# Evidence Search Service Results of your search request

## What is the efficacy of the PPE equipment purchased by Public Health England to support the COVID-19 pandemic

**ID of request:** 22606  
**Date of request:** 6th April, 2020  
**Date of completion:** 6th April, 2020

If you would like to request any articles or any further help, please contact:  Pam Collins at [Pamela.collins@nhs.net](mailto:Pamela.collins@nhs.net)

Please acknowledge this work in any resulting paper or presentation as: Evidence search: What is the efficacy of the PPE equipment purchased by Public Health England to support the COVID-19 pandemic. Pam Collins. ( 6th April, 2020). WOLVERHAMPTON, UK: The Royal Wolverhampton NHS Trust Library and Knowledge Service.

**Sources searched**  
BMJ Journals (1)  
CEBM: Oxford COVID-19 Evidence Service (1)  
EMBASE (14)  
Goggle Scholar (1)  
MEDLINE (4)  
PubMed (1)  
Royal College of Nursing (RCN) (1)

**Date range used** (5 years, 10 years): 2019   
**Limits used** (gender, article/study type, etc.): English Language, Human   
**Search terms and notes** (full search strategy for database searches below):

The following relevant controlled vocabulary (MeSH Headings) and natural language terms where selected and combined to conduct the search:

* Covid-19
* coronavirus
* efficacy
* personal protective equipment
* emergency medical service

Data sources searched include Cinahl, Embase, Medline PubMed on the HDAS platform.  Additionally the Coronavirus Research Database and Public Health Database on the Proquest platform. Further searches were then completed on Cochrane, Trip database, BMJ Best Practice, UpToDate , NHS Evidence, CEBM Oxford, Google and Google Scholar.

These items were reviewed for relevance.

For more information about the resources please go to: <https://base-library.nhs.uk/rwtlks/>.

## Summary of Results

The primary search terms used within the Embase database, covid-19, personal protective equipment combined with Human and English language limits generated very few articles.

The search was then rerun using the within the other databases within the HDAS collection. Again, very few items of relevance were identified.  Additional searches were run in the two ProQuest database with no additional items identified.

Many of the articles identified mentioned efficacy of equipment, but there seem to be a lack of in-depth research articles at present.

The most relevant item identified was the CEBM Oxford guidance published last week.  The RCN and other articles point to this guidance.

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CEBM Oxford COVID-19 Evidence Service

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Royal College of Nursing (RCN)

[RCN position on personal protective equipment (PPE) for COVID-19](#Research618337)

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### [D. Search History](#SearchHistory)

## A. National and International Guidance

#### CEBM Oxford COVID-19 Evidence Service

**What is the efficacy of standard face masks compared to respirator masks in preventing COVID-type respiratory illnesses in primary care staff?** (2020)

Greenhalgh, T et al

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=cc2f2ca13839aeac2e7bdb0776688285)

A recent meta-analysis of standard v respirator (N95 or FFP) masks by the Chinese Cochrane Centre included six RCTs with a total of 9171 participants with influenza-like illnesses (including pandemic strains, seasonal influenza A or B viruses and zoonotic viruses such as avian or swine influenza). There were no statistically significant differences in their efficacy in preventing laboratory-confirmed influenza, laboratory-confirmed respiratory viral infections, laboratory-confirmed respiratory infection and influenza-like illness, but respirators appeared to protect against bacterial colonization.

## B. Institutional Publications

#### Royal College of Nursing (RCN)

**RCN position on personal protective equipment (PPE) for COVID-19** (2020)

RCN

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=ad5ab80fa2d4d7b60658988163f1501e)

As a Royal College and professional trade union representing the largest directly affected workforce, with over 450,000 members, the RCN are pleased to have had the chance to advise the government about the issues affecting our members in the development of this guidance. As such, they are satisfied with the government guidance being issued today and they will be monitoring the situation with regards to the evidence of its efficacy and use. The success of this guidance will be judged by its implementation and communication to those who need it most.

