HIV Transmission Risk Is Considerable at the Time of STI Diagnosis in HIV-Infected Persons

Lucar J, Hart R, Rayeed N, et al. Sexually transmitted infections among HIV-infected individuals in the District of Columbia and estimated HIV transmission risk: data from the DC cohort. Open Forum Infect Dis 2018;5:ofy017.

STUDY OVERVIEW

Objective. To evaluate the incidence and demographic factors associated with chlamydia, gonorrhea, and syphilis among HIV-infected persons in Washington, DC.

Design. Descriptive, retrospective cohort study.

Setting and participants. HIV-infected persons enrolled at 13 DC Cohort sites from 2011 to 2015. The DC Cohort is a clinic-based, city-wide, longitudinal observational cohort launched in 2011 to better understand HIV epidemiology in DC, describe clinical outcomes among those in care, and improve the quality of care for people living with HIV in the DC metropolitan area. Eligible participants included those enrolled from 1 January 2011 to 31 March 2015. Participant follow-up time included time from enrollment to 30 June 2015 or until one of these occurred: death, withdrawal from the DC Cohort, or loss to follow-up.

Main outcomes measures. Confirmed cases of chlamydia, gonorrhea, and syphilis, as well as HIV viral loads at the time of sexually transmitted infection (STI) diagnosis as a proxy for HIV transmission risk.

Main results. Around the time of the study, there were approximately 11,235 persons with HIV infection receiving care at the 13 DC Cohort sites, of which 8732 (77.7%) were approached for enrollment. Of those approached, 7004 (80.2%) agreed to participate and provided consent, 948 (10.9%) declined to enroll, 14 (0.2%) withdrew consent, and 766 (8.8%) remained undecided. There were significant differences between those consenting and declining, including female gender (27.8% of those consenting vs 36.1% of those declining, *P* < 0.001), white race/ethnicity (13.1% of those consenting vs 6.6% of those declining, *P* < 0.001), and private insurance status (27.6% of those consenting vs 33.2% of those declining, *P* < 0.001).

Median age of patients was 47 years (interquartile range, 36.5–54.5 years); 71% were male, 76% were non-Hispanic black, 39% were men who have sex with men (MSM), and 29% were heterosexual. 63.8% had public insurance. 6.7% (451/6672) developed an incident STI during a median follow-up of 32.5 months (4% chlamydia, 3% gonorrhea, 2% syphilis); 30% of participants had 2 or more STI episodes. The incidence rate of any STI was 3.8 cases per 100 person-years (95% confidence interval [CI], 3.5–4.1); age 18–34 years, 10.8 (95% CI, 9.7–12.0); transgender women,

9.9 (95% CI, 6.9–14.0); Hispanics, 9.2 (95% CI, 7.2–11.8); and MSM, 7.7 (95% CI, 7.1–8.4). Multivariate regression analysis showed younger age, Hispanic ethnicity, MSM risk, and higher nadir CD4 counts to be strongly associated with STIs. Among those with an STI, 41.8% had a detectable viral load within 1 month of STI diagnosis, and 14.6% had a viral load ≥ 1500 copies/mL.

Conclusion. STIs are highly prevalent among HIV-infected persons receiving care in DC. HIV transmission risk is considerable at the time of STI diagnosis. Interventions toward risk reduction, antiretroviral therapy adherence, and HIV virologic suppression are critical at the time of STI evaluation.

Commentary

Although the number of new HIV cases in Washington, DC, has been decreasing over recent years [1], it still has one of the highest rates of HIV infection in the United States [2]. In this large-scale, single-city analysis, Lucar et al reported on the incidence and factors associated with the development of chlamydia, gonorrhea, and syphilis in a cohort of people living with HIV in care in DC. Consistent with incidence rates among the DC general population [2], chlamydia had the highest incidence, followed by gonorrhea and then syphilis, each with particularly high rates among 18- to 34-year-olds, MSM, transgender women, and Hispanics.

Studies have shown that many people with HIV do not consistently practice safer sex, placing themselves and others at risk for HIV or STI infection/co-infection [3]. While most HIV prevention programs target HIV-negative individuals, targeting sexual risk behaviors in HIV-positive people can prevent the transmission of HIV and other STIs to uninfected individuals and can also prevent co-infections with other STIs [3]. However, effective interventions to maintain long-term behavior change and prevent HIV transmission are needed. In a recent systematic review and meta-analysis by Globerman et al [3] assessing the effectiveness of HIV/STI prevention interventions for people living with HIV, group-level health education interventions were found to be effective in reducing HIV/STI incidence when compared to attention controls. Another intervention type, comprehensive risk counseling and services, was found to be effective in reducing

sexual risk behaviors when compared to both active and attention controls. All other intervention types showed no statistically significant effect or had low or very low quality of evidence. Improving strategies to reduce the impact of HIV and STDs may require an understanding of how different populations are experiencing those conditions [1].

