Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Postexposure prophylaxis during COVID-19 lockdown in Melbourne, Australia

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See Online for appendix

The Australian government introduced several lockdown measures in the state of Victoria on March 23, 2020, in response to the COVID-19 pandemic. The lockdown measures included the introduction of physical distancing, closure of non-essential services, the banning of indoor gatherings, shift to working from home for those who could, and restrictions requiring people to stay at home unless necessary for essential shopping, medical needs, exercise, or caring roles. Data from 56 Dean Street in London, UK, showed an 80% reduction in HIV postexposure prophylaxis (PEP) prescriptions in the first 4 weeks after the implementation of a similar lockdown in the UK.[1] We expected to see a similar reduction in PEP prescriptions in Australia from reduced casual sex during the lockdown and were interested in how quickly causal sex would resume.

The Melbourne Sexual Health Centre (MSHC) is the major public HIV and STI clinic located in the city of Melbourne, VIC, Australia. During the lockdown period, MSHC remained open and face-to-face consultations were provided after an initial assessment of the risk of COVID-19 via the phone. The MSHC provides free PEP to individuals after clinical assessment. In 2019, 1279 PEP prescriptions were given at MSHC (unpublished). We examined the changes in weekly PEP prescriptions at MSHC before and during the COVID-19 lockdown period. This study was approved by the Alfred Hospital Ethics Committee (301/20).

Between Jan 6 and May 31, 2020, 368 PEP prescriptions were given to 346 individuals at MSHC. The median age of the patients was 29 years (IQR 26–34). Most PEP consultations were provided to men (n=347 [94%]) and a small proportion of women (n=10 [3%]) and individuals who are transgender or have other gender identities (n=11 [3%]). Of the 347 PEP consultations had with men, 330 (95%) were men who have sex with men (MSM). The number of PEP prescriptions remained around 20–30 each week before the lockdown (Jan 6–March 22) but decreased to 11 during the first week of the lockdown (March 23–29) with a nadir of two PEP prescriptions in the fourth week of the lockdown (April 13–19; appendix p 1). However, the number of PEP prescriptions increased after April 20 to approach levels before lockdown.

The median number of weekly PEP prescriptions before lockdown (Jan 6–March 22) was 21 (IQR 19–26), which was significantly higher than the median weekly number during lockdown (eg, March 23–May 31 median 11 [IQR 8–17]). Furthermore, comparing data from the 4 weeks before lockdown (Feb 24–March 22) with the first 4 weeks during lockdown (March 23–April 19), a 66% reduction was seen, from 88 to 30 PEP prescriptions. No differences were seen in the median age (Mann-Whitney *U* test p=0·376), sex (χ^2 test p=0·172), or proportion who were MSM (χ^2 test p=0·424) before and after lockdown. Notably, four female sex workers accessed PEP before lockdown but none during the lockdown period, which might be due to the closure of brothels during the lockdown. 19 individuals received more than one PEP prescription during the study period (16 individuals had two PEP prescriptions and three individuals had three PEP prescriptions). 12 individuals received the repeated PEP prescriptions before and during the lockdown period, five individuals only received the repeated PEP prescriptions before the lockdown period, and two individuals only received the repeated PEP prescription during the lockdown period.

The reduction in PEP prescriptions during the lockdown period at our clinic was similar to the size of the reduction observed at 56 Dean Street in London (66% *vs* 80% for the 4 weeks before and after lockdown).[1] Both Australia and the UK implemented lockdown measures on the same day (March 23, 2020), and a substantial reduction in PEP prescriptions was observed immediately after the implementation of the lockdown. The reduction in PEP prescriptions we saw was slightly lower than that seen at 56 Dean Street, which might be because the COVID-19 epidemic in England (5585 cases as of March 22)[2] was larger than in Australia (1765 cases as of March 22).[3] The reduction observed at MSHC might have been due to reduced sexual risk during the COVID lockdown period rather than reduced access to services,[4] given our walk-in service remained open and accessible throughout the period.

Since the nadir of PEP prescriptions in the week of April 13–19, a relatively rapid increase in prescriptions was seen during the lockdown period reaching 17 prescriptions (May 11–17) and 20 prescriptions (May 18–24) in the 2 weeks immediately after restrictions began to on May 13, 2020, and individuals were allowed to visit friends and family indoors with no more than five visitors.[5] If PEP prescriptions are used as a proxy for risky behaviour then our data suggest that any decrease in HIV and STI diagnoses will be temporary.

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1 Junejo M, Girometti N, McOwan A, Whitlock G. HIV postexposure prophylaxis during COVID-19. *Lancet HIV* 2020; published online May 25. https://doi.org/10.1016/S2352-3018(20)30146-6.

