Using Sexual Orientation and Gender Identity to Monitor Disparities in HIV, Sexually Transmitted Infections, and Viral Hepatitis

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Objectives. To quantify sexual orientation and gender identity (SOGI) disparities in incidence of HIV, other sexually transmitted infections (STIs), and viral hepatitis.

Methods. We performed a records-based study of 19 933 patients visiting a federally qualified health center in Los Angeles, California, between November 2016 and October 2017 that examined HIV, STIs, and viral hepatitis incidence proportions. We created multivariable logistic regression models to examine the association between incidence proportions and SOGI among people living with HIV and HIV-negative patients.

Results. Among those who were HIV-negative at baseline (n = 16 757), 29% tested positive for any STI during the study period, compared with 38% of people living with HIV. Stratified by birth sex, STI positivity was 32% among men and 11% among women. By SOGI, STI positivity was 35% among gay and bisexual cisgender men, 15% among heterosexual cisgender men, 11% among cisgender women, 25% among transgender women, 13% among gay and bisexual transgender men, 3% among heterosexual transgender men, and 26% among nonbinary people.

Conclusions. Stratifying by SOGI highlighted disparities that are obscured when stratifying by birth sex.

Public Health Implications. To monitor and reduce disparities, health jurisdictions should include SOGI data with infectious disease reporting. (*Am J Public Health.* 2018; 108:S277–S283. doi:10.2105/AJPH.2018.304751)

Sex disparities in HIV, viral hepatitis, and bacterial sexually transmitted infections (STIs) are well documented through nationally notifiable STI surveillance data, population studies, and sentinel surveillance in the United States.[1–4] HIV, syphilis, and gonorrhea incidence are all higher among male individuals, and incidence of chlamydia is higher among female individuals.[1,4] Hepatitis A virus (HAV) incidence is similar among male and female individuals, whereas both hepatitis B virus (HBV) and hepatitis C virus (HCV) are more common among male individuals.[3] But stratifying only by binary sex (male or female, as assigned on birth certificate) leads to an incomplete understanding of the burden of disease in lesbian, gay, bisexual, and transgender (LGBT) communities and affects our ability to plan effective prevention and care programs.[5–9] Both the Institute of Medicine and the *Healthy People 2020* initiatives recommend that federally funded surveys and electronic health records collect sexual orientation and gender identity (SOGI) as part of standard demographic data to identify health disparities and ultimately improve LGBT health.[6,10]

Efforts to improve SOGI data collection are important for monitoring infectious disease disparities and designing health care services and programs.[11] Currently, the Centers for Disease Control and Prevention (CDC) provides sex-specific recommendations for STI screening, but screening schedule guidelines for transgender people—individuals whose gender identity differs from sex assigned at birth—are absent.[2] Assessing differences in sexual behavior, exposures, and testing outcomes is key to developing comprehensive guidelines.

Although gay, bisexual, and other men who have sex with men (MSM) are sometimes distinguished in surveillance data such as those reported by the National HIV Surveillance System and the National Notifiable Diseases Surveillance System, HIV, STI, and viral hepatitis surveillance data typically do not include sexual orientation variables.[1,6] This distinction is important because MSM have higher incidences of HIV and bacterial STIs compared with exclusively heterosexual men.[1,4]

Gender identity is reported with HIV diagnoses by many jurisdictions, but is not universally incorporated into surveillance.[11] Of 2351 HIV infections in transgender people reported to the CDC by 45 states and the District of Columbia between 2009 and 2014, 84% occurred among transgender women (individuals with female gender identity and

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male birth sex), 15% were in transgender men (individuals with male gender identity and female birth sex), and 0.7% were among people with another gender identity, such as gender nonbinary (those who identify as neither male nor female).[11] These reports include positive results but not the total number of transgender people tested or population estimates. Incidence estimates of HIV, bacterial STIs, and viral hepatitis among transgender people are therefore based on convenience samples rather than nationally representative samples.[2,4] To our knowledge, there are no published reports of the incidence or prevalence of HIV, viral hepatitis, or bacterial STIs among gender-nonconforming or nonbinary people. Moderately sized studies (n = ~250) comparing prevalence of other STIs and viral hepatitis prevalence among transgender men and transgender women have found different exposure risks and varying burdens of disease.[12–15]

