Swissnoso updated recommendations on the use of FFP2 respirators for healthcare workers with direct contact to COVID-19 patients in acute care hospitals

v2.0 (December 2021, replaces document 210630_Swissnoso_update_recommendations_use_of_FFP2_V0.7_EN from Jun 2021) Important content updates/changes are highlighted in blue

PURPOSE OF THE DOCUMENT AND APPROACH TAKEN

To ensure adequate protection of healthcare workers (HCWs) to minimize the risk of SARS-CoV-2 acquisition when delivering care to confirmed or suspected cases of COVID-19 in the acute care setting. Recent scientific literature was reviewed to update recommendations on HCW precaution measures, in particular on the use of filtering facepiece class 2 (FFP2)[1] respirators and in light of more transmissible virus variants that continue to emerge.

BACKGROUND AND RECENT FINDINGS FROM SCIENTIFIC LITERATURE

Several interventions have proven effective to mitigate the impact of the COVID-19 pandemic, first and foremost vaccination. However, the progress made is being jeopardized by the emergence of new virus variants [Meyerowitz, 2021], with reproduction numbers (Ro) having increased for the delta variant to over 5 [Liu, 2021] and might be even higher with omicron, justifying a re-evaluation of the previous recommendations.

Infectious respiratory particles are the most important mode of transmission of SARS-CoV-2. Previous reports showed type II/IIR surgical masks to be comparable to FFP2 respirators to prevent transmission of SARS-CoV-2 or other respiratory viruses in most instances [Wiersinga, 2020; Cheng, 2021; Conly, 2021; Chu, 2021]. For the direct care of suspected or confirmed COVID-19 patients in situations not involving aerosol-generating procedures (AGPs[2]), the World Health Organization recommends using surgical masks [WHO 2020]. In contrast, the Infectious Diseases Society of America (IDSA) suggests using either surgical masks or respirators [Lynch, 2021].

Current evidence suggests no boundaries exist between different-size particles (larger droplets vs. smaller aerosols). Exposure to lower-range aerosols and infectious dose (a function of viral concentration and time) are important risk factors of transmission [Klompas, 2021]. Klompas et al. recently put the concept of AGPs for the risk stratification of COVID-19 into perspective since some AGPs are likely to generate fewer aerosols than certain non-AGP situations. In contrast, they propose as most crucial risk factors: epidemiology, prolonged exposure, proximity to the respiratory tract, poorly ventilated rooms, highly symptomatic patients, and respiratory activities other than quiet breathing [Klompas, 2021]. Transmission appears to be heavily linked to the level of indoor air circulation, a factor that had not been taken into account in previous recommendations.

[1] The document considers FFP2 or equivalent respirators, such as N95or KN95 types.

[2] Most of the international guidelines still suggest the use of FFP2 (respirators) for AGPs

There are no classical randomized controlled clinical trials [3] directly comparing masks vs. respirators and the risk of SARS-CoV-2 acquisition in HCWs. However, laboratory and epidemiological studies point towards an added benefit from respirators, if worn properly and combined with other measures as indicated [Cheng, 2021; Wilson, 2021; Bazant, 2021; Hamilton, 2021]. A recent multi-center Swiss cohort study suggested additional protection in HCWs predominantly using FFP2 rather than surgical masks with more frequent exposure to COVID-19 patients outside AGPs [Haller, 2021]. However, the results need to be interpreted with caution due to the inevitable limitations of an observational study based on self-reported mask use.

Notably, the Haller study shows that exposure to positive household contacts has the by far strongest association with laboratory-confirmed SARS-CoV-2 infection/seroconversion. Similar was observed in other reports [Martischang, 2021; Kahlert, 2021; Steensels, 2020], some of which suggested the risk of transmission from interactions between HCWs (at work and during breaks) to be higher than from HCWs interacting with patients. This underlines that the protective effect of masks in the direct care of suspected or confirmed cases of COVID-19 relies on the strict adherence of HCWs to the use of other personal protective equipment (PPE) and precaution measures as indicated both in the community and at the workplace. In addition, added protection from source control (patients wearing a surgical mask) should be considered [Ueki, 2020]].