## C. Original Research

1. **A RANDOMIZED TRIAL OF INSTRUCTOR-LED TRAINING VERSUS VIDEO LESSON IN TRAINING HEALTH CARE PROVIDERS IN PROPER DONNING AND DOFFING OF PERSONAL PROTECTIVE EQUIPMENT.**  
   Christensen Liva Disaster medicine and public health preparedness 2020;:1-15.

OBJECTIVEThis study compared live instructor-led training in Personal Protective Equipment (PPE) donning and doffing with video-based instruction. It assessed the difference in performance between (i) attending one instructor-led training session in donning and doffing PPE one month prior to assessment, and (ii) watching training videos over the month.METHODSThis randomized controlled trial pilot study divided 21 medical students and junior doctors into 2 groups. Control group participants attended one instructor-led training session. Video group participants watched training videos demonstrating the same procedures, which they could freely watch again at home. After one month, a doctor performed a blind evaluation of performance using checklists.RESULTS19 participants were assessed after one month. The mean donning score was 84.8/100 for the instructor-led group and 88/100 for the video group; mean effect size 3,2 (95%CI: -7,5 to 9,5). The mean doffing score was 79.1/100 for the instructor group and 73.9/100 for the video group; mean effect size 5,2 (95%CI: -7,6 to 18).CONCLUSIONOur study found no significant difference in donning and doffing score between instructor-led and video lessons. Video training could be a fast and resource-efficient method of training in PPE donning and doffing in responding to the COVID-19 pandemic.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=dce2e8224791f80e9e6737678b8e406c)

1. **A systematic risk-based strategy to select personal protective equipment for infectious diseases**  
   Jones R.M. American Journal of Infection Control 2020;48(1):46-51.

Background: Personal protective equipment (PPE) is a primary strategy to protect health care personnel (HCP) from infectious diseases. When transmission-based PPE ensembles are not appropriate, HCP must recognize the transmission pathway of the disease and anticipate the exposures to select PPE. Because guidance for this process is extremely limited, we proposed a systematic, risk-based approach to the selection and evaluation of PPE ensembles to protect HCP against infectious diseases. <br/>Method(s): The approach used in this study included the following 4 steps: (1) job hazard analysis, (2) infectious disease hazard analysis, (3) selection of PPE, and (4) evaluation of selected PPE. Selected PPE should protect HCP from exposure, be usable by HCP, and fit for purpose. <br/>Result(s): The approach was demonstrated for the activity of intubation of a patient with methicillin-resistant Staphylococcus aureus or Severe Acute Respiratory Syndrome coronavirus. As expected, the approach led to the selection of different ensembles of PPE for these 2 pathogens. <br/>Discussion(s): A systematic risk-based approach to the selection of PPE will help health care facilities and HCP select PPE when transmission-based precautions are not appropriate. Owing to the complexity of PPE ensemble selection and evaluation, a team with expertise in infectious diseases, occupational health, the health care activity, and related disciplines, such as human factors, should be engaged. <br/>Conclusion(s): Participation, documentation, and transparency are necessary to ensure the decisions can be communicated, critiqued, and understood by HCP.<br/>Copyright &#xa9; 2019 Association for Professionals in Infection Control and Epidemiology, Inc.

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1. **Absence of contamination of personal protective equipment (PPE) by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)**  
   Ong S.W.X. Infection control and hospital epidemiology 2020;:1-6.

Previous laboratory studies demonstrated that viruses such as SARS-CoV and human coronavirus 229E can remain viable on PPE items including latex gloves and disposable gowns, though these were not performed in clinical settings. Despite the potential for extensive environmental contamination by SARS-CoV-2, The study did not find similar contamination of PPE after patient contact. This provides assurance that extended use of N95 and goggles with strict adherence to environmental and hand hygiene while managing SARS-CoV-2 patients could be a safe option.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=5faae46ae5632b47cd5cc2d706829716)

1. **Air, surface environmental, and personal protective equipment contamination by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from a Symptomatic Patient**  
   Ong S.W.X. JAMA - Journal of the American Medical Association 2020;:No page numbers.