In addition to reporting SOGI variables, it is also important to consider HIV status, as HIV disparities may also drive disparities in other STIs and viral hepatitis. People living with HIV (PLWH) have elevated prevalence of bacterial STIs, HBV, and HCV compared with individuals who are HIV-negative.[1,16–19] Transgender women are consistently estimated to have as high or higher prevalence of HIV (4.5%–43% in community samples) compared with MSM (3.0%–15% in community samples).[4,20–26] HIV prevalence among transgender men has been estimated as 0.9% to 4.3% in community samples and 0.5% in a national testing event.[21,22,24] Given the nonroutine collection of both birth sex and gender identity data, it is difficult to determine if this estimate underrepresents the true burden of HIV in these populations.

The objectives of this analysis were to describe SOGI disparities in HIV, STIs, and viral hepatitis in a large urban clinic in the United States and to examine how reporting SOGI data can improve public health efforts to address disease disparities among LGBT people. Using data from an LGBT-focused federally qualified health center that provides primary care and sexual health care, we compared the incidence proportions of new HIV diagnoses, bacterial STIs, and viral hepatitis by both SOGI and HIV status. We also assessed differences in key behavioral risk factors (number of partners, injection drug use) by gender identity. Finally, we compared stratification by SOGI to stratification by birth sex only to illustrate the contribution of SOGI data to monitoring disparities and providing services.

METHODS

We conducted the study by using electronic health record data collected as part of clinical care at the Los Angeles LGBT Center. The Los Angeles LGBT Center is a federally qualified health center that, in addition to providing general primary care and HIV care, provides sexual health services—including HIV and STI testing and counseling, viral hepatitis testing, STI treatment, preexposure prophylaxis, and postexposure prophylaxis—at 2 locations in the Hollywood neighborhood of Los Angeles and the City of West Hollywood, California, to more than 25 000 unique patients annually. Current gender identity, birth sex, sexual orientation, race/ethnicity, and date of birth are collected for all patients during registration. We derived gender identity from sex assigned at birth and current gender identity to form the following categories: cisgender men, cisgender women, transgender women, transgender men, and gender nonbinary people. We used self-reported sexual orientation for all analyses, as partner's gender was available only for the most recent partner. In addition, self-reported behavioral data (number of recent partners, history of injection drug use, hepatitis vaccination history, history of transactional sex, condom use) was available for patients who tested in the STI and HIV testing program (at either location) but not those who tested in the context of a primary care or HIV treatment appointment (available at the Hollywood location only). We reviewed medical records for patients aged between 18 and 89 years with known gender identity who received testing for HIV, bacterial STIs, or viral hepatitis between November 2016 and October 2017.

HIV testing was performed with antibody tests and nucleic acid amplification tests. All patients first had an INTSI HIV-1/HIV-2 Rapid Antibody Test (BioLytical Laboratories Inc, Richmond, VA). Individuals with a positive INSTI test had a confirmatory UniGold Recombigen HIV-1/2 (Trinity Biotech, Bray, Ireland) or OraQuick ADVANCE Rapid HIV-1/2 Antibody Test (Orasure Technologies Inc, Bethlehem, PA). Samples from individuals with a negative INSTI test or discordant initial and confirmatory antibody tests were reflexed to HIV nucleic acid amplification testing to identify acute HIV infection (Aptima HIV-1 RNA Qualitative Assay, Hologic Inc, Bedford, MA). Gonorrhea and chlamydia positives were defined as positive nucleic acid amplification test results for genitourinary, rectal, or pharyngeal samples performed with APTIMA Combo 2 Assay (Hologic Gen-Probe, San Diego, CA). Syphilis testing was performed by rapid plasma reagin (ASI Rapid Plasma Reagin Carbon Antigen Test, Arlington Scientific Inc, Springville, UT), with reflex to *Treponema pallidum* particle agglutination assay (Serodia TPPA, Fujirebio Diagnostics Inc, Tokyo, Japan). New syphilis diagnoses were defined as first instance of positive rapid plasma reagin with positive *T pallidum* particle agglutination assay or a 4-fold increase in rapid plasma reagin following previously treated syphilis infection. Any STI was defined as a positive result for chlamydia, gonorrhea, or syphilis. Hepatitis testing was performed with Vitros (Ortho Clinical Diagnostics, Raritan, NJ) or ADVIA Centaur CP (Siemens, Munich, Germany). Acute HAV was identified by a positive result for HAV immunoglobulin M. Current HBV infection (acute or chronic) was identified by a positive result on HBV surface antigen or HBV DNA. HCV was identified by a positive HCV antibody test or a positive HCV RNA test.

