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SARS-CoV-2 among inmates aged over 60 during a COVID-19 outbreak in a penitentiary complex in Brazil: Positive health outcomes despite high prevalence

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Objectives: To assess SARS-CoV-2 prevalence and health outcomes among inmates over 60 years during a COVID-19 outbreak in a major penitentiary complex in the Federal District, Brazil.

Methods: A mass test campaign was performed on May 13, 2020, using antibody-detection rapid tests for asymptomatic inmates and reverse transcriptase-polymerase chain reaction testing for those who were symptomatic. Those with negative results were retested on June 16. Inmates were interviewed to characterise background health conditions and the presence of symptoms.

Results: A total of 159 inmates were evaluated. In the first mass testing, 79.9% (127/159) of inmates had been infected, of whom 53.5% (68/127) reported symptoms. In the second testing round, 17 new cases were identified, increasing the total to 90.6% (144/159) of inmates with a positive result. Comorbidities were present in 67.3% of inmates; 2 hospitalisations and no COVID-related deaths were recorded.

Conclusion: More than 90% of inmates aged >60 years were infected with SARS-CoV-2 during the outbreak. Periodic health monitoring, active case finding and early care for symptomatic patients contributed to positive post-infection outcomes. Such measures must be considered essential for the surveillance of COVID-19 in environments with limited capacity to promote social distance, such as penitentiary institutions.

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The first COVID-19 case in Brazil was reported on February 26, 2020. Brazil has registered over 10 million cases and 248 000 deaths as of February 24, 2021 (Painel Coronavirus, 2021). A COVID-19 outbreak started in a maximum-security penitentiary complex in Brasília, Federal District, on April 1, 2020. The complex comprises 4 prison units, hosting over 13 000 male inmates. There were 2064 COVID-19 confirmed cases at the complex by October 7, 2020, including 1724 inmates. The outbreak is further described elsewhere (Gouvea-Reis et al., 2021). In this report, we describe the SARS-CoV-2 prevalence among inmates aged >60 and discuss factors related to their health outcomes. This work was part of a public health surveillance action as defined by national law n° 8080.IV.II.16. All individuals provided voluntary oral consent. Ethics approval was obtained under CONEP (Comissão Nacional de Ética em Pesquisa [National Research Ethics Commission], protocol number 37007220.1.0000.0008).

In the first week of April, local health and security teams initiated the transfer of all 159 inmates aged >60 into a specific block, aiming to provide better monitoring and assistance. Dedicated health and security staff were assigned to assist that
group, face masks were distributed, and periodic sanitisation of common spaces was implemented.

The first 2 COVID-19 cases among these inmates were reported on April 13; by May 12, 30 cases were confirmed in the group (18.9%). From 13 to 15 May, the local health team tested the remaining inmates in the group. Symptomatic patients were tested by reverse transcriptase-polymerase chain reaction (RT-PCR), the others were screened through immunoglobulin (IgM/IgG antibody-detection rapid tests (Acro Biotech, https://www.acrobio-tech.com). RT-PCR identified 10 new COVID-19 cases, and 87 were identified through antibody rapid tests. Overall, 79.9% (127/159) had been infected by SARS-CoV-2 by May 15. All inmates were interviewed to characterise their symptoms since the beginning of the outbreak. Symptoms were reported by 53.5% (68/127) of the positive cases. Pre-existing health conditions were present in 107 (67.3%) inmates, with hypertension (54.1%) and diabetes (17.6%) being the most prevalent (Table 1).

A second mass testing campaign was performed on June 16, where the 32 inmates without a previous positive result were tested with IgM/IgG antibody-detection rapid tests (Livzon Diagnostics, http://www.livzondiagnostics.com). A total of 17 new positive results were found, meaning that a total of 90.6% (144/159) of inmates aged >60 had been infected by SARS-CoV-2. The COVID-19 pandemic has raised concerns about the impact of living conditions in prison settings on patient outcomes (Sánchez et al., 2020; Burkí, 2020; Kinner et al., 2020). Prisons are often overcrowded and poorly ventilated, making them an ideal environment for the introduction and spread of respiratory infectious diseases (Dolan et al., 2016). There are very few reports on the transmission dynamics and impact of COVID-19 in prisons settings. Mass testing for SARS-CoV-2 in 16 prisons and jails in the United States found viral prevalence as high as 86.8% (Hagan et al., 2020).

There was great concern from public health authorities and the local health team about patient outcomes if SARS-CoV-2 reached the block hosting inmates >60 years. In addition to advanced age, the group had other risk factors such as high levels of pre-existing comorbidities and their intrinsic vulnerability as an incarcerated population. In the Federal District of Brazil, the COVID-19 mortality rate is 5.2% for patients aged 60–69, 12.5% for 70–79 and 27.6% for ≥80. It would therefore be expected that the outbreak would pose a challenge for older inmates inside the prison unit (Secretaria de Saúde do Distrito Federal, 2021). However, despite >90% of the group being infected by SARS-CoV-2, only 2 inmates were hospitalised, and there were no COVID-19 related deaths as of October 7 (Appendix Table 1 in Supplementary material).

Such positive outcomes likely resulted from the local health and security teams’ actions to prepare, prevent, and respond to the COVID-19 outbreak. Although the congregation of all inmates aged >60 years into the same block did not prevent the introduction and spread of SARS-CoV-2 in that population, it allowed a better allocation of resources in the context of increased healthcare demand. The dedicated health team provided daily monitoring of comorbidities, active case finding and early patient care upon symptoms onset. Symptomatic inmates were tested through RT-PCR, positive cases were isolated, and mass test campaigns were important to estimate the true SARS-CoV-2 prevalence, including the proportion of asymptomatic infected inmates. No off-label medication was used, but symptomatic patients were treated to relieve symptoms and, on early signs of desaturation or severity, they were referred to a local hospital.

In conclusion, >90% of inmates aged >60 were infected with SARS-CoV-2 within 2 months. Despite high levels of underlying health conditions, we found that periodic health monitoring, active case finding and early assistance for symptomatic patients were key actions that contributed to positive outcomes. Such initiatives should be considered in settings with limited social distancing capacity, such as correctional and detention facilities.

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**Appendix A. Supplementary data**

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.ijid.2021.03.080.

**Transparency declaration**

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