Significant environmental contamination by patientswith SARS-CoV-2 through respiratory droplets and fecal shedding suggests the environment as a potential medium of transmission and supports the need for strict adherence to environmental and hand hygiene.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=b728d6cfe7f7daa7f8ddb3bf8ccaa7ce)

1. **Are UK doctors getting sufficient protective equipment against covid-19?**  
   Sayburn BMJ 2020;369(2nd April.):Online.

An updated Cochrane review, posted on MedRxiv and under review at The BMJ this week, finds little good evidence of the effectiveness of face masks in reducing the spread of respiratory viruses, but it recommends that healthcare workers still wear surgical masks in clinical settings. It found no evidence of any difference between surgical masks and N95 respirators.10 The University of Oxford’s Centre for Evidence-Based Medicine is producing a series of rapid evidence reviews looking at this. Its first review considered the effectiveness of different types of masks. It said that evidence from a recent (2020) meta-analysis of the effectiveness of N95 respirators versus surgical masks against influenza included six randomised controlled trials and 9171 participants. It found no differences in efficacy in preventing flu, flu-like illness, or respiratory infection. Respirators “appeared to protect against bacterial colonisation,” However, based on this finding, the review concludes that the trials reviewed “provide cautious support for the use of standard surgical masks in non-AGPs, though the empirical studies underpinning this conclusion were not in a covid-19 population, and only one was in a community setting.” They plan to publish more evidence on other types of PPE within days, including a review of what should be considered AGPs and which PPE is recommended for primary care.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=969b48a5fc2a03b044cf38a82b246e2a)

1. **Behavioral considerations and impact on personal protective equipment (PPE) use: Early lessons from the coronavirus (COVID-19) outbreak**  
   Kantor J. Journal of the American Academy of Dermatology 2020;:No page numbers.

The authors mention the possibility of prophylactic dressing use to mitigate the risk of skin-related complications of PPE use, this approach has not been studied, and – more importantly – the potential impact of such dressings on PPE efficacy is unexplored. Given the very high stakes associated with adequate and reliable PPE.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=59e3739918d01b0c8d668fc85c0e6919)

1. **COVID-19 : face masks and human-to-human transmission.**  
   Liu X. Influenza and other respiratory viruses 2020;:No page numbers.

In December 2019, transmission of the novel coronavirus (SARS-CoV-2) that causes coronavirus disease 2019(COVID-19) occurred in Wuhan, China1 .And later the virus began to be transmitted from person to person2 .Face masks are a type of personal protective equipment used to prevent the spread of respiratory infections,it may be effective at helping prevent transmission of respiratory viruses and bacteria3 .Here, we share a case of face masks are be used to prevent the transmission of COVID-19 infection.<br/>Copyright This article is protected by copyright. All rights reserved.

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[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=9ff4afd77fb848f97d862d8058714dd0)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=0f03010787c4087085d34b0ddbf71a88)

1. **COVID-19: government issues new PPE guidance for healthcare staff**  
   Jones-Berry Nursing Standard 2020;(2nd April.):Online.

The new PPE government guidance specifies precise PPE requirements for healthcare workers in secondary care clinical contexts and primary, outpatient and community care settings. RCN general secretary Dame Donna Kinnair said the college was ‘satisfied’ with the guidance and would be monitoring the situation to see evidence of its efficacy and use.

