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Concise Communication

Incidence of healthcare-associated coronavirus disease 2019 (COVID-19) in the state of Geneva

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Abstract

An examination of all coronavirus disease 2019 (COVID-19) cases and patient movements in Geneva indicated important disease activity within the healthcare system since the beginning of the pandemic. We estimate that 4.3% of all COVID-19 cases were likely acquired within the healthcare system, contributing to 62% of the COVID-19–related deaths.

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The coronavirus disease 2019 (COVID-19) pandemic has caused a global burden of infection, hospitalization, and mortality. Visitors and healthcare workers are at risk of being infected with severe acute respiratory coronavirus virus 2 (SARS-CoV-2),[1] and inpatients may be exposed to an increased risk of acquiring COVID-19 within the healthcare setting. Clusters of COVID-19 have been reported in acute and long-term care institutions since the early stage of the pandemic,[2–4] and concerns about hospital-acquired COVID-19 have continued.[5,6] However, the literature to date only report surges occurring in a limited period or detailed transmission chains from only a relatively few cases. Thus, the overall incidence of healthcare-associated COVID-19 infections remains to be estimated.

In this study, we estimated the incidence of healthcare-associated COVID-19 cases (HACCs) since the beginning of the pandemic in a mostly urban Swiss canton (cantons are the member states of the Swiss confederation. For readability, we refer to cantons as states.). This state has 54 nursing homes (~4,100 residents) and the University Hospitals of Geneva (HUG), the largest tertiary-care center in Switzerland, comprising 10 affiliated peripheral sites with 2,000 beds and 12,000 employees. Its department of geriatric and readaptation (DRG) includes geriatrics wards (ie, acute-care medical wards for patients aged >65 years), rehabilitation wards and long-term care facilities (ie, assisted living for patients waiting to be admitted in another healthcare facility).

Methods

Information on patients in healthcare facilities was available for all patients in the main public hospital and all nursing homes. Information on COVID-19 cases residing in the state of Geneva comes from the ARGOS registry (CCER no. 2020-01273),[7] which contains baseline, follow-up, and contact information for all SARS-CoV-2–positive persons tested in Geneva: 57,203 cases between the first case on February 26, 2020, and April 1, 2021. The present analyses were conducted entirely with deidentified data and thus did not require additional approval from the institutional review board.

Following current recommendations,[8] HACCs are identified as probable or definite according to the following criteria:

- Patients being hospitalized or institutionalized for at least 8 days for probable HACCs and 14 days for definite HACCs.
- Having a positive SARS-CoV-2 polymerase chain reaction (PCR) test result delivered after 8 days following admission and before the day 4 following discharge for probable HACCs or after 14 days following admission and before the day 4 following discharge for definite HACCs.
- If symptoms were declared (self-reported during calls, see[7]), the date of their appearance was after 8 days following admission for probable HACCs and after 14 days for definite HACCs.
- Not being declared as contact of a COVID-19 case during a period spanning from a week before the admission until discharge.

The incidence of HACCs in hospitals was calculated as the number of hospitalizations leading to HACCs divided by the number of hospitalizations (of duration >8 days for probable HACCs or >14 days for definite HACCs, respectively) not linked to COVID-19.

For the nursing homes, we considered a fixed number of residents who were all admitted at least 14 days before the pandemic. Since Geneva experienced 2 main waves of COVID-19 activity, the analysis was separated between 2 periods: February 26 to July 1, 2020, and July 2, 2020, to April 1, 2021 (Fig. 1).

The vaccination program in Geneva that started on December 28, 2020, and continued until March 17, 2021,[7] included only residents >74 years old and patients with risk factors.

