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## Brief Report

# Absence of SARS-CoV-2 infections among patients with end-stage renal disease following facility-wide testing in four outpatient hemodialysis facilities



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## Key Words:

Facility-wide testing SARS-CoV-2  
End-Stage Renal Disease  
COVID-19  
Hemodialysis

Facility-wide testing performed at 4 outpatient hemodialysis facilities in the absence of an outbreak or escalating community incidence did not identify new SARS-CoV-2 infections and illustrated key logistical considerations essential to successful implementation of SARS-CoV-2 screening. Facilities could consider prioritizing facility-wide SARS-CoV-2 testing during suspicion of an outbreak in the facility or escalating community spread without robust infection control strategies in place. Being prepared to address operational considerations will enhance implementation of facility-wide testing in the outpatient dialysis setting.

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## BRIEF REPORT

## Background

Patients with end-stage renal disease (ESRD) and COVID-19 have increased risk of hospitalization and mortality.<sup>1,2</sup> Outpatient hemodialysis facilities are unique healthcare settings where patients receive therapy 3 times a week on shared equipment in an open area near other patients, making social distancing challenging.

The role of asymptomatic SARS-CoV-2 transmission has been described in the community and long-term care facilities.<sup>3</sup> Despite reports of high asymptomatic SARS-CoV-2 infection rates among patients with ESRD, the contribution of asymptomatic transmission in outpatient hemodialysis facilities is not well understood.<sup>4</sup> Currently, there are no recommendations for testing asymptomatic

hemodialysis patients in the absence of known exposures or a facility outbreak. Given considerations for expanded testing strategies of asymptomatic individuals in other congregate settings, the purpose of this project was to assess the usefulness of facility-wide testing in determining the SARS-CoV-2 burden in an outpatient hemodialysis facility without evidence of transmission within the facility and to describe the logistical considerations required for successful implementation.<sup>5</sup>

## Material and methods

Facility-wide SARS-CoV-2 testing was conducted at four outpatient hemodialysis facilities within the same healthcare system in Atlanta in August 2020. Testing was conducted over a 2-week period between August 13th through August 28th, during which community incidence of SARS-CoV-2 infections decreased from 450 to 250 cases per 100,000 population<sup>5</sup> and community prevalence declined to 10% positivity per week.<sup>6</sup> Operational considerations for facility-wide testing are included in Table 1.

Patients with ESRD were eligible for inclusion if they were receiving in-center hemodialysis and did not have an active SARS-CoV-2 infection (i.e., being dialyzed in a SARS-CoV-2 isolation shift).

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**Table 1**  
Operational considerations for and steps and strategies implemented during facility-wide testing for SARS-CoV-2 at outpatient dialysis facilities\*