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1. **Covid-19: GPs call for same personal protective equipment as hospital doctors**  
   Rimmer A. BMJ (Clinical research ed.) 2020;368:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=ff56df711a93bd74751d3cfd15dc10ed)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=4a9e5e8d498e1a984f27ffe6920f7c3a)

1. **Critical supply shortages - the need for ventilators and personal protective equipment during the Covid-19 pandemic**  
   Ranney M.L. The New England journal of medicine 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=63bd698b753d2f4b56c5e7274d411a16)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=f986992e7ff7c3bf7ffabcf6f7851e7f)

1. **Evaluation of sporicidal disinfectants for the disinfection of personal protective equipment during biological hazards**  
   Papp S. Health Security 2020;18(1):36-48.

A fast, effective, and safe disinfection of personal protective equipment (PPE) is vitally important for emergency forces involved in biological hazards. This study aimed to investigate a broad range of disinfectants to improve the established disinfection procedure. We analyzed the efficacy of chlorine-, peracetic acid-, and oxygen-based disinfectants against Bacillus spores on PPE. Therefore, spores of different Bacillus species were exposed to disinfectants on PPE material by using a standardized procedure covering the dried spores with disinfectants and applying mechanical distribution. Efficacy of disinfectants was quantified by determining the reduction factor (log10 levels) and number of viable spores left afterward. The chlorine-based granulate Hypochlorit CA G (2% chlorine) sufficiently inactivated Bacillus spores of risk groups 1 and 2, even with temperatures ranging from -20 to 35degreeC. Wofasteril SC super (1.75% peracetic acid) achieved a reliable reduction of risk groups 1 and 2 and even fully virulent Bacillus spores by >=5 log10 levels on PPE. With this, Hypochlorit-CA G and Wofasteril SC super proved to be promising alternatives to the previously proven and widely used peracetic acid compound Wofasteril (2% peracetic acid) for the disinfection of PPE when bacterial spores are known to be the contaminating agent. These results will help to improve the disinfection of PPE during biological hazards by providing new data on promising alternative compounds.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=5d1814cf3223bba532a294f6b821c71e)

1. **Headaches associated with Personal protective equipment - a cross-sectional study amongst frontline healthcare workers during COVID-19 (HAPPE Study).**  
   Jy Ong Jonathan Headache 2020;:No page numbers.

BACKGROUNDCOVID-19 is an emerging infectious disease of pandemic proportions. Healthcare workers in Singapore working in high-risk areas were mandated to wear personal protective equipment (PPE) such as N95 face-mask and protective eyewear while attending to patients.OBJECTIVESWe sought to determine the risk factors associated with the development of de novo PPE-associated headaches as well as the perceived impact of these headaches on their personal health and work performance. The impact of COVID-19 on pre-existing headache disorders was also investigated.METHODSThis is a cross-sectional study amongst healthcare workers at our tertiary institution who were working in high-risk hospital areas during COVID-19. All respondents completed a self-administered questionnaire.RESULTSA total of 158 healthcare workers participated in the study. Majority [126/158 (77.8%)] were aged 21-35 years. Participants included nurses [102/158 (64.6%)], doctors [51/158 (32.3%)] and paramedical staff [5/158 (3.2%)]. Pre-existing primary headache diagnosis was present in about a third [46/158 (29.1%)] of respondents. Those based at the emergency department had higher average daily duration of combined PPE exposure compared to those working in isolation wards [7.0 (SD 2.2) vs 5.2 (SD 2.4) hours, p<0.0001] or medical ICU [7.0 (SD 2.2) vs 2.2 (SD 0.41) hours, p<0.0001]. Out of 158 respondents, 128 (81.0%) respondents developed de novo PPE-associated headaches. A pre-existing primary headache diagnosis (OR=4.20, 95% CI 1.48-15.40; p=0.030) and combined PPE usage for >4 hours per day (OR 3.91, 95% CI 1.35-11.31; p=0.012) were independently associated with de novo PPE-associated headaches. Since COVID-19 outbreak, 42/46 (91.3%) of respondents with pre-existing headache diagnosis either 'agreed' or 'strongly agreed' that the increased PPE usage had affected the control of their background headaches, which affected their level of work performance.CONCLUSIONMost healthcare workers develop de novo PPE-associated headaches or exacerbation of their pre-existing headache disorders.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=80b790c8a43256252fd5620bcfc1b7bb)

1. **Reflections on Nursing Ingenuity During the COVID-19 Pandemic.**  
   Newby Jamison C. The Journal of neuroscience nursing : journal of the American Association of Neuroscience Nurses 2020;:No page numbers.