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Table 1. Summary of COVID-19 Cases and Related Deaths in the state of Geneva[a] during the 2 COVID-19 Pandemic Periods[b]

Variable	Total	First Period	Second Period
COVID-19 in Geneva			
Total COVID-19 cases in Geneva	57,203	6,276	50,927
Total COVID-19–related deaths in Geneva	734	288	446
Patients in healthcare facilities			
Hospitalizations other than COVID-19 in HUG with LOS > 8 d, no.	14,918	4,916	10,002
Hospitalizations other than COVID-19 in the department of geriatric and readaptation of HUG, LoS > 8 d, no. (%)	5,033 (33.7)	1,845 (37.5)	3,188 (31.9)
Sex, female, no. (%)	7,528 (50.5)	2,460 (50.0)	5,068 (50.7)
Probable and definite healthcare-associated COVID-19 cases (HACCs)			
Probable and definite HACCs, no.	2,435	547	1,888
Age, median y (IQR)	86.3 (78.1–91.5)	87.1 (80.2–91.3)	86.1 (77.6–91.5)
Sex, female, no. (%)	1,603 (65.9)	355 (64.9)	1,248 (66.2)
Probable and definite HACCs compared to the total COVID-19 cases, %	4.3	8.7	3.7
Probable and definite HACCs in nursing homes, no. (% of the HACCs)	1,897 (77.9)	404 (73.9)	1,493 (79.1)
Probable and definite HACCs in the department of geriatric and readaptation of HUG, no. (% of the HACCs)	464 (19.1)	134 (24.5)	330 (17.5)
Probable and definite HACCs in other HUG departments, no. (% of the HACCs)	74 (3.0)	9 (1.6)	65 (3.4)
Probable and definite HACCs in geriatrics and rehabilitation wards of HUG per 100 non–COVID-19 hospitalizations (LoS > 8 days)	9.2	7.3	10.3
Probable and definite HACCs in other wards of HUG per 100 non–COVID-19 hospitalizations (LoS > 8 days)	0.7	0.3	1.0
Probable and definite HACCs in nursing homes per 100 stays	46.3	9.8	36.4
Deaths related with probable and definite HACCs	452	178	274
Healthcare facility worker COVID-19 cases			
Total no.	5,049	980	4,069
Age, median y (IQR)	40.8 (30.8–51.6)	41.2 (31.2–51.6)	40.7 (30.7–51.6)
Sex, female, no. (%)	3,562 (70.6)	709 (72.3)	2,853 (70.1)
In contact with patients, no. (%)	3,217 (63.7)	733 (74.8)	2,484 (61.0)

[a]Number of hospitalizations of length of stay (LoS) >8 days and not related to COVID-19 in the University Hospitals of Geneva (HUG), statistics concerning the probable and definite healthcare-associated COVID-19 cases (HACCs) in the state of Geneva, and characteristics of the COVID-19 cases detected among people working in a healthcare facility.
[b]First period: February 25–July 1, 2020; second period: July 2, 2020, to April 1, 2021.

The SARS-CoV-2 tests were mainly prioritized for symptomatic persons. Between early April 2020 and midMay 2020, and between the beginning of November 2020 and end of June 2021, weekly systematic PCR-based screening of most patients in the DRG of HUG was performed. Beginning in June 2020, all patients admitted to the HUG were systematically tested at admission. Since November 2020, healthcare workers in the DRG of HUG have been encouraged to be tested on a weekly basis.

Results

We identified 2,435 probable or definite HACCs from February 26, 2020, to April 1, 2021, with a median age of 86.3 years (interquartile range [IQR], 78.1–91.5) (Table 1), corresponding to 4.3% of all COVID-19 cases. Overall, 77.9% of these cases were acquired in nursing homes, 19.1% were acquired in the DRG of HUG (464 cases, among which 358 definite HACCs) (Supplementary Table S1 online), and 3.0% were acquired in the other departments of HUG (74 cases, among which 53 were definite HACCs). The incidence of probable or definite HACCs in nursing homes was 46.3 per 100 nursing home stays (9.8 per 100 nursing home stays during the first wave, 36.4 during the second wave). Compared to non–COVID-19 hospitalizations >8 days in the HUG, the incidences of probable or definite HACCs was 9.2 per 100 hospitalizations in the DRG (first period: 7.3 per 100 hospitalizations; second period: 10.3 per 100 hospitalizations) and 0.7 per 100 hospitalizations in the other department (first period: 0.3 per 100 hospitalizations; second period: 1.0 per 100 hospitalizations). Among the 2,435 probable and definite HACCs, there were 452 COVID-19–related deaths, accounting for 62% of the total COVID-19–related deaths in Geneva. During the same period, 5,049 persons working in a Geneva healthcare facility tested positive for SARS-CoV-2, among whom 3,217 declared that they had been in contact with inpatients. The total number of weekly HACCs and healthcare facility worker cases do not appear as clustered in time; rather, they follow the general shape of the curve of the total number of COVID-19 cases detected in Geneva (Fig. 1).