Operational considerations	Steps and strategies
<b>Facility layout and sample collection</b>	
Identify a location for sample collection that will minimize potential exposure to patients and healthcare personnel during collection of respiratory samples	<ul style="list-style-type: none"> <li>○ A separate area inside the facility with a door that could be closed (ie, exam room) and that was not being used for other purposes or a designated area outside the facility (ie, for patients with stretchers) was used for sample collection</li> <li>○ Staff remained flexible and adjusted the sample collection location for some patients, particularly those with mobility issues</li> <li>○ Ventilation, including directional airflow and air exchanges, in the sample collection area was reviewed<sup>1</sup> <ul style="list-style-type: none"> <li>- During sampling, patients faced away from other patients and from equipment to avoid dispersing respiratory droplets if coughing or sneezing. Tissues were available for patients to cover any coughs or sneezes</li> <li>- Patient wore masks for duration of specimen collection procedure, only removing them just before sample collection and immediately replacing it once sample collection was complete</li> <li>- If patients coughed or sneezed on supplies or equipment (eg, table), equipment was cleaned and disinfected, or discarded if it could not be cleaned and disinfected</li> <li>- Efforts were made to identify at least 2 potential sample locations in a facility to help ensure timely sample collection could continue if an area needed to be temporarily closed</li> </ul> </li> </ul>
<b>Staff involvement</b>	
Define roles and responsibilities of staff in advance	<ul style="list-style-type: none"> <li>○ Multiple individuals were needed on the day of testing to ensure all tasks were completed in a timely manner. For example, 5 - 6 staff were involved in sampling and questionnaire administration for a dialysis shift with 40-50 patients <ul style="list-style-type: none"> <li>- Two staff were dedicated to sample collection</li> <li>- Two staff were involved in interviews</li> <li>- One to 2 staff were dedicated to overseeing the process (ie, consenting, interviewing, and reminding patients to get tested prior to or following dialysis treatment)</li> </ul> </li> </ul>
<b>Patient communication</b>	
Communicate facility-wide testing plans to patients in advance Ensure staff are prepared to explain the rationale behind facility-wide testing and sample collection procedures	<ul style="list-style-type: none"> <li>○ Patients were told in advance that they should arrive 15 min ahead of their normal arrival time or anticipate staying 15 min after their dialysis treatment for sample collection</li> <li>○ Trusted facility staff and other providers were involved in patient education</li> </ul>
<b>Patient consent</b>	
Review organization policies and determine how patient consent will be obtained (e.g., will patients be required to sign a consent form or will verbal consent be sufficient) Make a plan for approaching patients who are unable to provide consent (eg, cognitive impairment)	<ul style="list-style-type: none"> <li>○ Consent forms were provided to patients in advance so they could review and be prepared to ask any questions on the day of testing</li> <li>○ Staff reviewed consent form with patients on the day of testing and consent was obtained prior to performing interviews and collecting respiratory samples</li> </ul>
<b>Patient interviews</b>	
Identify a location where patient interviews can be performed while ensuring patient privacy	<ul style="list-style-type: none"> <li>○ Facility layout determined appropriate location to perform interviews <ul style="list-style-type: none"> <li>- At some facilities the layout of the dialysis treatment floor and distance between patient stations allowed for patient interviews during dialysis treatments</li> <li>- In some facilities, the treatment floor layout was not amenable to performing interviews during treatments, so a separate area was identified. Ideally interviews were performed in a location separated in time and space from respiratory sample collection, to ensure expeditious sample collection and minimize patient exposures</li> </ul> </li> </ul>
<b>Timing of sample collection</b>	
Define when sample collection will be performed in relation to the different dialysis shifts (ie, before or after shift) Ensure efforts are made to minimize interferences with dialysis start times to avoid disruptions to normal facility operations	<ul style="list-style-type: none"> <li>○ Patients on the first shift were only tested after dialysis treatments and patients on the last shift were only tested before dialysis treatments. Patients on other shifts were tested either before or after dialysis treatments</li> </ul>
<b>Receiving and responding to SARS-CoV-2 test results</b>	
Ensure clear coordination with laboratory to avoid diagnostic delays in testing specimens and receiving results Ensure patients positive for SARS-CoV-2 can dialyze in a space that does not expose other patients Ensure a plan for proper test result interpretation (eg, determining when a positive test may represent persistent SARS-CoV-2 positivity following a resolved prior infection) that considers test performance characteristics, clinical symptoms, and prior SARS-CoV-2 infection <sup>1</sup> . Follow local regulations regarding reporting newly identified infections to public health.	<ul style="list-style-type: none"> <li>○ Patients with positive SARS-CoV-2 infections were dialyzed together in a cohort at the last shift of the day with dedicated staff</li> <li>○ Testing was performed at public health lab (Centers for Disease Control and Prevention) and test results were delivered to a nephrologist at the facility the day of or the day after test results were available</li> </ul>

\*This list highlights some, but not all, operational considerations in the outpatient dialysis setting. Each facility will have unique characteristics that will impact implementation of these considerations.