INTRODUCTIONThis reflections article provides insight toward nursing innovations to reduce the overuse of personal protective equipment while maintaining a safe environment for staff taking care of COVID-19 patients. The secondary aim of this paper to capitalize on recent advances in mass electronic communication through social media to encourage nurses across the globe to share their knowledge and expertise during this pandemic.The many innovations that have been implemented fall into 3 categories of: reducing unnecessary use of personal protective equipment (PPE), promoting staff safety and readiness, and reducing foot traffic.SUMMARYThese strategies are being shared to promote dissemination of innovative nursing interventions that will save lives during the COVID-19 pandemic.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=1eb06fc55f44514c30d1f50936c63239)

1. **Simulation as a tool for assessing and evolving your current personal protective equipment: lessons learned during the coronavirus disease (COVID-19) pandemic**  
   Lockhart S.L. Canadian journal of anaesthesia = Journal canadien d'anesthesie 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=2b31f00e7094f0a43ca2a2baf6cc9710)

1. **Sourcing Personal Protective Equipment During the COVID-19 Pandemic.**  
   Livingston Edward JAMA 2020;:No page numbers.

Numerous proposals suggested sterilization of used PPE with agents ranging from ethylene oxide, UV or gamma irradiation, ozone, and alcohol. There were also novel proposals such as mask-fiber impregnationwith copper or sodium chloride. These are not new ideas;work was performed after prior viral epidemics to determine the feasibility of sterilizing PPE. Most commenters acknowledged uncertainty about the effects of these sterilizing agents on the structural integrity of PPE, and there is some evidence the fibers in masks and respirators that filter viral particles can degrade and lose their efficacy with PPE reprocessing.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=04d43e4e9fe840f2492eb8c4f26a9587)

1. **Use of in situ simulation to evaluate the operational readiness of a high-consequence infectious disease intensive care unit**  
   Fregene T.E. Anaesthesia 2020;:No page numbers.

On 30 January 2020, the World Health Organization (WHO) declared that the outbreak of a coronavirus disease-2019 (COVID-19) was a public health emergency of international concern. The WHO guidance states that patients with (COVID-19) should be managed by staff wearing appropriate personal protective equipment; however, working whilst wearing personal protective equipment is unfamiliar to many healthcare professionals. We ran high-fidelity, in-situ simulation of high-risk procedures on patients with COVID-19 in a negative-pressure side room on our intensive care unit (ICU). Our aim was to identify potential problems, test the robustness of our systems and inform modification of our standard operating procedures for any patients with COVID-19 admitted to our ICU. The simulations revealed several important latent risks and allowed us to put corrective measures in place before the admission of patients with COVID-19. We recommend that staff working in clinical areas expected to receive patients with COVID-19 conduct in-situ simulation in order to detect their own unique risks and aid in the creation of local guidelines of management of patients with COVID-19.<br/>Copyright &#xa9; 2020 Association of Anaesthetists

1. **Evaluating video-reflexive methods to improve infection prevention and use of personal protective equipment in Australian hospitals**  
   Wyer M. Infection, Disease and Health 2019;24:No page numbers.

