

# Contribution of Occupational Health to multidisciplinary team work for COVID-19 prevention and management

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## ABSTRACT

**Introduction:** *The SARS-CoV-2/Covid-19 pandemic is a challenge for public health and occupational medicine and developing prevention and protection strategies needs expertise from many disciplines. To make prevention successful, individuals have to be motivated to participate and, in turn, motivation depends on understanding how and why prevention measures are implemented. We present a structured approach (the Cycle of prevention) which involves different stakeholders and perspectives to develop, and monitor, prevention strategies in transparent and effective ways.*

Currently, we are facing the SARS-CoV-2/ Covid-19 pandemic as a serious global public health challenge. While there is focus on developing medications and providing vaccinations for this virus, the importance of creating and optimizing prevention strategies remains indisputable. The lack of preparation clearly emerged for such a global SARS-CoV-2 risk of infection, which poses new challenges to Occupational Health. In particular, occupational health physicians seem to have gained a key role, owing to their ethically binding mandate – i.e., the workers' health protection – and that of company's advisers in a multidisciplinary effort to re-organize industrial activities ensuring that the job be fitted for the workers' safety (1, 2). On the one hand, workplaces are often at risk of resulting in clusters and can be associated with factors that increase the risk of super-spreading

events. Worldwide, several super-spreading events were for instance observed in meat-factories (3), that may be associated with working in restricted areas, cooled and recirculated air as well as with special accommodation such as shared dormitories. But also for more common workplaces, such as offices, a risk of infection is described (4). These work-associated cases then can spread the virus into the community. Therefore, prevention measures at workplaces are highly relevant for both the individual worker and public health. Moreover, as prevention measures and exposures at workplaces are often easier to control and compare than in other places, these can be suitable settings for developing and investigating prevention strategies.

When implementing prevention measures at workplaces, occupational medicine expertise will

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be needed. Some authors even consider company doctors to have the leading role in developing prevention measures (5). Spinazzè et al. describe transferring knowledge about effective prevention measures from prevention and hygiene professionals to employers and employees as a challenge (6). However, prevention strategies should not be created by a single person or a single profession but be a result of team-work. In the following we discuss the relevance of principles usually governing prevention programmes to mitigate the effects of physical and chemical pollutants at the workplace compile prevention strategies in an ongoing *Cycle of Prevention* to be adopted by a multidisciplinary team – including employers and employees – fighting COVID-19.

### **What different groups of prevention measures do exist?**

We should remember, that prevention measures follow a hierarchical order according to their level of importance, also known as the “STOP-principles”: 1) **S**ubstitution (substituting high- with low-risk procedures, e.g. relying on videoconferences instead of face-to-face meetings); 2) **T**echnical measures (e.g., performing aerosol-generating procedures in negative pressure rooms); 3) **O**rganisational measures (such as home office); and 4) **P**ersonal protective equipment (such as Ffp2-N95 respirators). Note that there is a priority hierarchy in prevention measures.

### **What do we want prevention measures to be like?**

(i) To be effective, in case of the contagiousness of SARS-CoV-2 we need to make sure that the risk of infection is significantly reduced by the prevention measure. Therefore, it can be helpful to assess the actual risk of exposure. In the recent situation of the pandemic, the Occupational Safety and Health Administration (OSHA) created four exposure levels, dividing jobs into groups of lower exposure risk (such as remote workers or long distance truck drivers), medium exposure risk (such as persons with frequent contact with general public, e.g. cashiers), high exposure risk (such as medical transport workers) and very high exposure risk

(healthcare-workers performing aerosol-generating procedures) (7). In addition, the risk of infection has to be specified concerning the way of transmission via droplets (airborne particles  $>10\ \mu\text{m}$ ), aerosols ( $<5\text{--}10\ \mu\text{m}$ ) (8) or direct contact with contaminated surfaces. To prevent infections from aerosols, which can even result from speaking and normal breathing, ventilation could be an important technical prevention measure. Therefore, increasing the number of air exchanges (for instance by expanding operating time of ventilation systems to enhance their efficiency) should be considered as well as avoiding air recirculation (9). Günther et al. investigated a super spreading event in a German meat factory, where a single person infected 60% of their co-workers, resulting in a temporary shutdown of the production site and a regional lockdown; Air recirculation and low air exchange rates, in addition to physical work and low temperature, were described to be promoting factors for aerosol transmission (3), whereas no significant accumulation of aerosols was observed in negative-pressure patient rooms with 4.25 air changes per hour (10).