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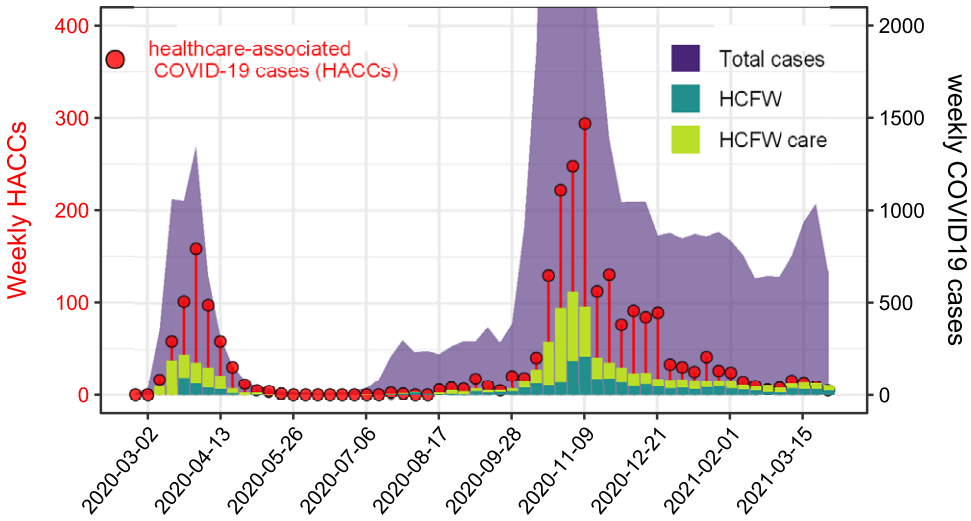

Fig. 1. Weekly number of healthcare-associated COVID-19 cases (HACCs), of COVID-19 cases among healthcare facility workers in contact with patients (HCFW care) or not (HCFW), and of COVID-19 cases in the state of Geneva (total cases). The latter graph has been cut off at 2,000 cases per week to ease comparison between the curves. For example, for the reporting week starting on Monday September 11, 2020, there were >2,000 weekly COVID cases in the state (4,307), 295 HACCs, and 482 cases in healthcare facility workers, 268 of whom were in charge of patient care and 214 of whom were not in direct patient contact.

Discussion

The systematic assessment of all COVID-19 cases reported to the public health authorities in the state of Geneva for more than a year allowed the estimation of probable or definite HACCs in different healthcare settings. The incidences of these HACCs were 46.3 per 100 stays in nursing homes, 9.2 per 100 hospitalizations in DRG wards, and 0.7 per 100 hospitalizations in acute care. Because most of the patients concerned are old and frail and have been hospitalized because of comorbidities, they are at higher risk of unfavorable evolution, as shown by their high proportion of the total COVID-19–related deaths in Geneva. The joint evolution in time of both healthcare-associated COVID-19 cases and cases among people working in a healthcare facility indicates indicates the existence of an important disease activity in healthcare facilities during the COVID-19 surges, which did not vary between the 2 periods. Despite existing preventive measures and the known effect of maskwearing on hospital transmission,[9] this disease activity is likely imported and maintained by healthcare workers and to a lesser extent by patients and visitors (cf, visits were heavily restricted during the first period). In particular, the underestimation of the airborne transmission of SARS-CoV-2[10] and the difficulty to respect preventive measures in shared spaces, such as workplace cafeterias, may have played an important role.[11] A contributing factor to the increase of HACCs in the nursing homes during the second wave, even when expressed as a percentage of the total number of COVID-19 cases, could have been the delay in implementation of global control policies imposed at the state or federal level. Indeed, no restriction nor legal recommendation concerning nursing homes were pronounced before March 31, 2021, in the state of Geneva. The present results support the necessity to vaccinate all hospital workers, and the necessity to promote and implement efficient preventive measures, such as mask-wearing, ventilation, and proactive screening of nursing home residents and employees.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/ice.2021.453

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Conflicts of interest. The authors have no conflict of interest to declare.

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