Introduction: Staff education and training in some infection prevention and control (IPC) practices, are highly variable and often cursory. Specifically, clinicians' use of personal protective equipment (PPE), is often poor; potentially leaving them inadequately protected against serious healthcare-associated infections during routine care, or prepared to respond, safely and confidently, to infectious disease emergencies. Our study tests the hypothesis that video-reflexive methods (VRM) will enhance the understanding, performance, recall of and confidence in appropriate use, of PPE in both routine and high-risk settings. <br/>Method(s): Two controlled trials of VRM in PPE clinician training were conducted at a large Sydney metropolitan hospital. Participants were recruited during existing IPC training and randomly assigned to control or intervention groups. The latter received VRM-modified training, involving videoing of their PPE practice and their reviewing footage, in reflexive sessions. The efficacy of VRM-modified training was tested by comparison of groups for: competency in PPE use, assessed longitudinally by audits in simulated and clinical settings; responses to survey questions on self-efficacy regarding PPE use, and evaluations of training; qualitative analysis of training debrief discussions and post training interviews. <br/>Result(s): Approximately 200 participants were recruited. Preliminary quantitative and qualitative results suggest that VRM training improves understanding, confidence and recall of effective PPE practice compared to standard training. Participants consistently reported high satisfaction and enjoyment in their evaluations of VRM-training. Learning through group video-reflexive discussion was identified as particularly useful. <br/>Conclusion(s): The introduction of VRM into IPC training and education can enhance clinicians' understanding and practice of PPE use.<br/>Copyright &#xa9; 2019

1. **Evaluation of a Redesigned Personal Protective Equipment Gown**  
   Drews F.A. Clinical Infectious Diseases 2019;69:No page numbers.

Background: In healthcare, the goal of personal protective equipment (PPE) is to protect healthcare personnel (HCP) and patients from body fluids and infectious organisms via contact, droplet, or airborne transmission. The critical importance of using PPE properly is highlighted by 2 potentially fatal viral infections, severe acute respiratory syndrome-associated coronavirus and Ebola virus, where HCP became infected while caring for patients due to errors in the use of PPE. However, PPE in dealing with less dangerous, but highly infectious organisms is important as well. This work proposes a framework to test and evaluate PPE with a focus on gown design. <br/>Method(s): An observational study identified issues with potential for contamination related to gown use. After redesigning the existing gown, a high-fidelity patient simulator study with 40 HCP as participants evaluated the gown redesign using 2 commonly performed tasks. Variables of interest were nonadherence to procedural standards, use problems with the gown during task performance, and usability and cognitive task load ratings of the standard and redesigned gowns. <br/>Result(s): While no differences were found in terms of nonadherence and use problems between the current and the redesigned gown, differences in usability and task load ratings suggested that the redesigned gown is perceived more favorably by HCP. <br/>Conclusion(s): This work proposes a framework to guide the evaluation of PPE. The results suggest that the current design of the PPE gown can be improved in usability and user satisfaction. Although our data did not find an increase in adherence to protocol when using the redesigned gown, it is likely that higher usability and lower task load could result in higher adherence over longer periods of use.<br/>Copyright &#xa9; 2019 The Author(s). Published by Oxford University Press for the Infectious Diseases Society of America. All rights reserved.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=e0d8cde6bed495970bb6eca97a488dc5)

1. **A multi-faceted approach of a nursing led education in response to MERS-CoV infection**  
   Al-Tawfiq J.A. Journal of Infection and Public Health 2018;11(2):260-264.

Background: The emergence of the Middle East respiratory syndrome-coronavirus (MERS-CoV) resulted in multiple healthcare associated outbreaks. In response, we developed a nurse-led program to screen and triage patients with MERS-CoV infection. <br/>Method(s): A formal educational program was implemented to ensure a standardized approach to care planning and delivery. The essential skills that were included were the use of Personal Protective Equipment (PPE) including gown, gloves, head cover and N95 mask, hand hygiene, the practice of donning and doffing and the collection of MERS-CoV nasopharyngeal specimens. <br/>Result(s): A core group of nurses were identified from high-risk units. The education program consisted of four skill-days. Nurses were assigned a pre-course work from Mosby's Nursing Skills, an online skill module, donning and doffing of PPE, and the process for obtaining a nasopharyngeal swab. The skill lab incorporated multiple methods such group discussion, watching an on-line video, and a simulated demonstration and practice on a mannequin. In total, 450 nurses attended the Nasopharyngeal Skills Day and 1000 nurses received training. Donning and doffing PPE and N95 mask fit testing has become an annual mandatory competency requirement for staff in nursing and clinical services. <br/>Conclusion(s): The application of specified protocols minimizes the risks of cross infection, placing emphasis on patient and staff safety as well as expediting the patient to definitive treatment. Nurse educators have an instrumental role in training nurses and other healthcare providers on the specifics needed to identify, contain and manage patient presenting with MERS-CoV.<br/>Copyright &#xa9; 2017 The Authors

