health. Student-run free clinics provide an important point of care for STD intervention among underserved populations.¹⁹ This study and future research at the clinic will contribute to the overarching mission of CUSOM in effectively serving rural and underserved populations.

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