

Building a Personal Protective Equipment Monitor Team as Part of a Comprehensive COVID-19 Prevention Strategy

Shelley Summerlin-Long MPH, MSW, BSN, RN ,
Amy Selimos MSN, RN, PCNS-BC ,
Brooke Brewer MS, BSN, RN, CNML ,
Mark Buchanan BS, BSN, RN, RN-BC ,
Christa Clark BSN, RN, CIC , Karen Croyle BSN, RN, CIC ,
Cynthia Culbreth BSN, RN , Pamela Del Monte MS, AMB-BC ,
Lauren M. DiBiase MS, CIC , Lori Hendrickson MPH, BSN, RN ,
Pam Miller BSN, RN , Natalie Schnell BSN, RN, RN-BC, CIC ,
Katherine Schultz MPH, BSN, RN, CIC , Lisa Stancill MPH ,
Lisa Teal BSN, RN, CIC , Emily Sickbert-Bennett PhD, MS, CIC ,
David J. Weber MD, MPH



PII: S0196-6553(21)00543-5
DOI: <https://doi.org/10.1016/j.ajic.2021.08.009>
Reference: YMIC 5962

To appear in: *AJIC: American Journal of Infection Control*

Please cite this article as: Shelley Summerlin-Long MPH, MSW, BSN, RN , Amy Selimos MSN, RN, PCNS-BC , Brooke Brewer MS, BSN, RN, CNML , Mark Buchanan BS, BSN, RN, RN-BC , Christa Clark BSN, RN, CIC , Karen Croyle BSN, RN, CIC , Cynthia Culbreth BSN, RN , Pamela Del Monte MS, AMB-BC , Lauren M. DiBiase MS, CIC , Lori Hendrickson MPH, BSN, RN , Pam Miller BSN, RN , Natalie Schnell BSN, RN, RN-BC, CIC , Katherine Schultz MPH, BSN, RN, CIC , Lisa Stancill MPH , Lisa Teal BSN, RN, CIC , Emily Sickbert-Bennett PhD, MS, CIC , David J. Weber MD, MPH , Building a Personal Protective Equipment Monitor Team as Part of a Comprehensive COVID-19 Prevention Strategy, *AJIC: American Journal of Infection Control* (2021), doi: <https://doi.org/10.1016/j.ajic.2021.08.009>

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Building a Personal Protective Equipment Monitor Team as Part of a Comprehensive COVID-19
Prevention Strategy

Shelley Summerlin-Long, MPH, MSW, BSN, RN^{1,3}; Amy Selimos, MSN, RN, PCNS-BC¹; Brooke Brewer, MS, BSN, RN, CNML¹; Mark Buchanan, BS, BSN, RN, RN-BC¹; Christa Clark, BSN, RN, CIC¹; Karen Croyle, BSN, RN, CIC¹; Cynthia Culbreth, BSN, RN¹; Pamela Del Monte, MS, AMB-BC¹; Lauren M. DiBiase, MS, CIC^{1,3}; Lori Hendrickson, MPH, BSN, RN¹; Pam Miller, BSN, RN¹; Natalie Schnell, BSN, RN, RN-BC, CIC¹; Katherine Schultz, MPH, BSN, RN, CIC¹; Lisa Stancill, MPH¹; Lisa Teal, BSN, RN, CIC¹; Emily Sickbert-Bennett, PhD, MS, CIC^{1,3}; David J. Weber, MD, MPH^{1,2}

¹Department of Infection Prevention, University of North Carolina at Chapel Hill Medical Center, Chapel Hill, North Carolina

²University of North Carolina School of Medicine, Chapel Hill, North Carolina

³University of North Carolina School of Public Health, Chapel Hill, North Carolina

Corresponding author: Shelley Summerlin-Long, MPH, MSW, BSN, RN

Word count: 821

No authors have any conflicts of interest to disclose.

Key words: Personal protective equipment; COVID-19; SARS-CoV-2; Infection Prevention; PPE Monitor

Abstract: We instituted Personal Protective Equipment (PPE) Monitors as part of our care of COVID-19 patients in high-risk zones. PPE Monitors aided healthcare personnel (HCP) in donning and doffing, which contributed to nearly zero transmission of COVID-19 to HCP, despite their care of over 1400 COVID-19 patients.

Key words: Personal protective equipment; COVID-19; SARS-CoV-2; Infection Prevention; PPE Monitor

Word count: 997

No authors have any conflicts of interest to disclose.