We identified PLWH on the basis of *International Classification of Diseases, Ninth Revision,* diagnosis codes or self-reported history of testing positive.[27] We considered those who had no history of testing HIV-positive or receiving medical care for HIV to be HIV-negative at baseline. We calculated HIV incidence among those who were HIV-negative at baseline.

Statistical Methods

The primary outcome was 1-year incidence proportion—the proportion of patients who tested positive for a given infection at least once during the study period. We calculated 1-year incidence proportion

estimates and 95% confidence intervals (CIs) to illustrate the differences between collecting data that include only birth sex and data that include SOGI variables. We used the χ^2 test ($\alpha = .05$) to assess differences in incidence proportion for each infection by gender identity, sexual orientation, and HIV status. We also used the χ^2 test to assess differences in sexual risk behaviors and exposure risks by gender identity. We used the Fisher exact test to accommodate distributions in which 30% or more of cells had expected counts less than 5. We created 2 multivariable logistic regression models to assess the associations among gender identity, sexual orientation, and HIV status to determine which of these factors remained significantly associated with "any STI" or "any hepatitis," respectively. We dichotomized sexual orientation as (1) lesbian, gay, or bisexual (LGB) and (2) heterosexual. We included individuals who reported another sexual orientation (e.g., queer, pansexual, same-gender-loving) in the LGB category. For consistency, we used the same sexual orientation umbrella terms to refer to people of all genders. We fit a third multivariable logistic regression model to test the association between gender identity and sexual orientation, and incident HIV infection. We performed all analyses in SAS 9.4 (SAS Institute Inc, Cary, NC).

RESULTS

We included records from 19 933 individuals in the study, of which 16% (n = 3176) were PLWH. The sample included 86% cisgender men (n = 17 115), 10% cisgender women (n = 1949), 3% transgender women (n = 549), 1% transgender men (n = 178), and 1% gender nonbinary people (n = 142; Table 1). Cisgender men in the sample were predominantly LGB (90%), and the majority (57%) of cisgender women were heterosexual. A little more than half (53%) of transgender women were LGB, compared with 68% of transgender men and 95% of gender nonbinary people. HIV prevalence was 18% among cisgender men (n = 3042), 17% among transgender women (n = 94), 6% among gender nonbinary people (n = 8), 2% among transgender men (n = 3), and 1% among cisgender women (n = 29). Among those who were HIV-negative at baseline, 1% were diagnosed with HIV during the study period (n = 220 of 15 686). Most patients received testing for gonorrhea, chlamydia, and syphilis during the study period, whereas viral hepatitis testing was less common. Overall, 7% of patients who received testing for syphilis tested positive at least once during the study period, and 18% tested positive for gonorrhea, 16% for chlamydia, 0.2% for HAV, 4% for HBV, 7% for HCV, and 31% for any STI (gonorrhea, chlamydia, or syphilis). Figure 1 illustrates the considerable variation seen in STI incidence when data are stratified by SOGI and shows how much information is lost when data are only stratified by male or female sex at birth.

