



COVID-19 Status, Symptom Burden, and Characteristics of Dialysis Patients Residing in Areas of Community Transmission: Research Letter

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Abstract

Background: Routine testing of hemodialysis patients for COVID-19 (outside of those identified as “at risk” based on regional practice) is not universally recommended. However, there is variability in the clinical presentation of COVID-19; patients may experience symptoms that do not meet regional criteria for testing and some patients with active infection may be asymptomatic. To avoid missing individuals who are infected, consideration could be made for regular screening, particularly among those residing in areas with evidence of community spread.

Objective: To describe the clinical characteristics, symptom burden, and COVID-19 status in a cross-section of hemodialysis patients residing in areas with evidence of community spread.

Design: Cross-sectional study.

Setting: Three hemodialysis units in a large tertiary care facility in Nova Scotia, Canada.

Patients: In-center hemodialysis patients who resided in areas with evidence of community transmission at the time of the study.

Methods: All dialysis patients (irrespective of whether or not they resided in areas with community spread) completed a standard “at-risk” questionnaire for COVID-19 based on (1) 2 or more of new or worsening cough, fever greater than 38°C, sore throat, headache, runny nose/new or acute respiratory illness consistent with infection or (2) any one of close contact with a known/suspected case, travel outside of the province or residence in a facility with an outbreak prior to entry into the dialysis unit at each treatment. Patients residing in areas with evidence of community spread were swabbed for SARS-CoV-2 over a 1-week period (May 1-7, 2020) using a combined oropharyngeal/nares swab irrespective of whether or not they were identified as “at-risk.”

Measurements: Baseline characteristics of patients were acquired using electronic records. In addition to the “at-risk” questionnaire, patients answered “yes” or “no” to any of the following symptoms at the time of the swab (sneeze, fatigue, myalgia, nausea/vomiting, diarrhea, malaise, abdominal pain, loss of taste, and loss of smell).

Results: Of the 334 patients receiving dialysis at the time of the study, 133 resided in areas with evidence of community transmission and 104 consented for the study. No patients met our regional criteria for being “at-risk” and no patients reported cough, sore throat or fever at the time of swab. Many other symptoms were noted, including sneezing (24%), fatigue (16%), myalgias (11%), nausea/vomiting (11%), loss of taste (4%), and loss of smell (4%). Overall, 100% of swabs performed for this study were negative for SARS-CoV-2.

Limitations: Single-center study, and the daily new case rate was exceedingly low (4-14) at the time of the study, emphasizing that the findings are not generalizable to areas of higher prevalence of SARS-CoV-2.

Conclusions: In this study of hemodialysis patients residing in areas with community spread who otherwise did not meet symptom criteria for being “at-risk,” we did not identify any individual who tested positive for SARS-CoV-2. Future studies are needed to examine the utility of routine testing for COVID-19 (outside of those who are “at-risk”) in areas of higher disease prevalence.

Trial Registration: Not applicable as this is not a clinical trial.

Keywords

COVID-19, SARS-CoV-2, hemodialysis, infectious diseases

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Introduction

Patients receiving in-center hemodialysis are at an increased risk of mortality after contracting the acute respiratory syndrome coronavirus 2 (SARS-CoV-2).¹ Recognizing this risk, recommendations have been made to safeguard dialysis patients, including regular screening and testing/isolation of symptomatic individuals with known or suspected exposure to COVID-19 upon entry to the dialysis unit.²⁻⁴ In spite of these measures, some facilities have observed high infection rates; in a large single-center study of 1530 dialysis patients in the United Kingdom, 300 individuals developed SARS-CoV-2 despite precautions.⁵ One of the difficulties in identifying who should be tested is that outside of influenza-like illness symptoms (including fever, cough, and sore throat) other symptoms commonly described in patients with COVID-19 are nonspecific,⁶ may not meet regional criteria for testing and may result from other respiratory illnesses or comorbidities. Furthermore, dialysis patients also experience a high symptom burden at baseline.⁷ This leads to uncertainty in determining what symptoms should guide testing. Finally, there is even evidence to suggest that some patients with COVID-19 may be asymptomatic.⁸ To avoid the risk of missing individuals who may have COVID-19, consideration could be made for screening of all individuals irrespective of “at-risk” symptoms, particularly those residing in areas with evidence of community spread.

