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Research paper

A COVID-19 micro-epidemic in the shelter for the homeless in Olsztyn

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Abstract

Introduction: Viruses, such as SARS-CoV-2, are airborne and transmitted mainly via droplets. This type of transmission is particularly significant for people remaining in common closed space. It is also crucial in the case of homeless people who remain periodically in shelters, considering that in this subpopulation it is often problematic to follow anti-epidemic hygiene measures.

Aim: The aim of this work was the assessment of COVID-19 incidence in the Shelter for the Homeless named after Sabina Kusznierów in Olsztyn (Poland), and the analysis of the development of a micro-epidemic.

Material and methods: Data were collected from the Shelter for the Homeless named after Sabina Kusznierów in Olsztyn. The retrospective analysis embracing the period of December 2020 and March 2021 was performed for 82 shelter residents. Attendance lists and personal identification numbers (PESEL) constituted the basis for obtaining the results of SARS-CoV-2 PCR tests from the gabinet.gov.pl portal.

Results and discussion: Each of those residents remained overnight in the shelter at least once. In total, 50% of the analyzed individuals became infected. No cases of reinfection were noted. This work presents a case of COVID-19 transmission in closed space in which 'patient zero' appeared on December 18, 2020.

Conclusions: The described epidemic demonstrates the classic scenario of an infectious disease transmission in closed space. Owing to the implications for society, ease of the infection transmission in the general population, and the lack of other real measures to influence this subpopulation, we believe that this group should be prioritized when planning vaccinations during possible subsequent waves of infections, if such should occur.

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1. INTRODUCTION

Medical literature published in the years 2020 and 2021 has been dominated by reports concerning COVID-19. This epidemic, with its onset on November 17, 2019 in Wuhan (China), reached Poland on March 4, 2020. After 24 days, the number of infections amounted to 1389 cases, and as of the editing of this work (May 2021) the number of cases in Poland has exceeded 2 800 000.[1] Viruses, such as SARS-CoV-2, are airborne and mainly transmitted via droplets, though they may also be transmitted indirectly, for instance, through contact with the belongings of infected individuals.[2–4] This type of transmission is particularly significant for people remaining in common closed space.[5] The principles of social distancing, aimed at breaking the chain of infections, require people at risk of getting infected to follow epidemiological discipline, to understand this risk and to observe anti-epidemic hygiene measures. This is of crucial importance in the case of homeless people who are at high risk of transmitting infectious diseases.[6] The low economic status, low educational level, and alcoholism affecting three fourth of this subpopulation make all attempts to implement anti-epidemic hygiene measures virtually impossible.[7]

The Centers for Disease Control and Prevention (CDC) recommend the following measures to prevent the SARS-CoV-2 transmission among homeless people: sleeping at a distance from others of at least 2 m, covering of the nose and mouth by all residents, and testing all shelter residents, including the staff, for SARS-CoV-2 infection in the case of epidemic outbreak.[8] Regular examinations of shelter residents during the pandemic are also recommended.[9] It must be stressed that the population of homeless people is more flexible as regards remaining in a specific location in relation to the general population.[10] High infectiousness creates the risk of the easy transmission of pathogens and difficulties in determining those individuals who might have been potentially infected.[11] A similar, although much less dynamic, situation is observed as regards tuberculosis. Homeless people constitute a specific reservoir of the pathogen and a source of infection transmission to the general population.[12] The incidence of tuberculosis is an 80-300-fold higher among the homeless compared to the general population, and each detected and cured case of this disease among homeless people contributes to the decrease of the cases of infection in the general population to a ratio of 1 : 20 within a 5 year period.[12,13]

2. AIM

The aim of this work was the assessment of COVID-19 incidence in the Shelter for the Homeless named after Sabina Kusznierów in Olsztyn (Poland), and the analysis of the development of a micro-epidemic.