Generally, face coverings are described as important prevention measures to reduce the transmission via large droplets (11). However, the filtration efficiency of cloth masks may not be sufficient to block smaller suspensions of particles or droplets, i.e. aerosols (8). The choice between respirators and surgical masks should be based on the risk of aerosol generation (12). In addition, fit testing should be conducted to find the best fitting face piece for the individual worker (13, 14). To ensure the necessary seal between the respirator and the individual's face, qualitative taste fitting tests (for instance using isoamyl acetate) (15) or quantitative fit testing (comparing particle proportions in and out of the mask) can be applied (16). To ensure the measure's effectiveness, fit tests should be performed before wearing the mask for the first time, when applying a new device that was not tested before and after any facial change (such as weight changes or facial surgery) (16). Every time before a face piece is put on, a fit checking,

such as negative or positive pressure techniques, should be done (14).

- (ii) In regard to safety, we need to consider that prevention measures can evoke side effects. Possible negative outcomes of these side effects, have to be weighed up against the benefit of reducing risk of infections as well as the risks that follow from the disease. In addition to obvious short-term effects, such as reduced sight when wearing a respirator or reduced physical condition, long-term consequences have to be factored in and anticipated. For instance, the prevalence of skin diseases that derive from protective equipment is described as high (17): Lan et al. reported that a considerable proportion of first-line health care workers (97%) suffered from skin damage, which was directly related with the wearing time of either FFP2 or N95 masks with the duration of application (wearing time for more than 6 hours compared to less than 6 hours: OR= 2.02; 95% CI= 1.35-3.01) (18). Darlenski and Tsanov described the aggravation of existing skin diseases by increased personal hygiene and using PPE that may interfere with epidermal barrier or result in contact reactions. Erythema, papules, maceration, and scaling were reported and, symptoms such as burning and itching were found in 97% of 542 frontline healthcare workers. Prolonged use of goggles and masks were described to cause contact dermatitis as well as pressure urticaria (19).
- (iii) It seems to be axiomatic to highlight that prevention measures have to be available. However, in the course of the recent pandemic, periods of limited availability of PPE resources (20) and laboratory testing equipment (21) were widely reported. Hence, it is important to adapt the strategies based on what is actually feasible under the existing circumstances or to create and explore how to reuse disposable PPE such as masks. Moreover, Giorgi et al. reported that the availability of safe procedures and PPE can moderate the risk of mental health concerns (22).
- (iv) The necessity to make sure that workers know how to use prevention measures is also essential, and often overlooked. To give an astonish-

ing example: there is no doubt that theatre staff should be trained in using PPE. However, Heron et al. reported that only 18% of the workers in a theatre did use PPE according to the CDC standard (23). During the recent pandemic, Wennmann et al. reported that in an emergency department in a German University hospital the staff needed more PPE-training than expected (24).

- (v) To be accepted, workers have to understand why and how to use prevention measures. For both, understanding and acceptance, bidirectional communication is crucial (25). In particular, teaching on why and how to use protection measures as well as learning from experiences throughout the implementation period are of great importance. This will not only show respect for workers, but also allows collecting important new information about prevention measures. As a result, both the effectivity and acceptance may be enhanced.

### **Who should be included when creating prevention strategies?**

The large number of questions when considering prevention measures at workplaces show that different stakeholders, such as employers, employees, specialists in workplace security, occupational physicians, occupational hygienists, infection control specialists, laboratory scientists, and researchers should be involved when creating prevention measures. Undoubtedly, it is of high relevance that these stakeholders are working together, as otherwise relevant information could be missed. Watterson described, for instance, that ignoring scientific knowledge by political authorities as well as employers had a negative impact on the course of the pandemic in the UK (26). The process to create consistent concepts of prevention including these stakeholders' interaction is what we describe in the "*Cycle of Prevention*".

### **How should prevention strategies be created?**

As outlined in Figure 1, firstly, workplace-associated risks have to be assessed by a team incorporating all relevant expertise (A). For instance, in terms of SARS-Co-V-2, in addition to risks of infection the burden on mental health has to be considered:

several studies described an association between the exposure to SARS-CoV-2 at the workplace and mental health problems (28). The risk of getting infected as well as of transmitting the disease to family and friends, insufficient prevention measures, overworking or traumatizing events are some factors that may lead to emotional strain (27). Moreover, those who return to work after having survived the infection may need special support due to limited physical and mental condition or stigmatisation in staff or society. Therefore, the expertise of various occupational health professionals is needed as well as insights by the employers and employees. Subsequently, resulting prevention measures (B) should be grouped according to the STOP-principle (C).

