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Short Communication

An outbreak of SARS-CoV-2 infections among people living with HIV and its successful containment—Taiwan, May to August 2021

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In Taiwan, 14,308 locally acquired COVID-19 cases among customers and employees in Sexy Tea shops were the first cases from May 9–August 28, 2021 (weeks 19–34). Nine weeks after the community spread of COVID-19 began, the proportion of people living with HIV (PLHIV) among the COVID-19 patients peaked at 35.7%, affecting 192 HIV patients, while the prevalence of HIV infection was 0.15%. In addition to a nationwide Level 3 epidemic alert, the Taiwan Centers for Disease Control (Taiwan CDC) launched four strategies to contain this outbreak among PLHIV in this prevaccine era, including improving the quality of contact tracing, delivering health information via peer navigators, expanding SARS-CoV-2 screening and encouraging vaccination, and addressing hesitancy. The outbreak of COVID-19 related to Alpha strain among PLHIV in 2021 ceased four weeks after peaking and lasted eight weeks.

Since China discovered the first patient with coronavirus disease 2019 (COVID-19) on the last day of 2019, severe acute respiratory syndrome virus 2 (SARS-CoV-2) has infected over 200 million people in early August 2021. Taiwan is an island country with a population of 23 million. Utilizing strategies of border control, wearing masks, and intensive

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contact tracing and quarantine, Taiwan diagnosed 1210 patients, with 99 (8.2%) categorized as locally acquired cases until week 18. From May 9–August 28 (weeks 19–34), 14,308 patients with locally acquired COVID-19 were diagnosed with the SARS-CoV-2 Alpha strain among customers and employees in Sexy Tea shops in Wan Hua, located in the Taipei metropolitan area, which harbors approximately 30% of the population of Taiwan. The nationwide Level 3 epidemic alert was imposed on May 19 (week 20), including mandatory indoor and outdoor mask wearing, registration for entry to any indoor facilities, limit on indoor gatherings to fewer than five persons, no dining in restaurants, school closures from kindergartens to colleges and encouraging nonmandatory working from home.

The reported number of people living with HIV (PLHIV) was 34,712 in August 2021. In 2020, the 90-90-90 estimates in Taiwan were that 90% of PLHIV knew their HIV status, 93% were receiving antiretroviral therapy (ART), and 95% of those receiving ART achieved viral suppression. Unsafe sex in men who have sex with men (MSM) is the primary transmission route (83%), followed by unsafe sex with heterosexual contact (11%) and injecting drug users (IDUs) (1%). Few people received COVID-19 vaccination before this epidemic, and vaccine coverage was less than 1% for the first dose in May. PLHIV were placed on the priority list for COVID-19 immunization as Group 9 (including adults aged 18–64 years with serious comorbidities, along with catastrophic illness and rare congenital diseases) and started to receive vaccination on July 16, 2021 (week 28).

We investigated an outbreak of COVID-19 among PLHIV in Taiwan from May 9 to August 28, 2021. The data included demographics, clinical outcomes of coinfected patients, and immunization records collected from the National Notifiable Diseases Surveillance System, the Case Management System of Chronic Infectious Diseases, and the National Immunization Information System. Contact tracing was implemented according to the following rules. Those who were exposed to COVID-19 index patients within 1.5 m without proper personal protective equipment for up to 15 min indoors were identified as close contacts. Close contacts were required to be quarantined either at a home with single-room occupancy, in specialized hotels, or in quarantine centers until 14 days after the last exposure to the index patients. Public health workers performed contact tracing and entered contact information into the contact tracing system, including the place of contact and their relationships. Contacts were tested for SARS-CoV-2 by PCR by the end of quarantine routinely starting on June 22. Before this mandatory testing strategy was implemented, mutual texting twice a day for symptoms of COVID-19 with public health authorities was needed, and testing was provided when symptoms were reported. The denominator of the secondary attack rate was the number of people who were identified as close contacts. The uptake rate of COVID-19 vaccines among PLHIV was stratified by transmission routes. Excel, SAS 9.4, and QGIS 3.10 software were used for the analysis.