This study has several limitations. First, the observational nature of the DC Cohort precluded standardized STI screening for all participants. STIs are frequently asymptomatic, and differences in screening practices can impact the observed STI frequency [4,5]. Subsequently, reported STI incidence rates are likely underestimating the true STI incidence in people with HIV in care in DC. Furthermore, STI screening may provide diagnosis dates distant from the actual time of STI acquisition. Similarly, the study design also limited the availability of HIV viral loads during the same encounter of STI diagnosis. In addition, the population enrolled in the DC Cohort may not be fully representative of the larger HIV-infected population in DC, as enrollment requires some degree of engagement in care, and the demographics of those declining to participate differed somewhat from those who provided consent.

Strengths of the study include its city-wide reach, prospective enrollment of participants, its longitudinal study design, and the large sample size. Also, since the study linked data from clinical sites with data reported to the local health department, this improved the accuracy of STI diagnosis frequency and provided insight into care received for STIs outside of the primary HIV care site.

Applications for Clinical Practice

Risk reduction interventions are needed for people living with HIV to help control the spread of STIs and reduce HIV transmission. More high-quality research on HIV/STI prevention interventions is needed. While there have been only a few studies, the existing data indicate that integration of STI services into HIV care and treatment service can be feasible and can have positive outcomes [6].

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Which Is More Effective For Hypertension Management: User- Or Expert-Driven E-Counseling?

Liu S, Brooks D, Thomas SG, et al. Effectiveness of user- and expert-driven web-based hypertension programs: an RCT. Am J Prev Med 2018 Feb 15.

STUDY OVERVIEW

Objective. To assess whether systolic blood pressure improved with expert-driven or user-driven e-counseling compared with control intervention in patients with hypertension over a 4-month period.

Design. Three–parallel group, double-blind randomized controlled trial.

Setting and participants. In Toronto, Canada, participants were recruited through the Heart and Stroke Foundation heart disease risk assessment website, as well as posters at University Health Network facilities. Participants diagnosed with stage 1 or 2 hypertension (systolic blood pressure [SBP] = 140–180 mm Hg, diastolic blood pressure [DBP] = 90–110 mm Hg) and between the ages of 35 and 74 years were eligible. Hypertension diagnoses were confirmed with the participant's family doctor at baseline if they were not prescribed antihypertensive medication. All participants were required to have an unchanged prescription for antihypertensive medication 42 months before enrollment. Participants prescribed antihypertensive medication were also required to have SBP $\geq$ 130 mm Hg or DBP $\geq$ 85 mm Hg in order to prevent "floor effects." Exclusion criteria included: diagnosis of kidney disease, major psychiatric illness (eg, psychosis), alcohol or drug dependence in the previous year, pregnancy, and sleep apnea.

Participants were randomly assigned to 1 of 3 intervention groups: control, expert-driven, and user-driven e-counseling. Randomization was conducted by a web-based program using randomly permuted blocks. The randomization code was known only to the research coordinator and not to the investigators or research assistants who administered the assessments.

Intervention. Briefly, user-driven e-counseling enabled the participants to set their own goals or to select the interventions used to reach their behavioral goal. The user-driven group received weekly e-mails that enabled participants to select their areas of lifestyle change using text and video web links embedded in the e-mail. Expert-driven e-counseling involved prescribed specific changes for lifestyle behavior, which were intended to facilitate adherence to behavior change. Participants in the expert-driven group received the same hypertension management recommendations for lifestyle change as the user-driven group; however, the weekly e-mails consisted of predetermined exercise and dietary goals. The control group received weekly e-mails provided by the Heart and Stroke Foundation e-Health program that contained a brief newsletter article regarding BP management through lifestyle changes. The control group was distinct from the intervention groups, as the e-mails were limited to general information on BP management. Blinding to

group assignment was maintained during baseline and 4-month follow-up.