3. MATERIAL AND METHODS

Data for the retrospective analysis were collected based on the attendance lists in the Shelter for the Homeless named after Sabina Kusznierów in Olsztyn (Poland). Next, based on the personal identification numbers (PESEL), information concerning the positive and negative results of COVID-19 polymerase chain reaction (PCR) tests were obtained from the gabinet.gov.pl portal. When collecting the database for the study, participants' details were fully anonymized. The following parameters were considered: age, gender, cases of infection, and number of overnight stays in the shelter. The Olsztyn shelter consists of 2 pavilions, located approximately 50 m from each other. Pavilion A, by definition, is a temporary night shelter, with a varying degree of use depending on the season. Pavilion B groups occupants who stay chronically, and allows 30 people to stay permanently. Meals are served in pavilion A. Statistical analysis was performed using the Statistica v. 13.3 software (Tibco Software Inc., USA). Because the homogeneity of variance was not met, the Kruskal–Wallis test was used. Post hoc analysis was conducted with using Dunn test.

In total, data of 82 residents in the Shelter for the Homeless in Olsztyn who remained during the analyzed period in the shelter at least once were included in the study. Females constituted 17% of the study group. The average age was 56 years (SD 11.485), whereas individuals younger than 50 years of age constituted 32%.

4. RESULTS

In the analyzed period, i.e., December 8, 2020 to February 28, 2021, 41 positive results of SARS-CoV-2 tests were confirmed. In total, 50% of all individuals who remained overnight in the shelter became infected. No cases of reinfection were observed. In 52 individuals diagnostic SARS-CoV-2 tests were performed more than once during the analyzed period. One person was hospitalized. The remaining participants had mild infections. Infected individuals spent 10 days of quarantine in an isolation facility. In Poland, shelter residents undergo vaccinations as provisioned in the national vaccination program. All cases of COVID-19 were recorded among the occupants of pavilion A. In January 2021, on average 47 (SD 15.99) people spent the night in pavilion A, an average of 27 (SD 1.54) people per day stayed in pavilion B (population much more stable – permanent residents). It should also be noted that these values are much

Table 1. Attendance in January in the following years 2017–2021 in pavilion A, average values (SD).

January of the year	2017	2018	2019	2020	2021
Average attendance	78(6.02)	77(4.50)	85(5.45)	73(6.09)	47(15.99)*

Comments: * The attendance in January 2021 differs statistically significant ($P < 0.001$) from the other presented average values, the average values for 2017–2020 do not differ statistically significant.

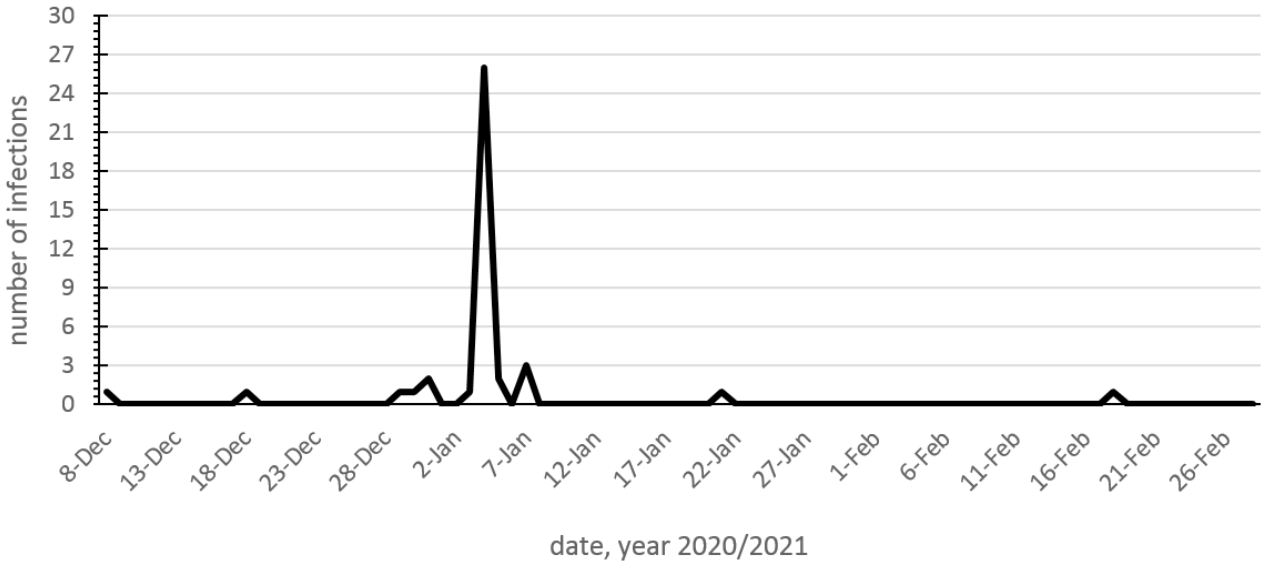

Figure 1. Dynamics of the development of a COVID-19 micro-pandemic in the Shelter for the Homeless named after Sabina Kusznierów in Olsztyn, Poland.

lower than in the years preceding the epidemic. Sample data (for the month of January) for the years 2017–2021 are presented in Table 1.