A total of 14,308 COVID-19 patients were notified, and 192 (1.3%) were coinfected with HIV. The epidemic of COVID-19, defined by day of symptom onset, started on May 11, peaked in week 20 (May 16–May 22), and declined thereafter (Fig. 1). Although a nationwide Level 3 epidemic alert was implemented on May 19 (week 20), the proportion of PLHIV among the COVID-19 patients was 2.5% in week 25 (June 20–26), peaked in week 29 (July 18–24) with a proportion of 35.7% and declined thereafter. Overall, 89% were young males (age 20–49 years), with 97% (186/192) receiving ART and 93% (173/186) achieving viral suppression. Geographically, 93% (178/192) of the coinfected patients were located in northern Taiwan (Fig. 2); subsequently, coinfected patients were identified in middle and southern Taiwan after May 23. The epidemic alert was downgraded to Level 2 after week 30. After week 34, the number of coinfections with HIV and COVID-19 decreased to one patient or zero per week.

Regarding the clinical presentation of COVID-19 among PLHIV, 175 (91.1%) were asymptomatic or had mild disease at the time of diagnosis, and 14 (7.3%) had severe pneumonia or acute respiratory distress. Two (1%) died within 60 days after diagnosis: they were a 66- and a 70-year-old male on regular once-daily ART with CD4 counts of 352 and 464, respectively, before the onset of COVID-19. They both experienced severe pneumonia and respiratory failure on the 8th day after the onset of symptoms (in week 20 and week 21) and died on the 40th and 33rd days with septic shock, respectively. The 70-year-old man had diabetes and coronary artery disease, while the 66-year-old man had no remarkable comorbidities. Among the 1806 contacts of the 192 patients, 130 were found to be SARS-CoV-2 PCR positive. The secondary attack rate was 17.1% (42/245) for household contacts and 5.6% (88/1561) for non-household contacts (p < 0.0001, chi-square test).

The Taiwan CDC launched a special task force focused on four strategies and targeting key populations on July 11 to contain the outbreak, including improving the quality of contact tracing, delivering health information via peer navigators, expanding SARS-CoV-2 screening and encouraging vaccination, and addressing hesitancy.

Reluctance to disclose intimate contact history to public health authorities due to moral and social pressures for PLHIV could hamper contact tracing. Therefore, public health officers engaged HIV case managers, whom coinfected patients are accustomed to, during COVID-19 contact tracing. Through this collaboration, coinfected patients were more willing to reveal their contact history so that relevant testing and quarantine of their contacts could be performed in a timely manner.

Second, simple messages were designed to propagate correct information, including encouraging SARS-CoV-2 testing and promoting the Taiwan Social Distancing App, as well as how to respond to contact interviews with ease and how to schedule COVID-19 vaccination. Correct health information via LINE, Facebook, and e-mail was delivered through different channels, including public health officers at health bureaus, HIV case managers, and peer groups in nongovernmental organizations and MSM health centers.

Third, to empower key populations, 8000 self-tests were delivered via public health stations and HIV-designated hospitals to those with high-risk sexual behaviors, including PLHIV, people enrolled in the Pre-exposure prophylaxis program, and people newly infected with sexually transmitted diseases. Since sex and casual encounters could still occur under the Level 3 alert, risk-based self-testing could
Epidemic curve (by symptom onset day) of coronavirus disease (COVID-19) among people living with HIV (PLHIV) in Taiwan, May 9—August 28, 2021. The proportion of PLHIV among COVID-19 patients was 2.5% in week 25 (June 20—26), peaked in week 29 (July 18—24) with 35.7%, and declined to 24.8% and 3.7% in weeks 30 and 33, respectively. After week 34, the number of people coinfected with HIV and COVID-19 decreased to one patient or zero per week and was stable. At the beginning of the coinfection outbreak, most of the coinfected PLHIV were older than 40 years of age (77%). However, since week 24, over 50% of the coinfected patients were under 40 years old.