Main outcome measures. The primary outcome was SDP; secondary outcomes included DBP, pulse pressure (PP), total cholesterol, 10-year Framingham cardiovascular risk (10-year CVD risk), daily physical activity, and dietary habits. Anthropometric characteristics, medical history, medication information, resting BP, daily step count, dietary behavior, participants' readiness for lifestyle behavior changes, and participants' cardiovascular risk (calculated by the Framingham 10-year absolute risk) were collected during the baseline and 4-month follow-up assessment.

Baseline and 4-month follow-up assessments at the Peter Munk Cardiac Center, Toronto General Hospital, University Health Network were scheduled between 8 AM and 12 PM to minimize diurnal BP variability. All participants fasted for 12 hours prior to their assessment in order to obtain accurate samples of cholesterol. Participants were also instructed to avoid smoking for > 4 hours, caffeine for 12 hours, and strenuous exercise for 24 hours prior to their assessment.

BP was measured by a validated protocol for automated BP assessments with the BpTRU blood pressure recording device. Participants were seated for >5 minutes prior to activation of the BpTRU device. The BP cuff was applied to participants' left arms by a trained research assistant. Following the initial BP measurement, the research assistant exited the room while the BpTRU device completed an automated series of 5 BP recordings with 1-minute intervals separating each of these recordings. The recorded BP at each assessment interval was the mean of these 5 BpTRU measurements. PP was determined by the difference between SBP and DBP readings.

Daily physical activity was defined as the mean 4-day steps (3 weekdays, 1 weekend day) recorded on a pedometer (XL-18CN Activity Monitor), which all participants were given to use as part of the study. Diet was measured as adherence to recommended guidelines for daily intake of fruits and vegetables, and evaluated by the validated NIH/National Cancer Institute Diet History Questionnaire. Readiness for exercise and dietary change were measured using a questionnaire from the

authors' previous trial and the stages of change were defined as the following: precontemplation (not ready to adhere to the target behavior in the next 6 months), contemplation (ready to adhere to the target behavior in the next 6 months), preparation (ready to adhere to the target behavior in the next 4 weeks), action (adherence to the behavior but for < 6 months), and maintenance (adherence to the behavior for ≥ 6 months).

For the primary outcome (SBP), the difference among groups was evaluated using univariate linear regression. Post-hoc comparisons with Bonferroni adjustment, among the three treatment groups were performed only if the overall *F*-test was significant. Secondary outcomes (DBP, PP, total cholesterol, 10-year CVD risk, daily steps, and daily fruit and vegetable consumption) followed a similar statistical approach as the primary outcome analysis. Statistical significance was defined by a two-tailed test with a *P* value < 0.05.

Main results. Of those screened (n = 847), 128 participants were randomized into the study. Between the 3 groups (control with *n* = 43, user-driven with *n* = 42, expert-driven with *n* = 43), there were no statistically significant differences in age, sex, household income, education, ethnicity, body mass index, and medications (antihypertensive and lipid-lowering) at baseline. The average age was 56.9 ± 0.8 years, 48% were female, 66% had a household income of > $60,000, 79% had a college/university or graduate school education, 73% identified as white, and over 85% were taking ≥ 1 antihypertensive medications. Baseline SBP, DBP, PP, cholesterol, 10-year CVD risk, daily steps, daily vegetable intake, smoking status, readiness for exercise behavior change and readiness for dietary behavior change were also similar across the 3 groups. All participants were highly motivated at baseline for adopting a healthy lifestyle. The percentage of participants that were already in preparation, action, or maintenance of readiness for exercise and diet were 96% and 92%, respectively. Only 4% and 8% of participants were in either precontemplation or contemplation stage of readiness at baseline for exercise and diet, respectively.

The expert-driven group showed a greater SBP decrease than controls at follow-up (mean difference between expert-driven versus control: –7.5 mm Hg,

95% CI –12.5 to –2.6, *P* = 0.001). SBP reduction did not significantly differ between user- and expert-driven (*P* > 0.05). DBP reduction and improvement in daily vegetable intake was not significantly different across groups. However, the expert-driven group demonstrated a significant reduction compared with controls in PP (–4.6 mm Hg, 95% CI –8.3 to –0.9, *P* = 0.008), cholesterol (–0.48 mmol/L, 95% CI –0.84 to –0.14, *P* < 0.001), and 10-year CVD risk (–3.3%, 95% C –5.0 to –1.5, *P* = 0.005). The expert-driven group showed a significantly greater improvement than both controls and the user-driven group in daily steps (expert versus control: 2460 steps/day, 95% CI 1137–3783, *P* < 0.001; expert versus user: 1844 steps/day, 95% CI 512–3176, *P* = 0.003) and servings of fruit consumption (expert versus control: 1.5 servings/day, 95% CI 0.2–2.7, *P* = 0.01; expert versus user: 1.8 servings/day, 95% CI 0.8–3.2, *P* = 0.001).