Figure 1 presents the dynamics of the development of the micro-epidemic, with an evident peak on January 4, 2021.

5. DISCUSSION

The study describes the outbreak of a COVID-19 micro-epidemic within the shelter in Olsztyn. 'Patient zero', who infected the remaining residents, had a positive result of SARS-CoV-2 test on December 18, 2020. According to the attendance register, this patient remained in the shelter from December 10, 2020 to December 17, 2020, with a one-day absence on December 16, 2021. Subsequent cases were detected (Figure 1) on December 29, 30 and 31, 2020, with 4 positive results detected from SARS-CoV-2 tests. The COVID-19 epidemic clearly evidenced the sensitivity of small closed environments as regards the spread of infection. Various types of nursing homes, prisons, military units, and even remaining on the same ship, significantly increased the potential risk of infection transmission.[14–16] In the case of the homeless, the situation is slightly more unique. This subpopulation, especially in winter, remains periodically, and in particular overnight, in conditions conducive to the local transmission of infection (common closed space – the shelter). However, during daytime it is characterized by relative mobility. This, combined with a tendency towards ignoring disease symptoms by homeless people, indicates epidemiological analogies to tuberculosis. Detection of tuberculosis in this subpopulation is generally late, and in an advanced stage of the disease, that is after a long period of contagiousness.[17] Authors of sparse reports concerning the COVID-19 transmission among the homeless present quite contradictory findings. Schrooyen L et al. observed that the number of hospitalizations due to COVID-19 is three-fold higher in this group as compared to the general population.[18] On the other hand, the study conducted by Baggett TP et al. involving a group of 408 shelter residents in Boston, with 147 individuals having a positive PCR test result, revealed that 87.8% of the individuals were asymptomatic.[19] Perhaps a higher number of hospitalizations resulted from preventive measures, aimed not so much at protecting the health of the particular homeless individual, but rather at slowing down and controlling the development of the epidemic. Positive SARS-CoV-2 patients from the shelter in Olsztyn were also periodically isolated in a temporary isolation facility, organized in a previously functioning student dormitory (a form of hospitalization). Significantly, considering the organization of local healthcare for the homeless, mortality rates in the population of the homeless is about four-fold higher as compared to the general population, and the average lifespan of homeless people is several years shorter.[20,21] In this context, a higher number of hospitalizations may result from the awareness of the risk associated with ambulatory care, although the observed course of the disease both in this study and in data from literature, was relatively mild.[19] A separate explanation is needed for the exceptionally low attendance in the Olsztyn shelter in January 2021 (Table 1). In the model of caring for the homeless, which is classic for our region, the attendance at the shelter increases with the first autumn cold wave, reaching its peak in the winter months. This phenomenon is used, among others, to estimate the number of homeless people using the point-in-time method.[22] The winter of 2021, colder than in previous years, should intensify this phenomenon. Meanwhile we have observed a completely opposite relationship. Our study does not answer the question why this is so. We believe, however, that the introduction of the 'lock down' by the Polish Government at the peak of the epidemic has cut the natural migration paths of homeless people, who under normal conditions during this period move towards urban agglomerations, where it is easier to ensure a certain subsistence level[10].

6. CONCLUSIONS

(1) The presented COVID-19 micro-epidemic occurring in the shelter for the homeless does not differ from the predictable course of the development of infection in a closed environment.
(2) Spreading of COVID-19 among the homeless may have the epidemiological consequences for the general population.
(3) Homeless people should be considered a potential disease vector.
(4) Early vaccination of that subpopulation should be considered during subsequent waves of infections, if such should occur.

Conflict of interest
Authors declare no conflict of interest.

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Ethics
The study was performed with the consent of the administration of the Shelter for the Homeless in Olsztyn, and previously granted a positive opinion by the Ethics Committee of the District Warmia and Mazury Chamber of Physicians in Olsztyn (Resolution No 5/2021/VIII of 15 March 2021).

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