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## Use of standard, contact, and droplet precautions with eye protection for the prevention of severe acute respiratory coronavirus virus 2 (SARS-CoV-2) transmission among home healthcare personnel in hospice and home healthcare settings—King and Snohomish counties, Washington, February–October 2020

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### Abstract

Among EvergreenHealth Home Care Service professionals, no coronavirus disease 2019 (COVID-19) cases were reported when they were instructed to use standard, contact, and droplet precautions with eye protection while providing home health care to patients diagnosed with laboratory-confirmed severe acute respiratory coronavirus virus 2 (SARS-CoV-2). These precautions might provide some level of protection against coronavirus disease 2019 (COVID-19) among home healthcare personnel.

As of May 26, 2021, healthcare personnel have accounted for 502,015 coronavirus disease 2019 (COVID-19) cases and 1,628 deaths reported in the United States.<sup>1</sup> The use of masks and respirators are important strategies to protect workers and prevent transmission of severe acute respiratory coronavirus 2 (SARS-CoV-2) in healthcare settings. High rates of SARS-CoV-2 infection have been observed among healthcare personnel, particularly in long-term care facilities,<sup>2</sup> but little is known about SARS-CoV-2 transmission among home healthcare personnel. Additionally, data supporting appropriate personal protective equipment (PPE) in home health and hospice-care settings, subsequently referred to as home health care, are lacking.

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Home healthcare personnel often provide intimate care (eg, bathing, feeding, and wound debridement) within private homes, group homes (including assisted living facilities), or adult family homes.<sup>3</sup> Differences in SARS-CoV-2 transmission risk have been noted between inpatient and outpatient healthcare settings, where engineering controls and duration and magnitude of exposure can vary.<sup>4</sup> The Centers for Disease Control and Prevention (CDC) recommends gown, glove, and eye protection with a National Institute for Occupational Safety and Health (NIOSH)-approved N-95 filtering facepiece respirator (FFRs) or higher when providing patient care.<sup>5,6</sup> Variation in home health care settings and work activities for home healthcare personnel led us to compare realworld use of different PPE types when providing care. We compared the use of standard, contact, and droplet precautions with eye protection to no PPE or minimal PPE in providing protection against COVID-19 among home healthcare personnel caring for SARS-CoV-2-positive patients.

## Methods

We analyzed line-level encounter data on home healthcare personnel from EvergreenHealth Home Care Services, which provides home health care to individuals residing in King and Snohomish counties in Washington state. We compared 2 periods of work-related exposures to SARS-CoV-2-infected patients: period 1 (February 29–March 20, 2020), when home healthcare personnel wore minimal to no PPE (ie, gloves only in addition to standard precautions) by following standard of practice or resulting from PPE shortages or allocation challenges, and period 2 (March 21–October 5, 2020), when home healthcare personnel were instructed to use standard, contact, and droplet precautions (ie, gown, gloves, and medical procedural mask) with eye protection when caring for SARS-CoV-2-infected patients. Exposures were defined as home health care provided to patient(s) with laboratory-confirmed SARS-CoV-2 during their infectious period [ie, -2 to 10 days after the first positive SARS-CoV-2 real-time reverse-transcriptase polymerase chain reaction (rRT-PCR) specimen collection].<sup>7</sup> Home healthcare encounters during period 2 by personnel who had tested positive for SARS-CoV-2 during period 1 were omitted. Home healthcare personnel were only tested for SARS-CoV-2 if they reported symptoms<sup>8</sup>; active symptom monitoring and/or routine testing were not performed. EvergreenHealth conducted case investigations of all personnel who tested positive for SARS-CoV-2. Descriptive analyses were used to examine the characteristics of home healthcare visits, provider type, and COVID-19 occurrence between periods using R version 4.0.2 software (R Foundation for Statistical Computing, Vienna, Austria). This activity was reviewed by the CDC and was conducted consistent with applicable federal law and CDC policy (eg, 45 CFR part 46, 21 CFR part 56; 42 USC §241(d); 5 USC §552a; 44 USC §3501 et seq).

