**A risk reduction framework for health care workers during the COVID-19 pandemic**

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Figures 2

**Introduction**

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a new strain of coronavirus that causes coronavirus disease 2019 (COVID-19). In March 2020, the World Health Organization classified COVID-19 as an international pandemic. Initial guidance from many organisations identified people who might be more vulnerable to COVID-19, based on knowledge of those known to be most susceptible to adverse outcomes from the influenza virus. Health conditions divided individuals into those who are ‘extremely vulnerable’, for whom ‘shielding’ is required, and those at ‘increased risk of severe illness’.

Studies of hospital admissions and mortality have subsequently allowed identification of more specific risk factors. They include age, sex and underlying health conditions, the most important of which are diabetes, hypertensive disease, cardiovascular disease and obesity. (1) Concerns have also been raised globally about ethnicity as a risk factor; because of the disproportionately higher rates of COVID-19 infection and deaths in ethnic minority populations compared to white populations. (2) In the UK’s National Health Service (NHS), 21% of staff are from ethnic minority backgrounds but non-white ethnicities accounted for 75.8% of deaths. (3)In the USA, Black people account for over 20% of COVID-19 cases among health professionals despite only 5% of doctors and 10% nurses in the US being from this group (4, 5). The extent to which COVID-19 mortality is linked to workplace exposure, cultural or social factors, ethnicity, housing and co-morbidities is not fully understood. (2)

**What does this article aim to do?**

In the UK, employers have a responsibility created by the Health and Safety at Work Act, 1974 to protect the health and safety of their workforce, as far as reasonably practicable. (6)

Tackling risks under the remit of UK health and safety law involves a preventative, risk

assessment approach. This includes an equitable and inclusive approach to risk management and risk reduction of potential workplace hazards, for all staff regardless of ethnicity and diversity. This involves identification of what could cause injury or illness (hazard); deciding how likely it is that someone could be harmed and how seriously (risk). Action needs to be taken to eliminate the hazard, or if this is not possible, control the risk. The Health and Safety Executive also recommended a risk assessment framework, for example, to employers to reduce the risk of work-related stress(7).

Due to the pandemic, there have been calls for the protection of all health care workers in primary, secondary or community care (8) and various frameworks and tools for risk stratification have been developed in UK and internationally. (9-13). The European Agency for Safety and Health at Work has also issued similar guidance for organisations to implement measures in place to prevent COVID-19 infections including risk assessment tools(14) and the World Health Organization have also issued guidance on understanding and managing risk(15) Here, we present a simple framework: principles for assessing and managing COVID-19 risk in health care settings. We describe a pragmatic approach that may be incorporated into existing risk procedures and be used as an aid to decision making. Several frameworks are currently in use in various NHS contexts and they can be adapted to suit other healthcare settings. (7, 9-14)

**How do you conduct a risk assessment?**

Clinicians are familiar with the concept of Clinical Risk Assessment that seeks to improve the quality and safety of healthcare (15). Most clinicians are less familiar with the concept of workplace risk assessment. The framework presented here suggests three aspects to a risk assessment that are necessary for effective decision-making (Figure 1). It is important to consider all three: *workplace, workforce* and *individual*. There are a number of published frameworks giving detailed practical methods of implementing these in practice.(7, 9-14)

*INSERT FIGURE 1 HERE*

First, an assessment of ***workplace factors*** should include measurement of exposure, to help identify who may encounter the hazard in their work environment. These include environmental hygiene, increased environmental cleaning, social distancing and hierarchy of other control measures including eliminating if possible.With COVID-19, we can identify the hazard, and to some extent the exposure (by environmental survey and testing) involved in the type of work being undertaken.

Second, an assessment of the ***workforce*** will help employers identify, in their team or service, to what extent those staff are at risk of exposure.The availability of redeployment options needs to be considered. Key considerations include staff location (primary or community care, or hospital setting) and an exploration of activities and risks in their typical working environments: for example, whether staff work in an environment where aerosol generating procedures (AGPs) are performed. Managers should seek to identify in their team or service, the proportion of staff who may have increased vulnerability including age and ethnicity data.

Third, an ***individual*** risk assessment is required for every employee to identity those with increased vulnerability to infection and adverse outcomes from COVID-19. These one-to-one conversations may be conducted by a line manager, supervisor, senior manager, or health and safety representative. They should take into account age, sex, chronic health conditions, ethnicity and pregnancy. (7, 9, 16) (17). Details of criteria recommended in this framework are presented in Figure 1 and will be updated and refined in the light of new evidence. Several risk assessment tools have been developed based on these criteria and are in operation within the NHS.(9-11, 13) These are suitable for use by non-clinicians. Others have been developed for clinicians to use with their patients.(18)

Assessments should consider psychological and social factors, risk behaviours and mental wellbeing. Individuals’ understanding of risk will vary, as will their willingness to engage in a work activity which they perceive to be hazardous. Managers may not be aware of their staff’s underlying health conditions, as in normal circumstances it is not appropriate to seek such information beyond functional capabilities. However, in the current situation, health assessment of all staff by a specialist (e.g. Occupational Health) service may not be practical and enquiry by managers about the presence of health conditions is reasonable, subject to cautions about confidentiality. Such conversations between managers and staff need to be handled sensitively and supportively and allowing for healthcare settings to foster a climate for individuals to openly discuss their concerns. Staff may be more anxious, depressed or traumatised than under normal working conditions. It is also important that there is an open and positive workplace culture that supports health workers to share their concerns about risk with employers and consider their preferences. Some staff may require additional advice and support.

*INSERT FIGURE 2 HERE*

**How will this help reduce the risk?**

Risk assessment should be followed by risk management: the application of a hierarchy of control measures. A holistic system of risk assessment aims to help employers make adjustments to mitigate the risk of COVID-19 to all staff. This starts with elimination of exposure to the hazard if possible, control of exposure to the hazard by engineering controls, hygiene measures and safe systems of work, and by the selection and correct use of personal protective equipment (PPE), including training and fit testing. This way potentially high risks of infection in some environments may be minimized. Individuals who are at greatest risk to adverse outcomes from infection may need adjustments to their roles, and some may require redeployment across the health system to lower risk environments. There are a number of published practical examples of how to conduct a risk assessment of the workplace, workforce and the individual(14, 19).

**Where do we go from here?**

Significant research and audit programmes are underway to determine the extent of the impact of covid19 on health care workers with a number of longitudinal studies under way.(20, 21) As more scientific evidence on COVID-19 becomes available, more accurate validated risk prediction scores will facilitate more precise estimates of individual risk.

Figures to date do not suggest that doctors or nurses, particularly in intensive care units, have a higher mortality rate than the general working population (22). This may reflect a controlled working environment where exposure to the hazard can be minimized by safe systems of work and provision and correct use of PPE. However, there still remains a disproportionate impact of overall deaths in ethnic minority health care workers

Finally, risk management should involve training, measuring how well control measures are working, and learning from that experience. A risk management process should also involve consultation with staff. The pandemic has created an opportunity to improve safety in the workplace beyond COVID-19 and also address workplace cultural factors and ensure all staff feel included and supported to raise concerns. How such processes have been conducted should also be evaluated to help improve risk management in the current pandemic and any future similar events.

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**Conflict of Interest**

KK and AM developed with others the Risk Reduction Framework currently being supported by NHS Employers.

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