Incidence proportion of HIV, syphilis, gonorrhea, chlamydia, HBV, HCV, and any STI all differed significantly by gender identity among those who were HIV-negative at baseline (Table 2). Incidence of HIV in this group was 2% among cisgender men, 0.2% among cisgender women, and 1% among transgender women. Thirty-two percent of cisgender men who were HIV-negative at baseline tested positive for any STI, compared with 11% of cisgender women, 26% of transgender women, 11% of transgender men, and 24% of gender nonbinary people. Incidence of syphilis was highest among transgender women (6%) followed by cisgender men (5%) and nonbinary people (4%). Gonorrhea positivity was highest among cisgender men (20%), followed by nonbinary people (14%), transgender women (13%), and transgender men

TABLE 1—Characteristics of Patients Testing for HIV, Sexually Transmitted Infections, and Viral Hepatitis: Los Angeles LGBT Center, Los Angeles, CA, November 1, 2016–October 31, 2017

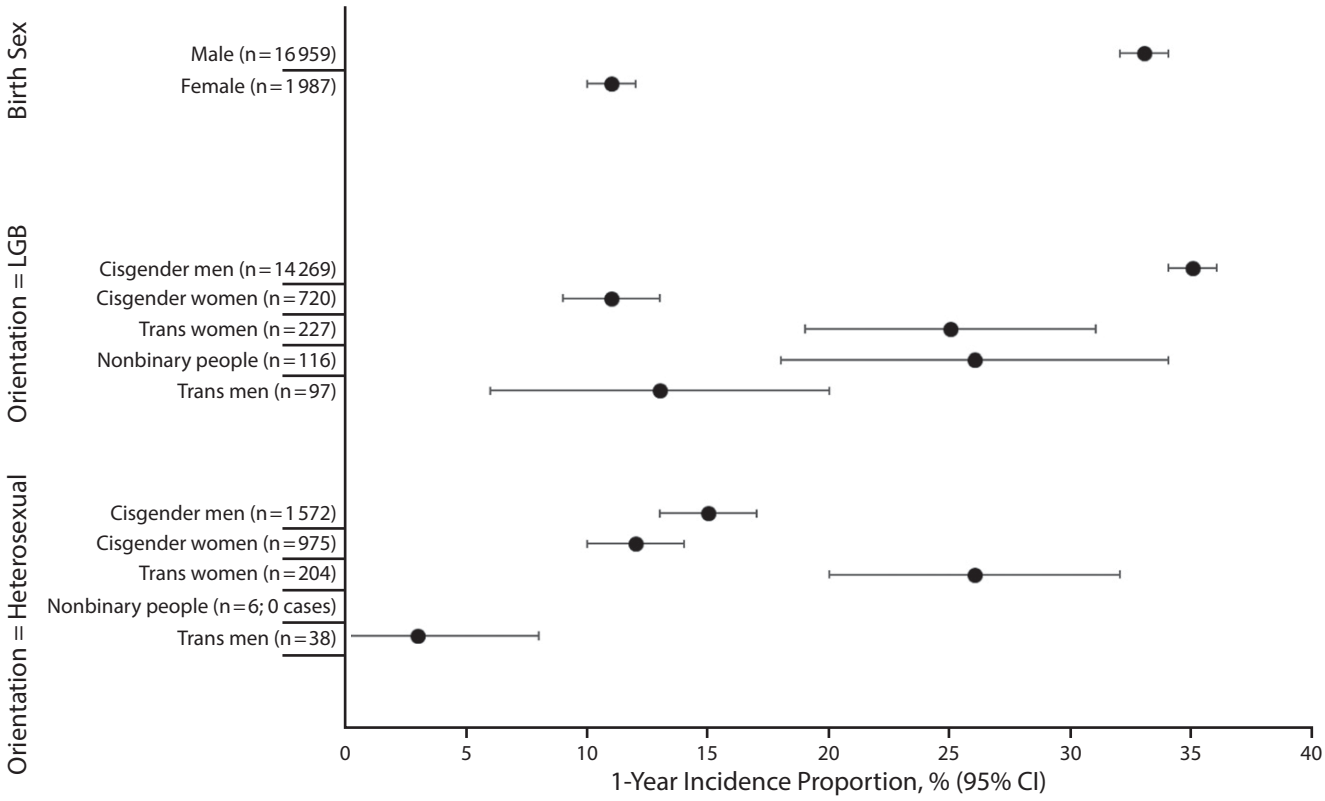
	No. (%)	Total tested
Gender identity		
Cisgender men	17 114 (86)	. . .
Cisgender women	1 950 (10)	. . .
Transgender women	551 (3)	. . .
Transgender men	175 (1)	. . .
Nonbinary people	143 (1)	. . .
Sex (binary)		
Male	17 760 (89)	. . .
Female	2 155 (11)	. . .
Unknown	18 (0.1)	. . .
Orientation		
Gay or lesbian	13 060 (66)	. . .
Bisexual	2 456 (12)	. . .
Heterosexual	2 920 (15)	. . .
Other	364 (2)	. . .
Unknown	1 133 (6)	. . .
Race/ethnicity		. . .
Asian/Pacific Islander	1 507 (8)	. . .
Black or African American	1 676 (8)	. . .
Hispanic or Latino	6 326 (32)	. . .
Other	1 380 (7)	. . .
White	7 970 (40)	. . .
Unknown	1 074 (5)	. . .
Age, y		. . .
18–24	3 406 (17)	. . .
25–29	5 064 (25)	. . .
30–39	6 282 (32)	. . .
40–49	2 838 (14)	. . .
50–59	1 830 (9)	. . .
60–86	513 (3)	. . .
HIV-positive at baseline	3 176 (16)	. . .
One-year incidence proportion[a]		
HIV (new diagnoses)[b]	220 (1.5)	14 687
Any STI	5 903 (31)	19 268
Syphilis	1 055 (7)	16 221
Gonorrhea	3 480 (18)	19 075
Chlamydia	2 990 (16)	19 014
Hepatitis A	2 (0.2)	872
Hepatitis B	64 (4)	1 561
Hepatitis C	201 (7)	3 020
Risk behaviors[c]		
Injection drug use (ever)	312 (2)	13 750
No. of sexual partners (past 3 mo)		
0	1 345 (8)	16 214
1	3 301 (20)	16 214
≥ 2	11 568 (71)	16 214

