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Point prevalence of asymptomatic COVID-19-positive hospital personnel on high-risk wards in a large urban hospital in British Columbia

Routine screening of on-duty asymptomatic COVID-19-positive hospital personnel is unlikely to be useful where there is 100% compliance with PPE use and community prevalence is controlled.

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ABSTRACT

Background: Routine screening of asymptomatic COVID-19-positive hospital personnel has not been implemented in BC. This study was conducted to address this shortcoming and support a culture of safety in Royal Columbian Hospital, a tertiary-care facility in a large urban centre.

Methods: We recruited volunteers from hospital personnel on duty in high-risk wards to identify the point prevalence of asymptomatic COVID-19-positive staff. Testing was conducted using nasopharyngeal swabs processed by reverse transcription–polymerase chain reaction assays.

Results: Over 2 days of screening, 140 hospital personnel from two high-risk wards—the emergency department and intensive care unit/high acuity unit—volunteered for testing. All samples were negative for COVID-19.

Conclusions: With strict use of personal protective equipment, routine screening for asymptomatic infection in hospital personnel who are regularly exposed to the SARS-CoV-2 virus is not warranted at Royal Columbian Hospital where community prevalence is held in check.

Background

While several studies have identified asymptomatic COVID-19-positive health care workers among on-duty hospital personnel,¹⁻⁵ others have not.^{6,7} Mass COVID-19 screening of asymptomatic hospital personnel has been conducted at some facilities in Canada,^{8,9} but no routine screening has been carried out in BC. Our study sought to address this shortcoming by identifying the point prevalence of asymptomatic health care workers who tested positive for COVID-19 while on duty on three high-risk wards at Royal Columbian Hospital, a tertiary-care facility in a large urban centre located within the Fraser Health Authority of British Columbia. The information gleaned from the investigation could be used to support a culture of safety in the hospital while emphasizing prevention measures.

Methods

The intent of our research—approved by the Research Ethics Board of the Fraser Health Authority—was to conduct convenience sampling of hospital personnel on three high-risk units where COVID-19 patients received care: the emergency department, the intensive care

unit (ICU)/high acuity unit (HAU), and the COVID-19 inpatient ward. Sampling was conducted over a 3-day period, and all personnel in the sample had volunteered for testing. The operational gold standard,¹⁰ the nasopharyngeal swab processed by a lab-based reverse transcription–polymerase chain reaction (RT-PCR) assay, was used for screening.

Based on mandatory daily health checks, the researchers assumed any hospital personnel present and working on the days of testing had self-declared as asymptomatic, was fit for work, and therefore was eligible for testing. Any hospital personnel employed on the ward in question, whether they had direct or indirect patient contact, was eligible for voluntary enrolment. Sample collection straddled shift change such that a full day's roster could potentially be tested over an 8-hour period.

Consent was obtained at the point of entry during the registration process, at which time potential volunteers also answered a few demographic questions, which included their age and job title. After completing the sampling protocol in the ICU/HAU and emergency department, the study was halted due to province-wide nasopharyngeal testing constraints caused by a shortage of reagent. In the end, we could not recruit volunteers in the COVID-19 inpatient ward. This was the third time the study was halted; the first two times occurred during the first wave of the pandemic because the provincial and regional laboratories could not accommodate testing of research samples.

Each volunteer was notified of their test results by phone call or email. Telephone follow-up on symptom development was scheduled on day 14 for all positive results, in an effort to separate truly asymptomatic individuals from those who were presymptomatic.

Statistical analysis

We hypothesized the asymptomatic disease prevalence of hospital personnel to be 1%, based on the range of 0% to 14% reported in the literature.^{1-9,11,12} For a cross-sectional study with the anticipated prevalence of 1%, a type 1 error of 5%, and absolute precision of 2% (1% ± 2% or 0% to 3%), a sample size of 96 was needed.¹³ Descriptive statistical methods were used for analysis, which was performed using SPSS version 25.

Results

On 23 November 2020, 48 of 116 (41%) hospital personnel who were on duty in the ICU/HAU over the 24-hour period volunteered for the study. On 26 November 2020, 92 volunteers from an estimated total of 140 in the emergency department, including a number of paramedics, were tested. The sample size in the emergency department represented 65.7% of the available workforce.

The sample included a representative cross-section of hospital personnel employed on the two wards [Table]. Registered nurses, including registered psychiatric nurses, accounted for 48.9% of the total number of collected samples in the emergency department and 64.6% in the ICU/HAU.

All 140 samples collected were negative for COVID-19. Because there were no positive cases, the 2-week telephone follow-up was not conducted.