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1. **Painting the gown red: Using a colored paint quality improvement process to evaluate healthcare worker personal protective equipment for highly pathogenic infections**  
   Eiras D. Open Forum Infectious Diseases 2017;4:No page numbers.

Background. Personal protective equipment (PPE) and strict infection control techniques are the primary methods by which healthcare workers (HCW) can avoid exposure during the treatment of patients with highly pathogenic infections such as Ebola Virus Disease (EVD) or the Middle East Respiratory Syndrome coronavirus (MERS-CoV). There is currently no consensus for the types of PPE that are recommended to be worn by HCWs, nor is there a universal process for the donning and doffing of PPE. Methods. HCWs from Bellevue Hospital participate in quarterly PPE trainings as part of the Special Pathogens Program (SPP), which consist of didactic sessions as well as an evaluation of donning and doffing techniques. A total of 50 HCWs completed the training curriculum in 2017. During the doffing process, PPE trainers applied corn start powder paint (Chameleon Colors; American Fork, UT) to the participants' gloved hands between multiple steps of PPE removal. At the end of the process, the areas where paint was found on was documented including the outer surgical gown, the powered air purifying respirator (PAPR) helmet and shroud, the inner impermeable suit, the knee-high boots and boot covers, and the extended-cuff gloves. Results. The areas of PPE that were most marked with paint were the lower shoulders and upper arms of the surgical gowns, the top sides of the PAPR shroud, the front upper chest area, and the center back of the inner impermeable suits. In a majority of cases no powder paint was noted on the knee-high boots. In a minority of cases, paint was observed on the inside upper chest area of the surgical gown. These paint markings were used to discuss potential breaches in PPE doffing technique in real-time, as well as identify areas to target in future PPE trainings. Conclusion. The powdered paint quality improvement process for donning and doffing PPE is a method to evaluate the complex PPE dressing procedure. It is particularly useful given the fact that it is incumbent on each hospital or healthcare system to develop its own processes and procedures for PPE, as well as maintain readiness through periodic trainings. Powdered paint can identify vulnerabilities in their process as well as areas that require further education.

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1. **A cluster-randomised controlled trial to test the efficacy of facemasks in preventing respiratory viral infection among Hajj pilgrims.**  
   Wang M. Journal of epidemiology and global health 2015;5(2):181-189.

<strong>BACKGROUND:</strong> Cost-effective interventions are needed to control the transmission of viral respiratory tract infections (RTIs) in mass gatherings. Facemasks are a promising preventive measure, however, previous studies on the efficacy of facemasks have been inconclusive. This study proposes a large-scale facemask trial during the Hajj pilgrimage in Saudi Arabia and presents this protocol to illustrate its feasibility and to promote both collaboration with other research groups and additional relevant studies.<br /><strong>METHODS/DESIGN:</strong> A cluster-randomised controlled trial is being conducted to test the efficacy of standard facemasks in preventing symptomatic and proven viral RTIs among pilgrims during the Hajj season in Mina, Mecca, Saudi Arabia. The trial will compare the 'supervised use of facemasks' versus 'standard measures' among pilgrims over several Hajj seasons. Cluster-randomisation will be done by accommodation tents with a 1:1 ratio. For the intervention tents, free facemasks will be provided to be worn consistently for 7days. Data on flu-like symptoms and mask use will be recorded in diaries. Nasal samples will be collected from symptomatic recruits and tested for nucleic acid of respiratory viruses. Data obtained from questionnaires, diaries and laboratory tests will be analysed to examine whether mask use significantly reduces the frequency of laboratory-confirmed respiratory viral infection and syndromic RTI as primary outcomes.<br /><strong>CONCLUSIONS:</strong> This trial will provide valuable evidence on the efficacy of standard facemask use in preventing viral respiratory tract infections at mass gatherings. This study is registered at the Australian New Zealand Clinical Trials Registry (ANZCTR), ACTRN: ACTRN12613001018707 (http://www.anzctr.org.au).