Notes. STI = sexually transmitted infection. The sample size was n = 19 933.

[a]Not all patients were tested for all infections; therefore, incident proportions are calculated from only those tested.

[b]Among those who were HIV-negative at baseline.

[c]Risk behaviors were available for patients who tested in the STI and HIV testing program, but not those who tested through the primary care clinic.



Note. CI = confidence interval; LGB = lesbian, gay, or bisexual. The sample size was n = 19 268. One-year incidence proportion with 95% CIs of sexually transmitted infections (gonorrhea, chlamydia, or new case of syphilis) stratified by binary sex assigned at birth vs sexual orientation and gender identity.

FIGURE 1—One-Year Incidence Proportion of Gonorrhea, Chlamydia, or Incident Syphilis Among Patients Testing at the Los Angeles LGBT Center: Los Angeles, CA, November 1, 2016–October 31, 2017

(7%). Incidence proportion of chlamydia ranged from 5% among transgender men to 16% among cisgender men. Eight percent of cisgender women who were screened for HCV tested positive, compared with 5% of nonbinary people and 4% of transgender women. Detailed incidence proportions, stratified by gender identity and dichotomized by sexual orientation, among those who were HIV-negative at baseline are available in Table A (available as a supplement to the online version of this article at http://www.ajph.org).

Among PLWH, incidence proportion of syphilis, gonorrhea, chlamydia, HCV, and any STI all differed significantly by gender identity (Table 2). Proportion of PLWH testing positive for any STI varied from no transgender men (0 of 3), 12% of cisgender women, and 29% of transgender women, to 38% of cisgender men. Twenty-three percent of cisgender men, 20% of transgender women, and 17% of nonbinary people tested positive for syphilis, compared with zero cisgender women. Incidence proportions stratified by gender identity and dichotomized sexual orientation, among PLWH, are available in Table B (available as a supplement to the online version of this article at http://www.ajph.org).