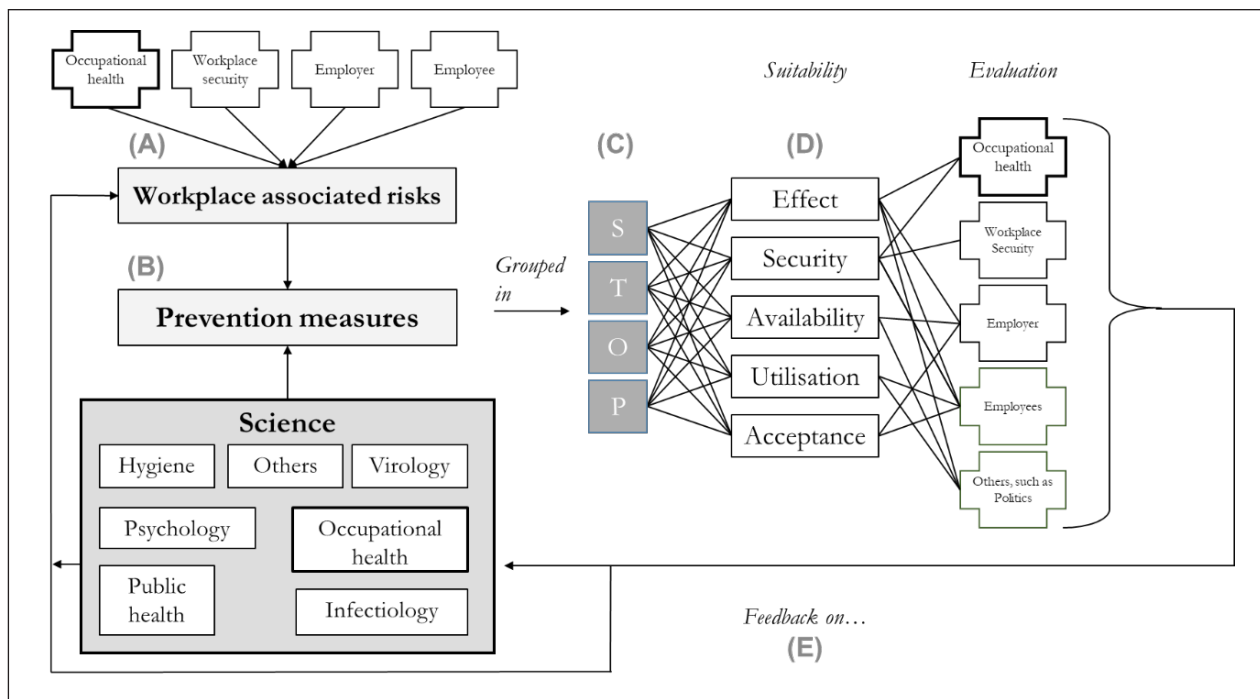
Every prevention measure has to be evaluated concerning the above discussed factors (D), so whether it is effective, safe, available, used properly and accepted. Different stakeholders should discuss these aspects and give feedback (E) to those implementing measures at the specific workplace as well as to research. Based on this feedback and recent scientific evidence, the risk assessment and preven-

tion strategy has to be revised (A) in an iterative process inducing a *Cycle of Prevention* (see Figure 1).

**Why should we think about this Cycle of Prevention right now?**

The SARS-CoV-2 pandemic leads to high risk for individual and global health. Therefore, sound prevention strategies are needed. The *Cycle of Prevention* is an approach to remember how to create prevention strategies through team-work. Here, it is presented in the context of workplace safety, but its principle, namely to consider different stakeholders to investigate fundamental requirements and choose the most appropriate options for varying situations, could be transferred to other settings easily.

The situation of the pandemic is unique, as we are not only facing a new virus but also a threat to public health systems of a magnitude that we have never handled before. Hence, we will make mistakes. But we should reduce the risk of wrong decisions as much as possible. Considering different stakeholders' expertise can be of high importance to reduce the risk of missing relevant information. This



**Figure 1** - The Cycle of prevention: stakeholders, team composition, and strategies when analysing health risk and mitigating interventions for COVID-19 according to the STOP principle (Substitution, Technical measures, Organisational measures, and Personal protection).

pandemic has posed unique challenges, by the way in which it exhausts people and resources at the very time when we need those people to be highly motivated in order to take part in prevention. Key to motivation is to understand “why” and “how” decisions on prevention measures are made. The *Cycle of Prevention* could help to create and monitor sound prevention strategies that are transparently based on different perspectives and empirical insights through team-work.

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