INTRODUCTION

A novel coronavirus, Severe Acute Respiratory Virus-2 (SARS-CoV-2), was recognized in late 2019 as the cause of the multisystem disease COVID-19. By late May 2021, over 33 million cases of COVID-19 were reported in the United States, leading to 590,000 deaths, including deaths of 3,600 healthcare personnel (HCP).^{1,2} The infection prevention strategies for protecting HCP from transmission of highly communicable pathogens have been described.³ The use of personal protective equipment (PPE) is a critical intervention in preventing the spread of transmission-based infections, including SARS-CoV-2.³ It has been reported that 40 percent of HCP make errors while doffing their PPE, causing them to self-contaminate skin and clothing.^{4,5,6,7,8} Therefore, it is recommended that PPE monitors be used to promote their colleagues' safety by guiding them through the donning and doffing processes.^{6,9,10} Early in 2020, the University of North Carolina Medical Center (UNC-MC) chose to incorporate PPE monitors as part of its comprehensive prevention strategy to reduce the risk of staff self-contamination with COVID-19. This paper describes the implementation and use of PPE monitors to observe staff donning and doffing PPE in areas treating known or suspected COVID-19 patients. In addition, it describes the results of a survey of HCP regarding their view of the importance of PPE monitors.

METHODS AND APPROACH

This assessment was conducted at a 950-bed academic medical center. A multidisciplinary group including Infection Prevention (IP) and Nursing developed a PPE Monitor Team. Nursing employed staff from clinics and inpatient areas that closed temporarily because of the pandemic. PPE Monitor training was developed and taught by IP Nurses. The two-hour training initially took place using video conferencing and then transitioned to on-demand, web-based training modules. Education included fundamentals of disease transmission, hand hygiene, COVID-19 policies and signage, proper donning and doffing, and coaching tips. Completion of all modules was required. Education was developed from Centers for Disease Control and Prevention (CDC) guidelines. Experienced PPE monitors precepted trainee monitors during their first 12-hour shift as part of unit-based training. Trainee monitors had a competency sheet that included items such as unit layout, communication, expectations, and IP resources that was signed off by a supervisor.

Three units were designated COVID-19 high-risk containment zones with dedicated PPE monitors, while other areas were assigned monitors (if available) when there was a COVID positive/rule-out patient being treated at the location. Two to three PPE monitors typically worked in the high-risk zones, whereas one monitor was assigned to locations with a single patient. Approximately ten PPE monitors worked on each shift across the facility. PPE monitoring included N-95 respirators or positive air pressure respirators, face shields, gowns (single use or reused after laundering), gloves, and alcohol hand antiseptic. Staff were observed and coached as needed by the monitors to prevent self-contamination.

In the fall of 2020, a housewide survey was sent to all inpatient staff to assess their perceptions of the Medical Center's efforts to protect them from acquiring COVID-19. It included a question asking how much staff agreed or disagreed that PPE Monitors "play an important role in keeping our staff who care for COVID patients safe."

HCP COVID-19 infection data were obtained through contact tracing and a search of the Employee Health database maintained by Infection Prevention and Occupational Health. The UNC Institutional Review Board approved the study.

RESULTS AND DISCUSSION

UNC-MC Nursing House Supervisors took over management and deployment of the PPE Monitor team from IP after three weeks, in early April of 2020, while IP continued to train new monitors. Eighty-three people participated in video conferencing training, and an additional 920 people took on-demand, web-based training as PPE monitors. Eventually, as closed areas reopened, PPE Monitors returned to their previous positions. Units with COVID patients used the training to educate their own staff to perform the role of PPE Monitor which accounts for the high number of staff trained. To limit reliance on unit staff as monitors and provide sustainability, UNC-MC created 10 per diem PPE Monitor positions in January 2021.

From April 1, 2020, through February 15, 2021, UNC-MC admitted 1,427 COVID-19 positive patients within the high-risk containment zones. Review of COVID-19 exposures revealed that during this period, there were only two possible healthcare-associated COVID-19 transmissions on the containment

units. These transmissions were determined “possible” as there were no identified PPE breaches or community sources for exposure. Outside of the containment zones, COVID infection rates mirrored that of the community.

Overall, 626 HCP answered the question on the housewide survey regarding their view of PPE monitors. Among respondents, 68 percent agreed or strongly agreed that “PPE monitors played an important role in keeping staff safe by preventing self-contamination during donning and doffing” (See Figure). Importantly, only 13 percent disagreed. Based on respondents’ survey comments, many who did not agree that PPE monitors played an important role in keeping staff safe worked in areas where monitors were not always available.

Among HCP job classes, providers (MDs/NPs/PAs) were less likely to see the value of the PPE monitors (61.1%) than nurses (66.8%), allied health (67.6%), and support staff (68.3%.) This is likely due to providers having more confidence donning and doffing for sterile procedures and surgeries.