After we adjusted for age, race/ethnicity, and SOGI variables, both gender identity and sexual orientation remained significantly associated with incident HIV infection (Table C, available as a supplement to the online version of this article at http://www.ajph.org). Odds of incident HIV infection were higher among cisgender men (adjusted odds ratio [AOR] = 6.0; 95% CI = 1.9, 19.2) and transgender women (AOR = 5.8; 95% CI = 1.3, 26.0) compared with cisgender women. Gay, lesbian, and bisexual individuals, as well as those who declined to report a sexual orientation, all had more than 8 times higher odds of incident HIV infection compared with heterosexual individuals.

In the any STI model, we observed significant associations for gender identity, sexual orientation, and baseline HIV status. Compared with cisgender women, higher odds of any STI were observed among cisgender men (AOR = 2.6; 95% CI = 2.2, 3.0), transgender women (AOR = 2.5; 95% CI = 1.9, 3.2), and gender nonbinary people (AOR = 1.8; 95% CI = 1.2, 2.7). Compared with heterosexual individuals, LGB people and those with other or unknown sexual orientation had approximately twice the odds of testing positive for an STI during the study period. People living with HIV had slightly higher odds of testing positive for an STI compared with those who were HIV-negative at baseline (AOR = 1.2; 95% CI = 1.1, 1.3). Only baseline HIV status was associated with testing positive for HBV or HCV. People living with HIV had significantly higher odds (AOR = 4.0; 95% CI = 3.0, 5.4) of testing positive for HBV or HCV compared with those who were HIV-negative at baseline.

During the study period, about 80% of participants completed a behavioral risk

TABLE 2—Incidence Proportion of HIV, Sexually Transmitted Infections, and Viral Hepatitis Among Patients Testing at the Los Angeles LGBT Center, Stratified by Gender Identity and HIV Status at Baseline: Los Angeles, CA, November 1, 2016–October 31, 2017

	Total, No. (%)	Cisgender Men, No. (%)	Cisgender Women, No. (%)	Transgender Women, No. (%)	Transgender Men, No. (%)	Nonbinary People, No. (%)	χ^2 *P*
HIV-negative at baseline							
Total	16 757 (84)	14 074 (82)	1 921 (99)	455 (83)	172 (98)	135 (94)	< .001
HIV (new infection)	220 (1)	213 (2)	3 (0.20)	4 (1)	0 (0)	0 (0)	< .001
Any STI	4 807 (29)	4 444 (32)	209 (11)	105 (23)	17 (10)	32 (24)	< .001
Syphilis	685 (5)	660 (5)	3 (0.20)	16 (6)	1 (1)	5 (4)	< .001
Gonorrhea	2 860 (18)	2 715 (20)	62 (3)	53 (13)	11 (7)	19 (15)	< .001
Chlamydia	2 474 (15)	2 236 (16)	162 (9)	52 (13)	10 (7)	14 (11)	< .001
Hepatitis A	2 (0.30)	2 (0.40)	0 (0)	0 (0)	0 (0)	0 (0)	. . .
Hepatitis B	22 (2)	19 (2)	1 (1)	2 (2)	0 (0)	0 (0)	.02[a]
Hepatitis C	69 (4)	46 (3)	12 (8)	9 (4)	1 (1)	1 (5)	< .001[a]
HIV-positive at baseline							
Total	3 176 (16)	3 040 (18)	29 (1)	96 (17)	3 (2)	8 (6)	< .001
Any STI	1 096 (35)	1 065 (35)	3 (10)	26 (27)	0 (0)	2 (25)	< .001[a]
Syphilis	370 (22)	362 (23)	0 (0)	7 (21)	0 (0)	1 (17)	.02[a]
Gonorrhea	620 (22)	605 (23)	0 (0)	14 (16)	0 (0)	1 (14)	< .001[a]
Chlamydia	516 (18)	497 (18)	3 (12)	15 (18)	0 (0)	1 (14)	.004[a]
Hepatitis A	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	. . .
Hepatitis B	42 (11)	42 (11)	0 (0)	0 (0)	0 (0)	0 (0)	.1
Hepatitis C	132 (12)	124 (12)	1 (17)	7 (15)	0 (0)	0 (0)	.05