<sup>1</sup><https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/air.html#tableb1>

<sup>2</sup><https://www.cdc.gov/coronavirus/2019-ncov/hcp/testing-overview.html>

Participation was voluntary and participants were tested only once. Interviewers administered a questionnaire that captured demographics and COVID-19 symptoms and potential exposures in the preceding 14 days. Bilateral anterior nasal samples were collected using BD NS Regular Flocked Swabs (Becton, Dickson and Company, New Jersey, USA) and tested for SARS-CoV-2 using real time reverse transcription-polymerase chain reaction (rRT-PCR) by a Clinical Laboratory Improvement Amendment-approved lab at the Centers for Disease Control and Prevention (CDC). This activity was reviewed by CDC and the Georgia Department of Public Health, determined to be non-human subject research as part of public health surveillance activities, and conducted consistent with applicable federal law and CDC policy<sup>1</sup>. Descriptive analyses were performed using SAS 9.3 (Cary, NC).

## Results

Of 561 patients available to consent for participation, 361 (64%) consented to participate, 13 (2%) were excluded for inability to consent due to cognitive impairment and 187 (33%) refused. Refusal data was available for 135 participants of which 48 (36%) provided no reason, 43 (32%) refused due to prior SARS-CoV-2 testing, and 10 (7%) refused citing distrust of the healthcare system. Among the 361 participants, there were no SARS-CoV-2 infections detected by rRT-PCR. Patient demographics exposures, and symptoms consistent with COVID-19 are included in Table 2.

## Discussion

SARS-CoV-2 testing among patients with ESRD receiving hemodialysis in facilities without evidence of an active outbreak documented no new SARS-CoV-2 infections. Other studies that have described facility-wide testing in hemodialysis facilities have indicated a high prevalence of SARS-CoV-2 infections but were the result of targeted and mandatory testing during an outbreak.<sup>7,8</sup> In our assessment, participation was voluntary and could have biased selection against those who were at higher risk for disease. Patients who knew they were at risk or were concerned about changing dialysis sites or shifts due to a positive test might have refused. Thirty percent of patients refused participation, most commonly due to having a prior test. Some patients interpreted having ever been tested as sufficient for ruling out infection during the current assessment. Patient engagement and education strategies may improve patient compliance with currently recommended COVID-19 testing and prevention strategies.<sup>9</sup>

At the time of testing, there was no evidence of ongoing SARS-CoV-2 transmission within participating facilities that would constitute an outbreak. Defining an outbreak in a dialysis facility can be challenging given the potential for exposures both inside and outside of the facility. Guidance on what constitutes a potential outbreak in a dialysis facility is available from both CDC and the Council for State and Territorial Epidemiologists<sup>2,3</sup>. To determine if transmission within a dialysis facility is occurring, their recommendations advise assessing whether exposures exist outside of the dialysis facility and epidemiologic links are present in the dialysis facility. Across all 4 facilities, 8 patients and 4 healthcare personnel had been diagnosed with COVID-19 in the 2 weeks prior to survey implementation. Internal investigation by the facilities identified exposures outside of the

**Table 2**

Characteristics of facility-wide survey participants (n=361) – Atlanta, August 2020

Median age in years (IQR)	61 (52 – 70)
Female	187 (51.8%)
Race	
Black or African American	317 (87.8%)
White	25 (6.9%)
Other	11 (3.0%)
Asian	8 (2.2%)
Native Hawaiian or Other Pacific Islander	2 (0.6%)
American Indian or Alaska Native	1 (0.3%)
Hispanic Ethnicity	14 (3.9%)
Residence	
House or apartment	345 (95.6%)
Other	13 (3.6%)
Nursing home	3 (0.8%)
New or worsened symptoms in the past 14 days <sup>10</sup>	
Any Symptoms	165 (47%)
Rhinorrhoea	47 (13%)
Cough	40 (11.1%)
Headache	39 (10.8%)
Diarrhea	33 (9.1%)
Shortness of breath	32 (8.8%)
Malaise	31 (8.6%)
Body aches	27 (7.5%)
Dizziness	26 (7.2%)
Fatigue	25 (6.9%)
Nausea / Vomiting	22 (6.1%)
Lethargy/Confusion	12 (3.3%)
Chills	12 (3.3%)
Sore throat	10 (2.8%)
Loss of taste	6 (1.7%)
Subjective fever	3 (0.8%)
Loss of smell	3 (0.8%)
Reported always wearing a cloth face covering (or facemask) in public settings	341 (94.5%)
Exposures in the past 14 days	
Visited another healthcare setting	133 (36.8%)
Attended any gatherings of greater than 10 people	19 (5.3%)
Traveled outside metro Atlanta but within US	14 (3.9%)
Reported community exposure to individual with COVID-19	8 (2.2%)
Reported household exposure to individual with COVID-19	6 (1.7%)
Worked in a healthcare setting	4 (1.1%)
Traveled outside the US	0 (0%)

