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Brief report

Daily use of public transportation and incidence of symptomatic COVID-19 among healthcare workers during the peak of a pandemic wave in Zurich, Switzerland

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A B S T R A C T

Use of public transportation could be associated with an increased risk for developing COVID-19. We investigated 376 COVID-19-compatible episodes among our healthcare workers (HCWs), of whom 225 (60%) reported that they used public transportation. In multivariate analyses, HCWs using public transportation had no greater incidence of COVID-19 than those continuously using a private transportation.

During this COVID-19 pandemic, the occurrence of infection clusters among healthcare workers (HCWs) is subject of ongoing research.[1-3] Taking public transportation could be thought of as increasing someone's risk for COVID-19. To explore this issue, we investigated whether the occurrence of COVID-19 among HCWs at our medical center might be related to the daily use of public transportation.

METHODS

The Balgrist University Hospital is a tertiary center for orthopedic surgery in Zurich. It has approximatively 1250 employees.[2] We routinely assess the history of public transportation use by our HCWs during a clinical investigation for COVID-19-compatible symptoms. For this study, we focused on the 2nd pandemic wave of COVID-19 that occurred from 1 October 2020 to 31 December 2020.[2] This period, defined in a prior publication,[2] had the highest rate of spread of the infection in Central Europe.[2] We defined COVID-19 by the presence of compatible symptoms and confirmation by PCR testing. We excluded both asymptomatic carriers of SARS-CoV-2 and HCWs identified by epidemiological linking.[2] Our primary outcome of interest was the risk for COVID-19 in relation to daily use of public transportation, that is, travel by tramway, bus, or train. Typically, our HCWs use such public transportation for approximately 40 minutes per day, but may require a change in types of vehicles. We used descriptive statistics. A chi-square test compared COVID-19 in both those that use and don't use public transportation (Table 1). A multivariate logistic regression with the outcome "COVID-19" adjusted for the following variables: sex, age, profession, public transport use, individual exposition to people with respiratory symptoms, localization and duration of that exposition, and the HCWs' opinion concerning his/her infection source (Table 2). Members of the Infection Control Team (SL and IU) assessed the source by performing interviews during 5-15 minutes; and repeated them, if the source remained unclear.

RESULTS

We assessed 376 symptomatic COVID-19 episodes among 337 different HCWs (101 males; median age 37 years [range, 16-63 y]; 11

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Table 1
Variables associated with symptomatic, PCR-confirmed COVID-19 disease

n = 376 episodes of investigation	COVID-19 n = 94	*P* value*	No COVID-19 n = 282
Male sex	25 (27%)	.95	76 (27%)
Profession: nurse	37 (39%)	.06	82 (29%)
Exposed to a team member with respiratory symptoms	21 (22%)	***.01***	33 (12%)
Anamnestically exposed in the hospital	18 (19%)	.82	57 (20%)
Being exposed to respiratory disease within the family	15 (16%)	.28	33 (12%)
Daily use of public transportation	58 (62%)	.67	167 (59%)

*Pearson-χ^2 or Wilcoxon-ranksum-tests, as appropriate.Statistically significant results are displayed ***in bold and italic.***

Table 2
Logistic regression with outcome "PCR-confirmed COVID-19" (n = 376 episodes of investigation) (odds ratios with corresponding 95% confidence intervals; goodness-of-fit; *P* = .47)

Potential risk factor	Univariate results	Multivariate results
Male sex	0.98, 0.58-1.66	1.09, 0.61-1.94
Profession nurse	1.58, 0.97-2.58	1.61, 0.95-2.72
Age group 30-45 compared to <30 years	0.92, 0.51-1.70	0.95, 0.53-1.72
Being exposed to a sick team member	***2.17, 1.18-3.98***	***2.28, 1.20-4.43***
Being generally exposed inside the hospital	0.95, 0.52-1.69	0.82, 0.43-1.56
Being potentially exposed within the family	1.43, 0.74-2.77	1.35, 0.65-2.80
No attributable localisation of exposition	0.80, 0.49-1.32	0.81, 0.47-1.40
Being in post-expositional quarantine at home	1.99, 0.96-4.16	1.84, 0.85-4.02
Daily use of public transport	1.10, 0.69-1.79	0.97, 0.59-1.62

