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Evidence of Nonrandom Mixing by Pre-exposure Prophylaxis Use Among Men Who Have Sex With Men Partnerships in Melbourne, 2016 to 2018

To the Editors:

We read with great interest the brief report by Chow et al[1] on the sexual mixing patterns by HIV status and pre-exposure prophylaxis (PrEP) use among men who have sex with men (MSM) partnerships in Melbourne. They reported longitudinal trends in the sexual mixing patterns among MSM by HIV status between 2011 and 2018, and by HIV status and PrEP use between 2016 and 2018. The authors found that among 930 MSM partnerships attending Melbourne Sexual Health Centre between 2016 and 2018, only 1.2% involved both men taking PrEP.

We agree with the authors that it was uncommon for both men within MSM partnerships in the study sample to be using PrEP. However, we suggest an additional interpretation of their data (Table 1), which shows that the observed proportion of partnerships in which both men are taking PrEP is greater than would have been expected by chance alone. For example, with 6.0% of HIV-negative MSM in partnerships and visiting Melbourne Sexual Health Centre between 2016 and 2018 on PrEP, the proportion of concordant HIV-negative partnerships in which both men would be expected to have been on PrEP because of chance alone is 0.4% (6% × 6% = 0.4%) (Table 1). However, we observed that in 1.4% of concordant HIV-negative partnerships between 2016 and 2018, both men were taking PrEP (Table 1). The proportion of HIV-discordant MSM partnerships in which the HIV-negative man was using PrEP is also higher than would be expected by chance (22.2% vs. 6.0%) (Table 1).

Thus, the Melbourne data provide additional evidence for nonrandom sexual mixing by PrEP use among MSM, as noted in previous studies.[2–5] We found that among MSM enrolled in a cross-sectional survey in Montreal, Canada, those on PrEP reported a higher proportion of partners on PrEP among their HIV-negative partners than would be expected by chance alone (50.6% vs. 28.5%)—a pattern we referred to as "PrEP-matching."[2] Similarly, using data from a nationwide survey of MSM in the United States, Grov et al found that MSM who used PrEP reported a larger proportion of partners on PrEP among their casual male partners, compared with HIV-negative MSM who did not use PrEP (41% vs. 22%)—a pattern referred to as a form of "biomed-matching" by the authors.[3] The term "biomed-matching" was originally introduced by Newcomb et al[4] to describe an emerging risk reduction strategy used by MSM in the era of biomedical HIV prevention, wherein both individuals in the partnership use PrEP or have undetectable viral load to engage in condomless sex. Indeed, Prescott et al,[5] found that among a sample of MSM who use alcohol in San Francisco, United States, approximately half of the sexual partnerships among MSM using PrEP were concordant in their use of biomedical prevention, and their concordant use of PrEP was associated with greater engagement in condomless anal sex.

Collectively, these findings suggest that the phenomenon of both men in a sexual partnership taking PrEP may be more common than expected by chance alone among MSM in the biomedical prevention era. Reasons underlying this pattern of PrEP-matching may include one or more of the following. First, PrEP users may be actively shaping their sexual network by preferentially selecting other men on PrEP. Martinez et al found that HIV-negative MSM on PrEP expressed preference toward PrEP users over non-PrEP users when meeting sexual partners online; those not on PrEP did not indicate such preference.[6] Second, qualitative studies revealed evidence of PrEP-related stigma (eg, due to assumptions surrounding promiscuity and/or equating PrEP use with condomless anal sex), which could be one reason that men on PrEP may be more likely to be in partnerships with other men who are also on PrEP.[7,8] Third, there may be confounders—factors within the pre-existing sexual-network before PrEP uptake—which may have influenced

TABLE 1. Comparing Observed Patterns of Sexual Mixing to What Would be Expected by Chance Alone at the Melbourne Sexual Health Centre, 2016–2018

Characteristics	Type of Data	2016	2017	2018	2016–2018
Prevalence of PrEP use among HIV-negative MSM, %	Observed*	2.1	7.2	8.3	6.0
Proportion of concordant HIV-negative partnerships in which both men are using PrEP, %	Expected†	0.04	0.5	0.7	0.4
	Observed*	0.4	2.7	1.1	1.4
Proportion of HIV-discordant partnerships in which the HIV-negative men is taking PrEP, %	Expected†	2.1	7.2	8.3	6.0
	Observed*	18.0	21.6	26.2	22.2

*Calculated based on data presented in the Figure 1B in the brief report by Chow et al.[1]

†Calculated using the prevalence of PrEP use among HIV-negative MSM in the study sample, assuming random mixing.