## Results

Among 92 home healthcare personnel, 62 (67.4%) were nursing staff: 51 registered nurses (55.4%), 5 licensed practical nurses (5.4%), and 6 nurse aides (6.5%). Furthermore, 25 (27.2%) were therapists: 13 occupational therapists (14.1%), 12 physical therapists or physical therapist assistants (13.0%), and 5 were other staff (Table 1). Home healthcare personnel conducted home healthcare visits on 68 patients with laboratory-confirmed SARS-CoV-2 infection: 14 during period 1, when the community COVID-19 incidence ~36 per

100,000 residents, and 54 during period 2, when the community COVID-19 incidence ranged 12–55 per 100,000 residents (Table 2).<sup>9</sup> The median times from the first positive SARS-CoV-2 specimen collection to the first home healthcare visit were 1.0 day (range, –2.0 to 10.0) in period 1 and 4.0 days (range, –2.0 to 10.0) in period 2.

Among 68 home healthcare patients with laboratory-confirmed SARS-CoV-2, 128 home healthcare encounters occurred during the period of infectiousness: 26 during period 1 and 102 during period 2 (Table 1). The median numbers of home healthcare visits per home healthcare provider were similar between periods at 1 visit (Table 1). The median visit length per home healthcare worker was higher during period 1 than in period 2 (78.8 vs 60.0 minutes, respectively). Total exposure time of home healthcare personnel to SARS-CoV-2–positive patients was lower during period 1 than during period 2 (35.2 vs 118.6 hours, respectively), though they were similar when expressed per patient (2.4 vs 2.2 hours, respectively). During period 1, 3 home healthcare personnel with no other known exposures outside the workplace developed COVID-19 (rate ratio, 8.5 per 100 home healthcare hours). No healthcare or non–healthcare-associated COVID-19 cases were reported among home healthcare personnel during period 2.

## Discussion

Transmission of SARS-CoV-2 occurs primarily through exposure to infectious respiratory fluids via inhalation of short-range aerosols, direct droplet deposition to exposed mucosal surfaces, and to a lesser degree, fomite transmission.<sup>10</sup> Even though FFRs are recommended,<sup>4,11,12</sup> COVID-19 appeared less common when home healthcare personnel were instructed to use standard, contact, and droplet precautions with eye protection while providing care for SARS-CoV-2–infected patients, which suggests that these precautionary measures provide some protection. To our knowledge, this is the first observational study to support these recommendations<sup>13</sup> in the home healthcare setting. Similar findings with the use of face shields in community health workers have been published in India<sup>14</sup> and for inpatient care settings.<sup>15</sup>

Home healthcare personnel often provide care within the patient’s home and in close proximity (<2 m or 6 feet). Private homes could be higher-risk care settings than hospitals because home ventilation focuses on comfort and is suboptimal compared to inpatient care, where the focus is infection control.<sup>16</sup> Patient and visitor mask wearing may be less common in private homes, and visit durations are typically longer (median, 60.0–78.8 minutes). Based on this information, we expected SARS-CoV-2 infections among home healthcare personnel during both periods, but we only observed them during period 1.

This study had several limitations. Routine testing of home healthcare personnel was not performed, and infection status was dependent on self-reported symptoms and testing (not including asymptomatic infection). Unmeasured factors including behavioral changes (eg, disinfection, mask use, and social distancing), and differences in community COVID-19 activity may have contributed to these findings. The symptom onset date was often missing, so the infectious period was derived from first SARS-CoV-2–positive test result, which might not have correlated with infectiousness. Based on a longer median interval between

testing and home healthcare visits in the second period (4 vs 1 day), patients might have had lower viral loads. Our sample size of 92 home healthcare personnel may have limited the study's power to detect differences, potentially affecting generalizability. It remains unclear whether all PPE included within standard, contact, and droplet precautions are needed for protection or if one is more important than another. Lastly, this study was performed before the emergence of the  $\delta$  (delta) variant (B.1.617.2) and vaccine availability; therefore, the effects of these variables were not measured.

