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**Facepiece Filtering Respirators with Exhalation Valve should not be used in the  
Community to Limit SARS-CoV-2 Diffusion**

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To the Editor,

From the first identified cases of COVID-19 to date, the pandemic spread of SARS-CoV-2 has led scientific community to face difficult challenges. Many countries have already experienced periods of social lockdown, with the aim of containing the diffusion of the virus, but with dramatical economic consequences. In order to balance health, economic and social needs in the long-term, a de-escalation of quarantine restrictions has been proposed in many countries.

It has been observed that during normal speech, a huge number of droplets are produced, and that face covering may be effective in limiting the distance reached by the droplets, potentially reducing the transmission of the virus from individuals who are unaware to be infected.<sup>1</sup>

Face covering with masks or tissue has been widely recommended as a complementary measure to reduce infection rate in the community, by limiting the excretion of droplets from asymptomatic or pre-symptomatic individuals.<sup>2</sup> In this context, some governments are ordering face covering, especially during activities when social distancing is impossible or difficult (e.g. using public transports, visiting groceries or supermarkets etc.).<sup>2,3</sup>

Such measures should be intended as a protection towards the community and not as self-protection. A distorted comprehension of the real aim and a scarce knowledge of the differences among protective devices, has led many people to start using facepiece filtering respirators (FFR) instead of the suggested non-medical or medical masks, which are the most appropriate devices for source control, especially in the context of a pandemic.

FFR are disposable filtering media, designed to provide the wearer an inward protection from inhaling contaminants conveyed by respiratory droplets or aerosols.<sup>4</sup> On one hand, this 'panic buying' of FFR may have contributed to the lack of supplies available for those employed in risky settings, such as healthcare workers frequently exposed to aerosol

generating procedures, and possibly also encouraged the phenomenon of counterfeiting.<sup>5</sup> On the other hand, the uncontrolled sale of FFR to people unaware of the specific features and untrained to their use can determine additional risks: wrong doffing procedures can increase cross-contaminations, a false perception of safety can reduce the compliance to other measures (i.e. hand hygiene, respiratory etiquette, social distancing) and, even worse, the use of FFR with exhalation valves in the community may be an additional and under tracked transmission source.

The risks related to the presence of an exhalation valve are not intuitive for the general population and should not be silenced by institutions and governments. FFR endowed with exhalation valves are meant for prolonged use, such as during extended work-shifts when the wearer can experience discomfort and heat, due to the high resistance during exhalation. The valve opens only during the expiration, lowering resistance encountered during expiration. At lower inward pressures than those created by the expiratory airflow, the valve closes and, despite minimal inward leakage exists, filtering performance is granted during inspiration, together with a more comfortable expiration.<sup>6</sup>

The functioning of exhalation valves poses major concerns about outward protection, reasonably not provided by these types of devices. Several institutions have already expressed concerns about their use outside the recommended context. The European Centre for Disease Prevention and Control (ECDC) and Africa Centre for Disease Prevention and Control have provided clear statements against their use in the community setting<sup>7,8</sup>. The U.S. Centre for Disease Prevention and Control (CDC) recommended against their use in those healthcare settings where a sterile field must be maintained, thus implying that the outward protection can not be provided.<sup>9</sup> Recently, the City and County of San Francisco explicitly listed respirators with one-way valves among the forbidden ones for the use in community, clarifying that they ‘allow droplets out of the mask, putting others nearby at risk’, thus not complying with the order of face covering.<sup>10</sup>

Communication campaigns should aim to promote the wearing of masks as a source control measure and to increase awareness about the fact that FFR supplies are already insufficient to protect highly exposed workers. Indeed, institutions and governments should consider preventing free marketing of FFR with valves, given that their indiscriminate use in the community setting can determine an additional and under tracked risk for the population.

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