Discussion

This study sought to define the point prevalence of asymptomatic COVID-19-positive hospital personnel on duty in the emergency department, ICU/HAU, and COVID-19 inpatient ward. All personnel were eligible to volunteer whether they had direct or indirect patient contact, as other studies have found positive cases in both groups.^{1,2}

For months, Fraser Health had been the provincial health region with the highest burden of COVID-19. The incidence in Fraser Health for the study week of 22–28 November 2020 was 146/100 000, while the nasopharyngeal swab test positivity was 10.4%.¹⁴ However, the health authority is geographically vast and the intraregional incidence of COVID-19 varies greatly. The case rate for the North Fraser region, an area within Fraser Health that corresponds to the catchment of Royal Columbian Hospital, was 75/100 000, and the test positivity was 4.3% during the study week.¹⁴ On 23 November 2020, 10/30 beds in the ICU/HAU were occupied by COVID-19 patients.

We expected to find asymptomatic COVID-19-positive hospital personnel on duty on high-risk wards in our hospital based on published data.^{1-5,8,11} While it is noteworthy that the study that reported the highest prevalence

TABLE. Number of hospital personnel voluntarily tested for COVID-19.

Job title	Intensive care unit/high acuity unit	Emergency department
Care aide	4	7
Housekeeper	—	1
Physician (resident)	5	8
Medical imaging staff	—	3
Medical lab assistant	—	2
Paramedic	—	19
Physiotherapist	—	1
Registration/unit clerk	3	4
Registered nurse	31	42
Registered psychiatric nurse	—	3
Security guard	—	1
Social worker	—	1
Dietitian	1	—
Respiratory therapist	4	—
Total	48	92

(14.3%) also noted there was less than 100% compliance with the use of personal protective equipment (PPE),¹ the most instructive studies are also among the largest screening studies and were completed in Toronto and Cambridge, England.^{8,9,11,12}

The study in Cambridge was conducted over 3 weeks in April 2020; it sampled 1032 health care workers and documented a 3% positivity rate, of which only 0.5% were truly asymptomatic.¹¹ Considered in light of the estimated false positive rate for RT-PCR of 0.8% to 4%,¹⁰ the significance of the Cambridge finding is unclear; regardless, by mid-May, the prevalence had declined to zero¹² following the UK lockdown.

The RESPECT trial⁸ conducted in the University Health Network hospitals in Toronto

was implemented from mid-April to the end of May 2020. The researchers identified 29/5776 (0.5%) positive nasopharyngeal swabs in asymptomatic health care workers. In another large hospital system in Toronto, a study conducted from the end of May to mid-June 2020—a time of declining community prevalence—indicated that of the 2751 health care workers tested, only 0.2% were positive, all of whom were either mildly symptomatic at the time of testing and did not self-identify, or later developed symptoms.⁹

Although we could not collect data from the COVID-19 inpatient ward, there is little chance the results would be different. The use of PPE and other measures aimed at reducing nosocomial viral transmission is effective, and it has been demonstrated that there is little difference in prevalence from one ward to another.¹⁵

Current infection prevention strategies used in health care are effective in preventing patient-to-health care worker transmission in the workplace.¹⁶ SARS-CoV-2 infection among health care workers likely reflects community transmission rather than in-hospital exposure.^{16,17} It seems probable that now, in the era of strict compliance with the use of PPE, truly asymptomatic COVID-19-positive health care workers form a very small, perhaps even negligible, subset of the workforce. Routine screening of asymptomatic health care workers seems an inefficient use of resources in our hospital.

Our study had limitations: only a small convenience sample was obtained at a single site, and due to provincial testing limitations, only two of three high-risk wards were screened. Therefore, the generalizability of our results may be limited. Although impossible in Fraser Health at the time of the study, periodic random sampling of on-duty health care workers on different wards at multiple sites would likely yield results with better generalizability.

Conclusions

Due to ongoing testing constraints in BC, it was difficult to conduct a study that used lab-based RT-PCR assays of nasopharyngeal swabs from hospital personnel who volunteered for testing. Hence, we were able to conduct only a small single-site study of the point prevalence of asymptomatic COVID-19-positive hospital

personnel on two of three high-risk wards. Because none of the hospital personnel in our study tested positive for COVID-19, routine screening for asymptomatic COVID-19-positive hospital personnel on duty is unlikely to be useful in Royal Columbian Hospital, where there is 100% compliance with the use of PPE, and community prevalence is held in check. ■

SARS-CoV-2 infection among health care workers likely reflects community transmission rather than in-hospital exposure.

Competing interests

None declared.

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