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the likelihood of PrEP initiation and led to the observed patterns of PrEP-matching. For example, if men who are highly engaged in sexual health programs are more likely to have sex with each other and also more likely to be early adopters of PrEP, then we may observe PrEP-matching as a result of the underlying sexual network itself even if men do not preferentially select partners by PrEP use.

Changes in sexual mixing patterns, including PrEP-matching, will be important in predicting how HIV and other sexually transmitted infections may circulate and spread at a population-level. The work by Chow et al is important because it demonstrates how sexual mixing patterns by HIV status and PrEP use have evolved over time. Future studies, via similar repeated cross-sectional analyses or longitudinal analyses, especially among representative samples at the population-level, on the evolution of serosorting and PrEP-matching following the roll-out of PrEP will become increasingly important when evaluating the population-level impact of PrEP on HIV and other sexually transmitted infections[9]; as will research into the underlying reasons for observed patterns in sexual mixing by PrEP use.

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A Case of HIV and SARS-CoV-2 Co-infection in Singapore

To the Editors:

As of April 10, 2020, there are close to 1.5 million cases of COVID-19 globally[1] and 37.9 million people living with HIV (PLHIV).[2] Most deaths in patients with COVID-19 disease have been in immunocompromised or elderly patients with little information on PLHIV. Concern arises from recent studies suggesting that the immune system function in HIV patients is not fully restored even after long-term chronic virologic suppression.[3,4] So far, there is only 1 report on a patient from Wuhan who was newly diagnosed with HIV on screening before starting lopinavir/ritonavir for COVID-19 treatment.[5] We report here a case of HIV and SARS-CoV-2 coinfection in a PLHIV on long-term antiretroviral therapy in Singapore.

A 37-year-old man presented to the emergency department of our public health institution with fever (38.6°C at maximum), sore throat, dry cough, and headache for the duration of 6 days. He returned from a 16-day trip to Paris and London 1 day before his symptom onset. In view of his travel history and presenting complaints of upper respiratory tract infection symptoms, he was immediately admitted to an isolation room.

His background medical history was significant for chronic HIV, diagnosed in late 2010. The $CD4^+$ T-cell count was 201 cells/μL (12%) on diagnosis. He was initiated on tenofovir, lamivudine, and efavirenz and has been fully adherent to medications. His viral load has been undetectable since February 2011, and the $CD4^+$ T-cell count increased to 900 cells/μL (36%) by 2015 (after which there were no further checks in view of the high-normal count). Efavirenz was switched to rilpivirine in September 2017 for financial considerations, but the patient has otherwise never been on protease inhibitors in the course of his HIV treatment.

On presentation, the patient looked clinically well and was afebrile (37.2°C) with normal blood pressure and heart rate. His oxygen saturation was 100% on room air, and his respiratory rate after admission was 20 breaths per min. Lungs were clear on auscultation, and physical examination was otherwise normal. He had a normal complete blood count with no cytopenias, as well as normal renal and liver function tests on admission. Inflammatory markers were not raised: CRP < 5 mg/L [reference range 0–10 mg/L], LDH 404 U/L [reference range 250–580 U/L], procalcitonin < 0.06 ug/L [reference range <0.50 ug/L], and ferritin 77 ug/L [reference range 20–300 ug/L]. His chest radiograph was clear with no infiltrates or consolidation. Real-time reverse-transcriptase polymerase chain reaction assay for the detection of SARS-CoV-2[6] was performed on a

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