The Nova Scotia Health Authority (NSHA) Renal Program provides renal replacement therapy to individuals from a catchment area of 758 000 individuals. On March 16, our dialysis center enacted screening precautions for SARS-CoV-2 that were mandated by our regional health authority. Individuals were characterized as “at-risk” based on (1) 2 or more of new or worsening cough, fever greater than 38°C, sore throat, headache, runny nose/new or acute respiratory illness consistent with infection or (2) any one of close contact with a known/suspected case, travel outside of the province, or residence in a facility with an outbreak. These individuals underwent nasopharyngeal swabbing (for real-time polymerase chain reaction [RT-PCR] for SARS-CoV-2) and were dialyzed using contact and droplet precautions. By March 24, all health care providers and patients wore masks upon entry to the dialysis unit (in addition to existing measures such as

handwashing/sanitizing and cleaning of the waiting room and dialysis treatment areas). From April to May 2020, 3 hemodialysis patients tested positive for COVID-19. In early May 2020, dialysis patients residing in regions with community transmission (the latter defined as several cases for whom a contact could not be identified within a postal code region) were required to be tested once after entering a health care facility for their maintenance dialysis, irrespective of the presence or absence of aforementioned “at-risk” symptoms. The estimated prevalence (total number of cases who recovered or died per community region/community region total population \times 100 000) of COVID-19 in areas with transmission ranged from 50 to 200 per 100 000 population. This exceeded the provincial prevalence (33.7 per 100 000 population on May 1, 2020) and prevalence in the health region affiliated with our primary dialysis facility (72.9/100 000 population). The purpose of this cross-sectional study was to describe the characteristics, symptom burden, and COVID-19 status of dialysis patients residing in regions with community transmission who subsequently underwent testing for SARS-CoV-2.

Methods

At the time of the study, 334 patients were receiving in-center hemodialysis at our primary facility. From May 1 to 7, 2020, 133/334 (40%) patients resided in areas with known community transmission and were tested for SARS-CoV-2 by RT-PCR of a combined oropharyngeal/nares swab. It has previously been shown at our center that RT-PCR with an oropharyngeal/nares swab has comparable sensitivity to a nasopharyngeal swab for the detection of SARS-CoV-2 (sensitivity of 91.7% versus 94.4% in one comparison)⁹ and to other screening swabs across Canada.^{9,10} Testing was performed by 2 nurses trained in infection prevention and control. Prior to being swabbed, patients were approached to consent for data collection, including demographics and comorbid conditions. Participants also completed an additional questionnaire about active symptoms that were not included in the “at-risk” screening questionnaire (sneezing, fatigue, myalgia, gastrointestinal symptoms, and loss of taste or smell). Characteristics of patients were reported using

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univariable statistics. The NSHA Research Ethics Board approved this study.

Results

Of the 133 hemodialysis patients who were swabbed, 104 consented for the study. Baseline characteristics are noted in Table 1. Mean age was 65 ± 13 years, 45% were female and 73% were of white race. No patients met our regional clinical criteria for being “at-risk” and no patients reported cough, sore throat or fever at the time of swab. The mean predialysis temperature on the day of the swab was $36.7^\circ\text{C} \pm 0.3^\circ\text{C}$. Other reported symptoms included sneezing (24%), fatigue (16%), myalgias (11%), nausea/vomiting (11%), diarrhea (9%), abdominal pain (6%), loss of taste (4%), and loss of smell (4%). Overall, 100% of swabs performed for this study were negative for SARS-CoV-2. One individual subsequently tested positive for SARS-CoV-2, 14 days after the initial swab. However, this individual resided in facility with a COVID-19 outbreak.

Discussion

In this study of hemodialysis patients residing in areas with community spread who otherwise did not meet symptom criteria for being “at-risk,” we identified that no individual tested positive for SARS-CoV-2. Patients in this study did experience a number of secondary symptoms, many of which are reported in other studies of COVID-19-affected patients.