dialysis facility and no clear epidemiologic links within the facility, suggesting an outbreak in any of the 4 facilities was unlikely.

Patients with COVID-19 were being cared for on a dedicated shift using transmission-based precautions. Each facility reported implementing all other CDC recommended COVID-19 infection prevention control (IPC) practices, including requiring all patients to wear a face mask or cloth covering during their dialysis session. While our assessment did not specifically evaluate compliance with these measures, they have been associated with a decrease in SARS-CoV-2 infections in dialysis facilities.<sup>8</sup> Furthermore, the decreasing SARS-CoV-2 incidence in the community may have decreased the likelihood of patient exposure to SARS-CoV-2 outside the facility and subsequent risk for pre-symptomatic or asymptomatic transmission once patients returned to the facility for dialysis.

While nearly half of the participants reported at least one symptom consistent with COVID-19 in the preceding 14 days, most symptoms were non-specific and are frequently reported by patients presenting to dialysis.<sup>10</sup> To our knowledge, there were no positive screens during routine temperature and COVID-19 symptom screening at the facility entrance during our assessment. The discrepancy between reported symptoms at the entrance screening and during the assessment is likely multifactorial but may represent the role that a clinical encounter may have in eliciting patient information compared to a screening process. The frequency of symptoms highlights the role that healthcare providers have in assessing patient symptoms to determine the need for SARS-CoV-2 testing and patient isolation.

<sup>1</sup> § See e.g., 45 C.F.R. part 46.102 (1) (2), 21 C.F.R. part 56; 42 U.S.C. §241 (d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq.

<sup>2</sup> <https://www.cdc.gov/coronavirus/2019-ncov/hcp/dialysis/testing-patients.html>

<sup>3</sup> <https://preparedness.cste.org/wp-content/uploads/2020/11/HC-Outbreak-Definition.pdf>

Our assessment has several limitations. We used a convenience sample of patients and results may not be generalizable to other facilities. Of those who refused participation, we were not able to obtain further information (i.e., demographics, place of residence) other than the stated reason for refusing to participate, limiting our ability to identify factors to improve participation during facility-wide testing. Implementation did not coincide with a high community incidence or suspected facility transmission, which limits our ability to better define specific indicators for facility-wide testing. Furthermore, we did not perform subsequent testing that may have identified initially missed cases. However, in the 2 weeks following testing, only 2 patients across all facilities were diagnosed with COVID-19. Finally, our assessment did not include healthcare personnel, which would be important for facility-wide testing following suspected facility transmission.

Results of this assessment suggest that facility-wide SARS-CoV-2 testing in hemodialysis facilities with IPC practices implemented may yield few positives in the absence of indicators of facility transmission. Instead, SARS-CoV-2 testing could be reserved for facilities with evidence of an outbreak or those facilities without robust strategies during escalating community spread. Understanding the logistics needed to successfully perform facility-wide testing remains important as the COVID-19 pandemic evolves and to ensure dialysis facility preparedness for future infectious disease outbreaks and pandemics.

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#### DISCLAIMER

The findings and conclusions in this report are those of the author (s) and do not necessarily represent the official position of the Centers for Disease Control and Preventions (CDC).

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