

Upgrading PPE for staff working on COVID-19 wards cut hospital-acquired infections dramatically

June 29 2021, by Craig Brierley



Credit: Cambridge University Hospitals NHS Foundation Trust

When Addenbrooke's Hospital in Cambridge upgraded its face masks for staff working on COVID-19 wards to filtering face piece 3 (FFP3) respirators, it saw a dramatic fall—up to 100% – in hospital-acquired SARS-CoV-2 infections among these staff.

The findings are reported by a team at the University of Cambridge and

Cambridge University Hospitals (CUH) NHS Foundation Trust. The research has not yet been peer-reviewed, but is being released early because of the urgent need to share information relating to the pandemic.

Until recently, advice from Public Health England recommended that [healthcare](#) workers caring for patients with COVID-19 should use fluid resistant surgical masks type IIR (FRSMs) as respiratory protective equipment; if aerosol-generating procedures were being carried out (for example inserting a breathing tube into the patient's windpipe), then the guidance recommended the use of an FFP3 respirator. PHE has recently updated its guidance to oblige NHS organisations to assess the risk that COVID-19 poses to [staff](#) and provide FFP3 respirators where appropriate.

Since the start of the pandemic, CUH has been screening its healthcare workers regularly for SARS-CoV-2, even where they show no symptoms. They found that healthcare workers caring for patients with COVID-19 were at a greater risk of infection than staff on non-COVID-19 wards, even when using the recommended respiratory protective equipment. As a result, its infection control committee implemented a change in respiratory protective equipment for staff on COVID-19 wards, from FRSMs to FFP3 respirators.

Prior to the change in respiratory protective equipment, cases were higher on COVID-19 wards compared with non-COVID-19 wards in seven out of the eight weeks analysed by the team. Following the change in protective equipment, the incidence of infection on the two types of ward was similar.

The results suggest that almost all cases among healthcare workers on non-COVID-19 wards were caused by community-acquired infection, whereas cases among healthcare workers on COVID-19 wards were

caused by both community-acquired infection and direct, ward-based infection from patients with COVID-19—but that these direct infections were effectively mitigated by the use of FFP3 respirators.

To calculate the risk of infection for healthcare workers working on COVID-19 and non-COVID-19 wards, the researchers developed a simple mathematical model.

Dr. Mark Ferris from the University of Cambridge's Occupational Health Service, one of the study's authors, said: "Healthcare workers—particularly those working on COVID-19 wards—are much more likely to be exposed to coronavirus, so it's important we understand the best ways of keeping them safe.

"Based on data collected during the second wave of the SARS-CoV-2 pandemic in the UK, we developed a mathematical model to look at the risks faced by those staff dealing with COVID-19 patients on a day to day basis. This showed us the huge effect that using better PPE could have in reducing the risk to healthcare workers."

According to their model, the risk of direct infection from working on a non-COVID-19 ward was low throughout the study period, and consistently lower than the risk of community-based exposure.

By contrast, the risk of direct infection from working on a COVID-19 ward before the change in respiratory protective equipment was considerably higher than the risk of community-based exposure: staff on COVID-19 wards were at 47 times greater risk of acquiring infection while on the ward than staff working on a non-COVID-19 ward.

Crucially, however, the model showed that the introduction of FFP3 respirators provided up to 100% protection against direct, ward-based COVID-19 infection.

Dr. Chris Illingworth from the MRC Biostatistics Unit at the University of Cambridge, said: "Before the [face masks](#) were upgraded, the majority of infections among healthcare workers on the COVID-19 wards were likely due to direct exposure to patients with COVID-19.

"Once FFP3 respirators were introduced, the number of cases attributed to exposure on COVID-19 wards dropped dramatically—in fact, our model suggests that FFP3 respirators may have cut ward-based [infection](#) to zero."

Dr. Nicholas Matheson from the Department of Medicine at the University of Cambridge, said: "Although more research will be needed to confirm our findings, we recommend that, in accordance with the precautionary principle, guidelines for respiratory protective equipment are further revised until more definitive information is available."

Dr. Michael Weekes from the Department of Medicine at the University of Cambridge, added: "Our data suggest there's an urgent need to look at the PPE offered to healthcare workers on the frontline. Upgrading the equipment so that FFP3 masks are offered to all [healthcare workers](#) caring for patients with COVID-19 could reduce the number of infections, keep more hospital staff safe and remove some of the burden on already stretched healthcare services caused by absence of key staff due to illness. Vaccination is clearly also an absolute priority for anyone who hasn't yet taken up their offer."

More information: Mark Ferris et al, FFP3 respirators protect healthcare workers against infection with SARS-CoV-2, (2021). [DOI: 10.22541/au.162454911.17263721/v1](https://doi.org/10.22541/au.162454911.17263721/v1)

Provided by University of Cambridge

Citation: Upgrading PPE for staff working on COVID-19 wards cut hospital-acquired infections dramatically (2021, June 29) retrieved 16 June 2024 from <https://medicalxpress.com/news/2021-06-ppe-staff-covid-wards-hospital-acquired.html>

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