EVALUATION AND CONCLUSION

The critical strategies for reducing the risk of SARS-CoV-2 acquisition in HCWs providing care to COVID-19 patients include vaccination and strict adherence to precaution measures, including the use of adequate masks/respirators and other PPE as indicated. The current evidence points towards an additional benefit of respirators (FFP2) in certain "risk" situations that may expose HCWs to lower-range aerosols close to COVID-19 patients (e.g., prolonged contact, proximity to airways, enhanced breathing activity, or poor room ventilation). Given the concerns about newer, more transmissible virus variants, respirators might offer additional protection in those situations.

FFP2 are only effective when correctly used, and therefore different types and models and mechanisms are required to ensure the best fit and tolerance in the HCWs. Importantly, respirators and other PPEs are only one of several "safety layers" to reduce the risk of SARS-CoV-2 acquisition in HCWs. Most transmissions in HCWs occur during "at-risk" situations in the community (family) or during exposure without adhering to precaution measures. Therefore, vaccination is the prime prevention measure on the population level (vaccination should be promoted for HCWs in all possible avenues), combined with strict adherence to hand hygiene and other prevention measures to limit the spread of SARS-CoV-2.

The universal use of FFP respirators in acute care hospitals is not recommended. Finally, the following recommendations are for acute care hospitals. Local employers can choose whether and how to adapt their approach according to their local analysis of benefits and risks (considering local epidemiology, vaccination status, and/or individual risk of immunocompromised HCWs).

[3] The only randomised-controlled trial is still ongoing https://clinicaltrials.gov/ct2/show/record/NCT04296643

KEY RECOMMENDATIONS

In addition to vaccination and the adherence to general precaution measures, the use of PPE (mask vs. respirators) represents another critical safety layer to prevent infection with SARS-CoV-2 in HCWs

1. **Whereas surgical masks provide sufficient protection in most situations, the use of FFP2 respirators is recommended for HCWs delivering care to patients with confirmed or suspected COVID-19, if one or more of the following risk situations are present or anticipated**

   - **prolonged or close contact** to the patient, especially to the airways[4], or performing aerosol-generating procedures
   - **patient showing enhanced respiratory activity** other than quiet breathing[5]
   - **room ventilation is poor**[6]

2. **For the effective use of FFP2 respirators, ensure**

   - **different respirator types are available,** matching different face shapes
   - **training on the fit check and offer formal fit testing**[7]
   - respirators are **tolerated and correctly handled by the HCW**

3. **HCWs must strictly adhere to general precaution measures, including**

   - applying **excellent hand hygiene**, **eye protection when in close (<1.5m) contact,** and **other PPE and measures as indicated/per local guidelines**
   - ensure **regular ventilation of patient rooms, offices, and staff rooms** and **responsible behavior during interactions with other HCWs & outside work**
   - **vaccination according to the latest national guidance** [8] **is strongly recommended** to reduce nosocomial and community spread

[4] e.g., assisting in oral/dental care or helping oral intake; if patient does not support wearing a surgical mask

[5] e.g., forced breathing, talking, shouting, coughing or other severe symptoms; during exercise or forced expiratory maneuvers, or if patient does not support wearing a surgical mask

[6] e.g., if not possible to regularly open the window (minimum 4-6 times per day for 15-20 minutes), or if less than 2-3 air exchanges per hour [Vernez, 2021] in air-conditioned rooms; or CO2-concentration > 1000 ppm (proxy for poor ventilation if normal room occupancy [Science Taskforce, 2021]

[7] Fit testing to formally evaluate fit of respirators in HCWs (e.g. ISO-Standard 16975 or see also links below)
https://www.aerzteblatt.de/archiv/218410/Dichtsitzpruefung-von-Atemschutzmasken-waehrend-der-COVID-19-Pandemie
https://www.3mschweiz.ch/3M/de_CH/arbeitsschutz-ch/sicherheitsloesungen/atemschutz/dichtsitzpruefung/
https://www.ifik.unibe.ch/unibe/portal/fak_medizin/ber_dlb/inst_infekt/content/e39965/e919099/e919108/e947661/e924425/20200131_Fact_Sheet_Schutzmasken_ger.pdf

[8] Federal Office of Public Health FOPH https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/impfen.html

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