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Letter to editor: Role of masks/respirator protection against 2019-novel coronavirus (COVID-19)

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To the editor,

Since the outbreak of a novel coronavirus, COVID-19, reported on 31 December 2019, in Wuhan, a central city in China, it has infected over thirty thousand cases in a very short term, with hundreds deaths (1). In fact, it continues to be a flaming infectious disease across the world. Up to now, many details of the biological features of this virus remain largely unknown.

COVID-19 is the third coronavirus threatening the global public health during the last two decades, following the severe acute respiratory syndrome coronavirus (SARS-CoV) in 2002 and the Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012 (2). Based on an updated report, Wang et al. indicated that the median age of deaths was 75 with fever (64.7% of deaths) and cough (52.9% of deaths) identified as initial clinical manifestation (3). Genomic characterization of samples from nine COVID-19 infected patients indicated that COVID-19 was with 88% identity to two bat-derived SARS-like coronaviruses (bat-SL-CoVZC45 and bat-SL-CoVXC21), whereas 79% identity to SARS-CoV and 50% to MERS-CoV (4). Phylogenetic analysis indicated that COVID-19 belonged to the subgenus Sarbecovirus of the genus Betacoronavirus (4).

Given large-scale spreading of this virus has been noticed around the world, the priority is to identify infected cases and contain possible spreading routes. Increasing risk has narrowed the window opportunity for effective refrain the disease. It becomes much more complicated and challenging when in-hospital populations are exposed. Noteworthy, Zhou et al. recommended urgent interventions for the protection of Chinese healthcare workers against COVID-19 (5). In fact, it raised our attention as what was the role of daily used N95 respirators and maskers during this pandemic.

Given the similarity among COVID-19 and SARS-CoV, initial political recommendation in China highlighted the use of masks and N95 respirators for protection against COVID-19. Wearing masks and respirators and self-isolation at home had been used as practice guideline for public. Of note, 10 of 213 medical staffs with no mask were infected by COVID-19 while 0 of 278 wearing N95 respirators was infected (6). Interestingly, a higher risk of infection was noticed in male professionals. This study called for the essential role of occupational protection (6).

However, the evidence-based guidelines remain largely sparse. By definition, N95 respirators are designed for the protection of reducing small airborne particles with clear filtration requirements. It must be tightly fit to wearer's face with limited seal leakage. Medical masks, also known as surgical masks, are used to protect the wearers from microorganism transmission, specifically during hand-to-face contact and large droplets and sprays. In fact, the comparably loose wearing of medical masks unable to efficiently prevent small airborne particles. Both masks and N95 respirators are used for the protection against airborne infections, such as SARS-CoV and influenza virus. Therefore, it is reasonable to initiate a wide mask/respirator protection across China when facing a virus similar to SARS-CoV.

Intriguingly, does N95 respirator demonstrate better outcome than medical masks? In fact, the clinical effectiveness between N95 respirators and medical masks for protection against respiratory infection transmission has not been fully assessed. Particularly, quantified protection analysis among healthcare individuals close to respiratory illness-suspected patients remain largely limited (7). In a randomized clinical trial of 2862 health care personnel analyzing the effectiveness of N95 respirators and medical masks, Radonovich et al. reported that there was no significant different incidence of laboratory-confirmed influenza between two types of equipments (8). Noteworthy, disease-bound features remain

another uncertainty limiting the direct translational protective implementation. Influenza A virus may explain the explanation (2). The altered specificity of influenza virus-targeting receptor has resulted in a changing disease burden due to lower-to-upper respiratory tract shift. H1N1 virus targets the upper respiratory tract with endemic population and comparably mild disease whereas H7N9 targets the lower respiratory tract with fewer human-to-human transmission cases (2). However, without sufficient evidence, it is far from conclusion that this lesson could be translated into COVID-19 given the unclear mechanistic evidences.

Nonetheless, the long-term protective role of both masks and respirators is another emerging concern given the worldwide spread of COVID-19. Previous evaluation over published literatures, including 67 randomized controlled trials and observational studies, indicated that surgical masks and N95 respirators were supportive measures with most consistency. However, they also concluded that the assessment of such measures was difficult (9). In fact, with the rising of COVID-19, the necessity to widely implement supportive protection using masks or N95 respirators may enable multiregional, or multinational people study.

Notably, Holshue et al. reported the first case of COVID-19 in the United States with stool specimen positive by rRT-PCR test (10). Given the full picture of the biological features of COVID-19 has yet to be recognized, it is prudent to consider more potential risk routes. In summary, the protective role of both N95 and medical masks in other diseases could be translated into the fight against COVID-19, with specific contribution yet to be quantified.

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Authors' contributions

QW and CY carried out data analysis.

QW and CY drafted the manuscript;

QW and CY participated in study design and data collection.

All authors read and approved the final manuscript.

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This study requires no ethics approval due to public data-based analysis.

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Consent for publication

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Competing interests

All authors declare no conflict of interest in this study.

Human participants and animal rights

This article does not contain any studies with human participants or animals performed by any of the authors.

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