Conclusion. Expert-driven e-counseling was more effective than control in reducing SBP, PP, cholesterol, and 10-year CVD risk at the 4-month follow-up. In addition, expert-driven e-counseling was more effective that user-driven counseling in improving daily steps and fruit intake. It may be advisable to incorporate an expert-driven e-counseling protocol in order to accommodate participants with greater motivation to change their lifestyle behaviors and improve BP.

Commentary

According to the American Society of Hypertension and the International Society of Hypertension, about one third of adults in most communities in both the developed and developing world have hypertension (or high blood pressure), and it is the most common chronic condition dealt with by primary care physicians and other health practitioners [1]. Hypertension, particularly in older/elderly and African-American/black populations, increases the risk for cardiovascular events, strokes, and kidney disease [1]. According to the most recent American College of Cardiology and American Heart Association guidelines from November 2017, the normal blood pressure category is measured as less than 120/80 mm Hg, and intervention/treatment is recommended with higher blood pressure measures [2]. Treatment aims to manage hypertension

and address other risk factors for cardiovascular disease, including lipid disorders, glucose intolerance or diabetes, obesity, and smoking [1]. Early intervention with lifestyle changes (nonpharmacological therapy) and antihypertensive drugs is recommended [1,3]. Several lifestyle interventions have been shown to reduce blood pressure while also helping to manage these other cardiovascular risk factors. These include weight loss (especially through a healthier diet, eg, the DASH diet), reducing sodium intake, increased aerobic exercise, moderation of alcohol intake, and smoking cessation [1,4,5]. However, efficacy of this approach is highly dependent on adherence to self-care behavior, a major challenge for patients. Increasing evidence has pointed to web-based, mobile, or other technology-assisted programs to facilitate delivery of and engagement with self-management and/or counseling-/therapy-based lifestyle interventions [6–11].

In a 2014 article, the authors summarized the efficacy of lifestyle counseling interventions in face-to-face, telehealth, and e-counseling settings, especially noting e-counseling as an emerging preventive strategy for hypertension [10]. E-counseling, a form of telehealth, presents information dynamically though combined video, text, image, and audio media, and incorporates two-way communication through phone, internet, and videoconferencing (ie, between patient and provider). This approach has the potential to increase adherence to counseling and self-care approaches by providing improved and convenient access to information, incorporating engaging components, expanding accessibility and comprehension of information among individuals with varying levels of health literacy, enabling increased and more frequent interactivity with health care professionals, and increasing engagement. Importantly, effective counseling approaches, whether through conventional or e-counseling approaches, should include certain core components, including goal-setting, self-monitoring of symptoms of behaviors, personalized training (based on patient setting or resources), performance-based feedback and reinforcement of health-promoting behaviors, and procedures to enhance self-efficacy [10].

This study adds to the literature by demonstrating that the counseling communication strategies (expert- and user-driven) used to deliver e-counseling can significantly

influence intervention outcomes related to hypertension management. Strengths of this study include the use of a double-blind randomized controlled study design powered to detect clinically meaningful SBP differences, the three–parallel group assignments (expert-driven, user-driven, control) that incorporated multiple evidence-based counseling approaches, the measurement of changes in multiple cardiovascular and behavioral outcomes (clinical and self-report measures), the inclusion of a theory-based measure of readiness for dietary and exercise behavior change, and the low attrition rate. However, there are key limitations, many acknowledged by the authors. The majority of the study participants were white, from higher income households, had completed higher education, and were already motivated for dietary and exercise behavior change, thus limiting the generalizability of findings. The study had a limited follow-up period (only 4 months) and the study design did not allow for the identification of the most impactful components of the intervention groups.

Applications for Clinical Practice

Expert-driven e-counseling may be an effective approach to managing hypertension, as this study showed that expert-driven e-counseling was more effective than control in reducing SBP, PP, cholesterol, and 10-year CVD risk at the 4-month follow-up, and expert-driven e-counseling was more effective that user-driven counseling in improving daily steps and fruit intake. However, providers should be mindful that this approach may be limited to patients with greater motivation to change their lifestyle behaviors to lower blood pressure.

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