HCPs who solely worked in the COVID containment zones were less likely to agree that the monitors kept staff safe (54.8%) than staff who worked solely in units with occasional COVID patients (66.6%). HCPs who reported working in both areas saw the most value in PPE monitors (77.8%). Since the survey occurred 6 months into the program, we speculate HCPs in the high-risk zones with dedicated monitors saw less value in the program over time, but HCPs floating between areas with and without monitors saw more value in units having dedicated monitors.

CONCLUSION

Use of appropriate PPE is essential for protecting HCP who provide care for patients with known COVID-19. PPE monitors are recommended as a method to ensure that HCP properly don and doff PPE.^{6,9,10} Our assessment demonstrates that PPE Monitors are an important part of a comprehensive COVID-19 prevention strategy.

ACKNOWLEDGEMENTS

We wish to thank the UNC-MC Nursing House Supervisor team, the staff caring for COVID-19 patients, and all of the staff who have served as PPE Monitors and kept our colleagues safe.

REFERENCES

1. Johns Hopkins Coronavirus Resource Center. Updated May 25, 2021. Accessed May 25, 2021. <https://coronavirus.jhu.edu/>
2. Spencer, J and Jewett, C. Kaiser Health News Web site. <http://khn.org/news/article/us-health-workers-deaths-covid-lost-on-the-frontline/>. Accessed July 28, 2021.
3. Weber DJ, Rutala WA, Fischer WA, Kanamori H, Sickbert-Bennett EE. Emerging infectious diseases: Focus on infection control issues for novel coronaviruses (Severe Acute Respiratory Syndrome-CoV and Middle East Respiratory Syndrome-CoV), hemorrhagic fever viruses (Lassa and Ebola), and highly pathogenic avian influenza viruses, A(H5N1) and A(H7N9). *Am J Infect Control*. 2016 May 2;44(5 Suppl):e91-e100.
4. Tomas ME, Kundrapu S, Thota P, Sunkesula VC, Cadnum JL, Mana TS, Jencson A, O'Donnell M, Zabarsky TF, Hecker MT, Ray AJ, Wilson BM, Donskey CJ. Contamination of Health Care Personnel During Removal of Personal Protective Equipment. *JAMA Intern Med*. 2015 Dec;175(12):1904-10. doi: 10.1001/jamainternmed.2015.4535. PMID: 26457544
5. Casanova LM, Rutala WA, Weber DJ, Sobsey MD. Effect of single- versus double-gloving on virus transfer to health care workers' skin and clothing during removal of personal protective equipment. *Am J Infect Control*. 2012 May;40(4):369-74.
6. Saran S, Gurjar M, Garg A. Identifying and Implementing Strategies to Reduce the Risk of Self-Contamination of Health Care Workers Caused by Doffing of Personal Protective Equipment During the COVID-19 Pandemic [published online ahead of print, 2020 Oct 22]. *Disaster Med Public Health Prep*. 2020;1-4. doi:10.1017/dmp.2020.396
7. Osei-Bonsu K, Masroor N, Cooper K, Doern C, Jefferson KK, Major Y, Adamson S, Thomas J, Lovern I, Albert H, Stevens MP, Archer G, Bearman G, Doll M. Alternative doffing strategies of personal protective equipment to prevent self-contamination in the health care setting. *Am J Infect Control*. 2019 May;47(5):534-539. doi: 10.1016/j.ajic.2018.11.003. Epub 2018 Dec 18. PMID: 30578138.

8. Okamoto K., Rhee Y, Schoeny M, Lolans K, Cheng J, Reddy S. . .Popovich K. (2019). Impact of doffing errors on healthcare worker self-contamination when caring for patients on contact precautions. *Infection Control & Hospital Epidemiology*, 40(5), 559-565.
9. Evans HL, Thomas CS, Bell LH, Hink AB, O'Driscoll S, Tobin CD, Salgado CD. Development of a Sterile Personal Protective Equipment Donning and Doffing Procedure to Protect Surgical Teams from SARS-CoV-2 Exposure during the COVID-19 Pandemic. *Surg Infect (Larchmt)*. 2020 Oct;21(8):671-676. doi: 10.1089/sur.2020.140. Epub 2020 Jul 6. PMID: 32628871.
10. Picard C, Edlund M, Keddie C, et al. The effects of trained observers (dofficers) and audits during a facility-wide COVID-19 outbreak: A mixed-methods quality improvement analysis [published online ahead of print, 2021 Mar 25]. *Am J Infect Control*. 2021;S0196-6553(21)00121-8. doi:10.1016/j.ajic.2021.03.011

Figure. Percentage of Healthcare Personnel who Agree or Disagree in a Hospital-Wide Survey that Personal Protective Equipment Monitors Play an Important Role in Keeping Staff Safe