Our findings would suggest that routine screening (outside of that being guided by established regional criteria based on those identified as “high-risk”) may not be helpful in identifying patients with SARS-CoV-2 in areas of low disease prevalence. Considering the potential cost, burden of frequent testing, and possible limitations on the supply of testing equipment or resources, other strategies (including targeted testing of those who are “at-risk”) may be a better approach. Furthermore, there is an unmet need to determine the predictive value of symptoms for SARS-CoV-2 among dialysis patients in areas of both high and low prevalence. However, regarding the latter, it is apparent that a much larger population would be required given the limited number of patients who test positive.

There are limitations to this study that are important for consideration. Our findings are not generalizable to regions where the prevalence of disease is higher. At the time of our study, the daily case rate was between 4 and 14 (although virtually all cases were concentrated to the health region associated with our primary dialysis unit). As noted in a recent study of a dialysis unit in Madrid, Spain (incidence of 1000 COVID-19 cases/100 000 population), over 40% had asymptomatic infection.¹¹ Finally, while our approach to diagnosis of SARS-CoV-2 using nasal/oropharyngeal swabs has comparable sensitivity and specificity to the more widely used nasopharyngeal swab, it is possible that positive patients may have been missed with a single swab in this lower risk

Table 1. Baseline Characteristics (N = 104).

Demographics	Value
Age	65 ± 13
Female sex	47 (45)
Race	
• White	76 (73)
• Black	16 (15)
• Other	12 (12)
Residing in a long-term care or assisted care facility	4 (4)
Cause of end-stage renal disease	
• Diabetes	46 (44)
• Glomerulonephritis	19 (18)
• Polycystic kidney disease	6 (6)
• Hypertension/ischemic nephropathy	9 (9)
• Other	24 (23)
Dialysis characteristics	
Access	
• Arteriovenous fistula	18 (17)
• Dialysis catheter	86 (83)
Predialysis temperature (day of swab), °C	36.7 ± 0.3
Average predialysis temperature (3 prior dialysis treatments), °C	36.7 ± 0.2
Comorbid conditions	
Coronary artery disease	41 (39)
Congestive heart failure	33 (32)
Chronic lung disease	11 (11)
Cirrhosis	5 (5)
Diabetes	54 (52)
Malignancy (solid tumor or hematologic)	17 (16)
Peripheral vascular disease	16 (15)
Prior stroke or transient ischemic attack	9 (9)
Previous kidney transplant	11 (11)
Laboratory data	
White blood cell count	7.7 (6.2-9.2)
Absolute neutrophil count	5.3 (4.1-6.4)
Absolute lymphocyte count	1.3 (1.0-1.7)
One or more previous swabs	16 (15)
Patient reported symptoms at time of swab	
Sneezing	24 (25)
Fatigue	17 (16)
Myalgia	11 (11)
Nausea/vomiting	11 (11)
Diarrhea	9 (9)
Abdominal pain	6 (6)
Loss of taste	4 (4)
Loss of smell	4 (4)

population. Importantly, a recent study suggested that there is a high prevalence of asymptomatic infection defined by the presence of SARS-CoV-2 antibodies among dialysis patients.¹² Longitudinal swabbing and antibody testing of dialysis patients for COVID-19 (particularly in the setting of a changing provincial disease prevalence) is a planned future objective for this study.

Conclusion

In this study of hemodialysis patients residing in areas with community spread who otherwise did not meet symptom criteria for being “at-risk,” we did not identify any individual who tested positive for SARS-CoV-2. Future studies are needed to examine the utility of routine testing for COVID-19 (outside of those who are “at-risk”) in areas of higher disease prevalence.

Ethics Approval and Consent to Participate

All patients provided informed consent to participate in this study. The NSHA Research Ethics Board approved this study.

Consent for Publication

All authors consented to the publication of this manuscript.

Availability of Data and Materials

Screening questionnaires are available upon request from the corresponding author.

Authors Contributions

All authors contributed to the research idea, data acquisition data analysis/interpretation and approved the final version of the manuscript.

Declaration of Conflicting Interests


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