Note. STI = sexually transmitted infection. The sample size was n = 19 933. We used the χ^2 test and Fisher exact test for differences in proportions. We calculated proportion from all nonmissing observations.

[a]Fisher exact test.

assessment (n = 16 237). Sexual risk behaviors—including condomless anal sex, condomless vaginal sex, number of partners, anonymous partners, history of exchange sex—differed significantly (all $P < .001$) by gender identity (not shown). History of intravenous drug use differed significantly by gender identity ($P < .001$) with 6% of transgender women and 5% of nonbinary people reporting ever injecting drugs compared with 2% in all other categories. HAV and HBV vaccination history did not differ by gender identity, with most patients reporting they had received both vaccines.

We created multivariable models with relevant behavioral risk factors for each infection. History of injection drug use (AOR = 1.4; 95% CI = 1.1, 1.8) and having 2 or more sexual partners in the last 3 months (AOR = 2.2; 95% CI = 1.9, 2.6, compared with zero sexual partners in the last 3 months) were both significantly associated with higher odds of testing positive for any STI (Table C). Number of recent partners was not significantly associated with incident HIV infection. Injection drug use was significantly associated with higher odds of incident HIV infection (AOR = 3.1; 95% CI = 1.7, 5.9) and higher odds of HBV or HCV infection (AOR = 10.3l; 95% CI = 4.0, 26.7). Because of small sample sizes of patients with behavioral data in the viral hepatitis models, we had quasi-separation when we included injection drug use in the multivariable model.

For any STI and HIV incidence, estimates for SOGI indicators remained stable with the addition of behavioral risk factors, though smaller sample sizes for models with behavioral data led to less-precise CIs.

DISCUSSION

This analysis highlights the contribution of SOGI data collection and reporting to monitoring disparities in incidence of HIV, STIs, and viral hepatitis. As Figure 1 illustrates, disparities in gender-minority populations are obscured when incidence is reported by birth sex only. The finding that gender identity and sexual orientation were significantly associated with differences in STI and HIV incidence affirms the need to incorporate these demographics more completely into HIV and STI surveillance systems.

Consistent with previous research, HIV prevalence and incidence were highest among transgender women and cisgender men. Age- and race-adjusted incidence proportions of STIs were highest among gay and bisexual cisgender men, transgender women (regardless of sexual orientation), and nonbinary people (predominantly LGB). Cisgender men and transgender women had increased odds of testing positive for any STI or new HIV infection, even after we adjusted for number of partners and history of injection drug use. This suggests that differences in risk behaviors may not entirely explain SOGI-related disparities. Sexual health of nonbinary people warrants further study, as they appear to face similar STI and HIV risk to

groups with highest HIV prevalence. Notably, incidence proportion did not substantially vary by sexual orientation for transgender women, with approximately one quarter of transgender women testing positive for any STI regardless of sexual orientation. On the other hand, STI incidence among transgender men varied substantially by sexual orientation, with LGB transgender men having 3-times-higher incidence of any STI compared with heterosexual transgender men. This finding supports the inclusion of transgender MSM in HIV prevention studies (e.g., preexposure prophylaxis clinical trials) from which they are frequently excluded.

Collecting and reporting SOGI data are critical to achieving national health goals, including *Healthy People 2020* and the strategic plan of the National Institute on Minority Health and Health Disparities.[7,10,28] Even with a large sample from an LGBT-focused clinic, the absolute numbers of gender-minority patients were relatively small. Population-level research is needed to examine these disparities. As calls for more National Institutes of Health funding to be allocated to studies focused on LGBT health, collecting SOGI data at the local, state, and federal level will enable researchers to identify disparities more efficiently.[29] Public health priorities can then turn to addressing these disparities through culturally competent prevention and treatment services. To this end, addressing structural and systemic social determinants of health that affect sexual and gender minorities will be crucial.