Distribution of coronavirus disease (COVID-19) patients among people living with HIV in Taiwan, May 9—August 28, 2021. Dots indicate where the COVID-19- and HIV-coinfected patients lived. Shading indicates the prevalence of COVID-19 at the city and county levels, representing community COVID-19 situations. The stratification of the prevalence rate at the city and county levels is based on the Jenks natural breaks classification method, a data clustering method designed to determine the best arrangement of values into different classes, seeking to reduce the variance within ranks and maximize the variances between classes.
help identify COVID-19 patients in a timely manner. Moreover, the message was also advertised not only targeting young groups who had used social apps before but also on dating applications, including Hornet, Grindr, and Jack’d, which were primarily used among the MSM population in Taiwan.

The fourth strategy was to call PLHIV to get vaccinated as soon as possible. The Taiwan CDC released an official document listing the right and the necessity for PLHIV to receive vaccination urgently to prevent discrimination or controversy between frontline health care providers and PLHIV. Furthermore, instructions were provided about how to respond to health care providers about their immune status and to contact HIV case managers if PLHIV had any difficulty getting COVID-19 immunizations through HIV case managers, peer groups in nongovernmental organizations, or MSM health centers. The trend of the uptake rate of the first dose of the COVID-19 vaccine among PLHIV during this outbreak increased sharply from 9.9% by week 28 to 48.3% by week 30 and to 66.5% by week 34. The vaccination rate of IDUs was 38.5%, which was the lowest compared to MSM and people who had unsafe sex with heterosexual contact.

While the prevalence of SARS-CoV-2 in the general population was estimated to be similar to that among PLHIV worldwide, the outbreak among PLHIV peaked nine weeks after the main epidemic started. The cause of the delay might reflect the situation of the Sexy Tea shops where the main breakout was located, which initially involved heterosexual older men. 

With a nationwide Level 3 epidemic alert, social gatherings were limited to families, while intimate behavior among MSM might not have been restricted that much before this outbreak was identified. Without COVID-19 vaccination, over 90% of coinfected individuals were asymptomatic or had mild diseases, and the outcome was good with a low fatality rate (1%), reflecting a younger age and the effects of mitigation and protective measures from PLHIV care providers and communities themselves.

From an immunological perspective, PLHIV could have a similar outcome of COVID-19 as the general population if viral suppression was achieved. The mortality was 1% in France and 3.6% in South Africa. Factors associated with in-hospital mortality were age, comorbidities, and low CD4 count. In this outbreak, only two (1%) mortalities occurred, and both were well-controlled patients. This might reflect the severely compromised intensive care capacity in the early phase of a community outbreak. Fortunately, essential health services and systems were maintained in Taiwan, and the disruption of HIV care was prevented by multiple medicine refills (every 3–6 months) and the use of telemedicine during the Level 3 alert during this wave of the COVID-19 epidemic in Taiwan.

Our study has some limitations. First, the data analyzed for this study were collected for the purpose of infectious disease control, so confounding factors could not be controlled for. Second, similar to all the studies using epidemic investigation data, recall bias, such as for symptom onset, could exist. The epidemic curve may skew toward the day that the individual tested positive. Finally, we were unable to assess the detailed treatment record for remdesivir or monoclonal antibodies for the coinfected patients since only secondary data were available at the Taiwan CDC. However, other studies did not reveal a potential difference in clinical care for coinfected patients with CD4 counts up to 50 cells/mm³.

In summary, timely collaboration with HIV partners and key communities, especially focusing on structural vulnerabilities, helped stop the explosive COVID-19 outbreak among PLHIV and the spread of the COVID-19 epidemic.

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Declaration of competing interest

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