Statistically significant results are displayed ***in bold and italic***.

immunosuppressed). Among these, 225 (60%) regularly used various public transport facilities. By crude group comparison, the HCWs using the public transportation system did not acquire a significantly greater percentage of COVID-19 than those using a private transport (58/225 vs. 36/151; χ^2-test; *P* = 0.67) (Table 1). When we interviewed the 94 COVID-19-positive HCWs (25%) about their most likely means of acquiring infection, none indicated the public transportation as a source. In the multivariate logistic regression results, a history of using public transportation did not increase risk (odds ratio (OR) 0.98, 95%CI 0.59-1.62). In contrast, contact with a team member with respiratory symptoms was the most relevant factor for acquiring COVID-19 (OR 2.28, 95%CI 1.20-4.34).

DISCUSSION

Little is known regarding the presumably enhanced risk of acquiring COVID-19 attributed to using public transportation.[3-5] While there are reports with mathematical modeling,[5-6] epidemiological surveys based on real-life data are lacking.[4,6] Hu et al. quantified the risk of COVID-19 infection on long-distance train passengers in China from 2,334 index patients and 72,093 close contacts and found an average attack rate of only 0.32.[5,6] Luo et al. examined the rate of COVID-19 infection among 3,410 close contacts on the urban public transport. They found that the attack rate was lower (0.1%) compared to those in a household setting.[5,7] In a study estimating the risk for COVID-19 infection in New York City, Sy et al. found a higher rate of COVID-19 per 100,000 population related to increased subway use. This association, however, was markedly reduced after adjustment for the patient's income (risk ratio 1.06, 95% CI 1.00-1.12).[5,8] In a study of the effect of general physical distancing on the incidence of COVID-19, Islam et al. found that on average any distancing was associated with a 13% overall reduction. There was, however, no further reduction in COVID-19 incidence related to a closure of public transportation.[5,9] To further investigate this possible association, the Research and Innovation Foundation in the UK announced the TRACK study, which will use modeling to quantify the proximity of people and their surface contacts through an analysis of transport operator data.[10] This study may provide targeted guidance and planning tools that will directly enable better assessment of infection risks,[10] rather than general recommendations that are actually in use.

Our experience-based evaluation found no association of acquiring COVID-19 infection associated with daily use of public transportation. This study, however, has a number of major limitations. First, it is a retrospective analysis with mostly academic interest. Second, we performed diagnostic testing only on those with COVID-19-compatible symptoms, not asymptomatic HCWs. With the 376 episodes investigated, we cannot be sure of the risk strata associated with the various types of transport types used by our HCWs, or the duration of their travel. In Zurich, passengers on public transports stand and frequently change their locations within the vehicle. A proper analysis can only be made with travel on vehicle such as airplanes or long-distance trains,[6] on which the passenger's seat is recorded electronically. Our experience concerning HCWs in Zurich cannot be generalized for various reasons. Knowledge about preventative methods to reduce the risk of COVID-19 infection is likely greater among HCWs than in the general population. Furthermore, Zurich is less crowded than megacities in other (often resource-poor) settings in the world. In addition, our observation of a lack of a significant link between public transit usage and acquiring COVID-19 infection may be related to the concomitant mask mandate in place at the time.

CONCLUSION

While daily use of public transportation facilities could theoretically be a risk for acquiring COVID-19 infection, there are no compelling data supporting this widespread presumption. In our hospital, HCWs who regularly used public transportation did not report a rate of symptomatic COVID-19 disease different from those who used private transportation. For this investigation we selected the time period with the most intense wave of COVID-19 in Zurich (winter 2020/2021), during which there was a mask mandate during public transport in effect.

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