2 UK Government. Number of coronavirus (COVID-19) cases in the UK. The latest number of coronavirus (COVID-19) cases in the UK. UK Government, 2020. https://www.gov.uk/guidance/coronavirus-covid-19-information-for-the-public (accessed June 10, 2020).

3 COVID-19 National Incident Room Surveillance Team. COVID-19, Australia: Epidemiology Report 8 (Reporting period from 19:00 AEDT 14 March to 23:59 AEDT 22 March 2020). *Commun Dis Intell (2018)* 2020; **44:** 28.

4 Chow EPF, Hocking JS, Ong JJ, et al. Changing the use of HIV pre-exposure prophylaxis among men who have sex with men during the COVID-19 pandemic in Melbourne, Australia. *Open Forum Infect Dis* 2020; published online July 2. https://doi.org/10.1093/ofid/ofaa275.

5 Victoria State Government. Bulletin 36/2020: Coronavirus (COVID-19) easing of restrictions. Victoria State Government, May 11, 2020. https://www.localgovernment.vic.gov.au/__data/assets/word_doc/0023/464306/BULLETIN-36-2020.docx (accessed June 10, 2020).

Sexual transmission of an extensively drug-resistant HIV-1 strain

Emergence of drug-resistant HIV-1 has long been identified as a public health threat.[1] However, there has so far been little transmission of multidrug-resistant strains, probably because of reduced replication fitness of highly mutated strains that makes them less adapted for establishing infection than wild-type strains among the viral quasispecies. In HIV-1 primary infections in France, less than 0·1% of transmitted viruses had triple-class resistance.[2]

Here, we report a case of symptomatic primary HIV-1 infection diagnosed in September, 2019, in a 23-year-old French man who has sex with men. HIV-1 ELISA was negative in June, 2019, then became positive in September, with incomplete immunoblot (Fiebig stage IV), plasma HIV-1 RNA of 5·1 $\log_{10}$ copies per mL, and CD4 count of 821 cells per µL. He did not use pre-exposure prophylaxis.

A unique, extensively drug-resistant founder virus was identified by Sanger and next-generation sequencing with a homogeneous, fully mutated viral quasispecies that remained stable off-treatment (appendix p 1). This subtype-B strain had resistance mutations to all available nucleoside reverse-transcriptase inhibitors, non-nucleoside reverse-transcriptase inhibitors, and protease inhibitors, and near-complete resistance to integrase inhibitors, except low-level resistance to dolutegravir and bictegravir, according to the Stanford algorithm and the French National Agency for Research on AIDS algorithm (appendix p 2).[3,4] Entry coreceptor usage assessment by a recombinant virus assay revealed a pure R5 phenotype, in agreement with V3 *env* next generation sequencing (appendix p 3). The gp41 *env* gene sequence revealed only an Asn42Gly mutation.

We identified a second extensively drug-resistant HIV-1 strain with the same mutation pattern in the same region of France in a 54-year-old man who has sex with men. This patient had been HIV-positive since 1995, with a long history of virological failure. Plasma HIV-1 RNA was 5·5 $\log_{10}$ copies per mL, and CD4 count was 205 cells per µL (8%) in July, 2019, despite a regimen of tenofovir, emtricitabine, ritonavir-boosted darunavir, and dolutegravir. Quasispecies analyses of pol and env genes by next generation sequencing identified the same dominant extensively drug-resistant strain (appendix p 1), as well as major CCR5-using variants and minor CXCR4-using variants (appendix p 3). The strains in both patients were phylogenetically-related (appendix p 4), but a direct transmission history could not be established, suggesting unsampled intermediary links.

A five-drug regimen combining four drugs that target the virus entry step (ibalizumab, fostemsavir, maraviroc, enfuvirtide) with dolutegravir (50 mg twice a day) is planned for the patient with a pure R5 phenotype. The patient with mixed R5 and R4 phenotype will have the same regimen without maraviroc. Early access to the new GS-6207 capsid inhibitor might be an interesting additional therapeutic option.

See Online for appendix

The sexual transmission of such an extensively drug-resistant virus is an unprecedented event. Transmission of a multidrug-resistant HIV-1 strain was reported in New York (NY, USA) in 2004, but without resistance to tipranavir and integrase inhibitors at that time.[5] Extensively drug-resistant HIV-1 strains might have a reduced viral fitness. However, the plasma viral load was more than 5 $\log_{10}$ copies per mL in the source patient at the time of transmission to the recipient patient, suggesting good adaptation of the viral strain to the host. However, the plasma viral load tended to decrease in the recipient patient after primary infection, which means that longer follow-up and additional studies on the viral fitness of this strain are needed. An epidemiological surveillance network of virologists, clinicians, and local actors of prevention should prevent the diffusion of this extensively drug-resistant HIV-1 strain. New antiretroviral drug classes are needed to open alternative therapeutic avenues for such strains.

We declare no competing interests.

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