Strengths

Strengths of the study included large sample size, SOGI data, and laboratory test results. To our knowledge, this study is among the largest clinic-based studies to compare incidence of these infections among cisgender, transgender, and gender nonbinary people. In addition, it is among the first to report HIV or STI test results for gender nonbinary people at all. By comparing incidence proportion by HIV status along with SOGI, we could examine the extent to which known gender identity and sexual orientation disparities in HIV explain disparities in other infections.

Limitations

Because we used a convenience sample at an LGBT-serving clinic, it may not generalize to other testing populations. Because screening recommendations and cost of testing differ among HIV, STIs, and viral hepatitis, HIV and STI testing was conducted more frequently, leading to more precise estimates. Screening for HAV, HBV, and HCV occurred mainly for patients in HIV treatment, patients with insurance, patients starting HIV pre- or postexposure prophylaxis, and those with specific risk factors (e.g., history of injection drug use, birth between 1945 and 1965 for HCV). During an HAV outbreak in Southern California in 2017, HAV testing was offered to more unvaccinated patients toward the end of the study period. Though only 2 cases of HAV were identified, the number tested was higher than it would have been without the outbreak. In addition, the testing algorithm for HCV could not distinguish between current and cleared infection if RNA testing for HCV was not performed at the same visit as positive antibody test, so HCV prevalence was likely overestimated. By calculating incidence proportion, we avoided having a small number of individuals with repeat infections influence the results, particularly among gender-identity minorities with small sample sizes. Conversely, this design also meant that individuals who tested more than once during the study period had more opportunities to test positive. Infections among those who tested only once during the study period were likely underestimated, which would lead to an overall underestimation of incidence proportion.

Although all data were analyzed from clients of the Los Angeles LGBT Center, the primary care and HIV care clinics did not have data available on behavioral measures whereas the STI and HIV testing program did. We found significant differences by SOGI variables, age, and race among the groups. Including these variables in the behavioral model addressed data missing at random, but not data that may be missing not at random or may have missingness dependent on variables we did not assess.

Using electronic health record data allowed us to make inferences about treatment-seeking populations, particularly those who might visit a federally qualified health center or an LGBT-focused clinic. Future studies are warranted to determine the extent to which gender-minority populations face disparities in accessing testing, treatment, or prevention services for these infections. Studies that include more widespread viral hepatitis testing could help determine whether differences observed in this sample reflect broader disparities or are an artifact of exclusion of routine hepatitis testing in publicly funded STI testing programs.

Public Health Implications

Given these findings, we recommend that sites with sexual health services collect data on birth sex, gender identity, and sexual orientation. By identifying specific segments of the population that have elevated disparities, targeted marketing campaigns can be used to encourage testing for particular infections or use of certain screening services. In the past, the Los Angeles LGBT Center has used SOGI data in developing targeted campaigns for meningitis vaccination among MSM, HIV testing among MSM and transgender populations, and cervical Papanicolaou tests for cisgender women and transgender men. Through incorporation of SOGI data collection, clinics can more accurately ensure that all clients receive the preventative health screenings that may be missed in settings without these data collection measures. AJPH

CONTRIBUTORS

C. L. Shover conceptualized the study, led the analysis, and wrote the first draft of the article. M. A. DeVost reviewed the epidemiological literature, helped design the study, contributed to analyses and presentation of data, and critically revised the article. M. R. Beymer contributed to analyses and presentation of data and critically revised the article. P. M. Gorbach helped design the study, planned the behavioral subanalysis, and critically revised the article. R. P. Flynn reviewed the policy literature, interpreted results, and critically revised the article. R. K. Bolan conceptualized the study, clinically interpreted results, and critically revised the article.

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HUMAN PARTICIPANT PROTECTION

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