Standard, contact, and droplet precautions with eye protection might provide some level of protection against symptomatic SARS-CoV-2 infection in home healthcare settings, but further data are needed to corroborate these observations. To protect home healthcare personnel caring for patients with SARS-CoV-2 infection, home healthcare agencies should continue to follow CDC and state, tribal, local, and territorial PPE guidance including updates as the pandemic evolves and variants emerge.<sup>17</sup>

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**Table 1.**

Home Healthcare Encounters With Diagnosed COVID-19 Patients That Occurred During A Calculated Infectious Window Across 2 Periods Before and After Home Healthcare Personnel Were Instructed to Wear Standard, Contact, and Droplet PPE With Eye Protection<sup>a</sup>

Variable	No PPE to Minimal PPE <sup>b</sup> (Feb 29-Mar 20, 2020)	Standard Droplet PPE <sup>d</sup> with Eye Protection (Mar 21-Oct 5, 2020)
Home healthcare personnel, no.	20	72
<b>Nursing staff, no. (%)</b>		
Registered nurse	10 (50.0)	41 (56.9)
Licensed practical nurse	1 (5.0)	4 (5.6)
Nurse aide	2 (10.0)	4 (5.6)
<b>Therapist, no. (%)</b>		
Occupational therapist	3 (15.0)	10 (13.9)
Physical therapist	2 (10.0)	9 (12.5)
Physical therapist assistant	0 (0)	1 (1.4)
Other staff, no. (%) <sup>d</sup>	2 (10.0)	3 (4.2)
Visits per home healthcare personnel, median no. (range)	1.0 (1.0–4.0)	1.0 (1.0–5.0)
Visit length per home healthcare personnel, median min (range)	78.8 (29.0–122.5)	60.0 (15.0–240.0)
Home healthcare personnel with secondary transmission, no. (%) <sup>c</sup>	3 (14.3)	0 (0)
Total home healthcare personnel exposure time, h	35.2	118.6
Rate of secondary transmission among home healthcare personnel per 100 home-care hours	8.5	0
Home healthcare encounters	26	102
<b>Home healthcare encounter type, no. (%)</b>		
Home health	13 (50.0)	42 (41.2)
Hospice	13 (50.0)	60 (58.8)
<b>Home healthcare personnel at home healthcare encounter, no. (%)</b>		
<b>Nursing staff</b>		
Registered nurse	14 (53.9)	66 (64.7)
Licensed practical nurse	1 (3.9)	6 (5.9)
Nurse aide	3 (11.5)	4 (3.9)
<b>Therapist</b>		
Occupational therapist	3 (11.5)	12 (11.8)
Physical therapist	3 (11.5)	10 (9.8)
Physical therapist assistant	0 (0)	1 (1.0)
Other staff <sup>d</sup>	2 (7.7)	3 (2.9)

Note. PPE, personnel protective equipment.

<sup>a</sup>Standard, contact, and droplet PPE is defined as medical procedural mask, gown, and gloves and included the addition of eye protection.

<sup>b</sup> Minimal PPE worn is defined as glove use.

<sup>c</sup> No other known exposures for SARS-CoV-2 transmission were identified outside the workplace.

<sup>d</sup> Other home healthcare staff types included social worker and chaplain.

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**Table 2.** Home Healthcare Patients With Diagnosed COVID-19 Receiving Care from Home Healthcare Personnel During a Calculated Infectious Window Across 2 Periods Before and After Home Healthcare Personnel Were Instructed to Wear Standard, Contact, and Droplet PPE With Eye Protection<sup>a</sup>

Variable	No PPE to Minimal PPE <sup>b</sup> (Feb 29-Mar 20, 2020)	Droplet PPE <sup>a</sup> With Eye Protection (Mar 21-Oct 5, 2020)
Total SARS-CoV-2-positive patients receiving care	14	54
Patients hospitalized, no. (%)	8 (57.1)	22 (40.7)
<b>County of residence, no. (%)</b>		
King	12 (85.7)	36 (66.7)
Snohomish	2 (14.3)	18 (33.3)
Home healthcare visits per patient, median no. (range)	1.0 (1.0-4.0)	1.0 (1.0-5.0)
Visit length per patient in, median min (range)	82.5 (45.0-165.0)	60.0 (15.0-240.0)
Time from specimen collection date to first home healthcare visit, median d (range)	1.0 (-2.0 to 10.0)	4.0 (-2.0 to 10.0)

Note. PPE, personnel protective equipment.

<sup>a</sup>Standard, contact, and droplet PPE is defined as medical procedural mask, gown, and gloves and included the addition of eye protection.

<sup>b</sup>Minimal personal protective equipment worn is defined as glove use.