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|  | **Source** | **Criteria** | **Results** |
| --- | --- | --- | --- |
| 1. | EMBASE | (covid-19).ti,ab | 1337 |
| 2. | EMBASE | (coronavirus).ti,ab | 11621 |
| 3. | EMBASE | "CORONAVIRUS INFECTION"/ | 2174 |
| 4. | EMBASE | (efficacy).ti,ab | 1154980 |
| 5. | EMBASE | (personal protective equipment).ti,ab | 3151 |
| 6. | EMBASE | (1 OR 2 OR 3) | 13137 |
| 7. | EMBASE | (4 AND 5 AND 6) | 2 |
| 8. | EMBASE | (5 AND 6) | 59 |
| 9. | EMBASE | (4 AND 5) | 87 |
| 10. | Medline | (covid-19).ti,ab | 1739 |
| 11. | Medline | (coronavirus).ti,ab | 10922 |
| 12. | Medline | "CORONAVIRUS INFECTION"/ | 0 |
| 13. | Medline | (efficacy).ti,ab | 780899 |
| 14. | Medline | (personal protective equipment).ti,ab | 2642 |
| 15. | Medline | (10 OR 11) | 11928 |
| 16. | Medline | (13 AND 14 AND 15) | 2 |
| 17. | Medline | (14 AND 15) | 65 |
| 18. | CINAHL | (covid-19).ti,ab | 261 |
| 19. | CINAHL | (coronavirus).ti,ab | 1320 |
| 20. | CINAHL | "CORONAVIRUS INFECTION"/ | 0 |
| 21. | CINAHL | (efficacy).ti,ab | 196705 |
| 22. | CINAHL | (personal protective equipment).ti,ab | 1694 |
| 23. | CINAHL | (18 OR 19) | 1461 |
| 24. | CINAHL | (21 AND 22 AND 23) | 1 |
| 25. | CINAHL | (21 AND 22) | 37 |
| 26. | EMCARE | (covid-19).ti,ab | 56 |
| 27. | EMCARE | (coronavirus).ti,ab | 1156 |
| 28. | EMCARE | "CORONAVIRUS INFECTION"/ | 396 |
| 29. | EMCARE | (efficacy).ti,ab | 231605 |
| 30. | EMCARE | (personal protective equipment).ti,ab | 1369 |
| 31. | EMCARE | (26 OR 27 OR 28) | 1337 |
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| 36. | HMIC | "CORONAVIRUS INFECTION"/ | 0 |
| 37. | HMIC | (efficacy).ti,ab | 3052 |
| 38. | HMIC | (personal protective equipment).ti,ab | 69 |
| 39. | HMIC | (37 AND 38) | 3 |
| 40. | PubMed | (covid-19).ti,ab | 2729 |
| 41. | PubMed | (coronavirus).ti,ab | 16705 |
| 42. | PubMed | "CORONAVIRUS INFECTION"/ | 0 |
| 43. | PubMed | (efficacy).ti,ab | 793743 |
| 44. | PubMed | (personal protective equipment).ti,ab | 31186 |
| 45. | PubMed | (40 OR 41) | 17792 |
| 46. | PubMed | (43 AND 44 AND 45) | 4 |
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