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# Mask or No Mask? May Be Modified Masks for Health Care Workers Wearing Respirators for Prolonged Hours During The COVID-19 Pandemic!

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## Background

The present Covid-19 pandemic along with the previous SARS, MERS and other infectious disease outbreaks have led to guidelines recommending the routine use of respirators for healthcare workers, many of whom work for prolonged hours [1]. In recent years, it is generally accepted that operating theatre staff has to wear respirators. A respirator is a personal protective device that is worn on the face, covers at least the nose and mouth, and is used to reduce the wearer's risk of inhaling hazardous airborne particles (including dust particles and infectious agents), gases, or vapors. Further the respirators used should be an unvalved Filtering Facepiece respirator (FFP2, that has no exhale valve) in operatory of clinical and hospital setting [2].

## Discussion

This pandemic due to its severity and widespread impact added to the challenges faced by healthcare workers including shortage of PPE. Respirators that comply with international standards may be considered during times of known shortages [3]. Hence, the use of KN95 was adopted by many countries due to lack of availability of N95 respirators. These respirators have similar filtration performance [4], are economical and easily available, hence an ideal substitute in these critical settings. The use of these respirators have certain disadvantages too. Long duration wearing of N95 respirator may induce physiological stress on the wearer, making regular tasks more challenging, and causes headaches among healthcare providers. Surgeons in the operating room frequently experience physical discomfort, fatigue, and possibly even deterioration of surgical judgment and performance [5,6].

The acceptable duration of wearing respiratory protective devices was about 1 hour in a work environment with an air temperature of 18°C on average [7]. Even the Revised Guidelines for Air Conditioning in Operation Theatres -NABH-Air Conditioning OT (2018) recommends It should be maintained 21°C ± 3°C [8]. Respirators may impose some measurable airway resistance, but it seems doubtful if this significantly increases the process of breathing. The respiratory effects of prolonged respirator use on clinicians working in clinical environment are unclear although there has been literature on its use but in simulated conditions.

Clinical settings are entirely different in relation to stress levels and unpredictability of duration of the surgery in some situations. The present situation necessitates the use of these respirators by surgeons even in these demanding situations due to the need

to protect these frontline health workers; many of whom have succumbed to Covid-19. The use of surgical masks during surgery [6] and in the present times respirators during surgical procedures is inevitable at the present hour when the pandemic is still not under control.

An abundance of literature but in simulated situations and conditions [1,5,9,10] including pregnant healthcare workers! [11] More research needs to be done to observe the effects of prolonged usage of these life savior respirators under stressful conditions as in surgery. Lack of literature might be due to the fact the doing complicated analysis and measurements of vitals might be infeasible during actual surgery. Here comes the use of the pulse oximeter to measure the oxygen saturation of blood as it is an indispensable equipment of any operatory to monitor the patient vitals. The human eye's ability to detect hypoxemia is poor. While the oxygen levels keep reducing in the blood level, the individual may not exhibit all the symptoms in a specific order because reacting to hypoxia may vary from individual to individual [12]. A pulse oximeter can detect the oxygen saturation of haemoglobin quickly, in an accurate, and reliable way [13]. Pulse oximetry provides a convenient, noninvasive method to measure blood oxygen saturation continuously. Pulse oximetry has a sensitivity of 92% and a specificity of 90% when detecting hypoxia at a threshold of 92% oxygen saturation [14].

Although it is stated that hypoxemia results from the increased CO<sub>2</sub> content of the inspired air due to the exhaled CO<sub>2</sub> getting trapped beneath the surgical face mask; there has been no controlled study concerning the effect of KN95 respirators on the level of blood oxygenation. The previous studies have either used a surgical mask or no mask at all as a control and are conducted in simulated environment [1,6,10]. Dental surgeons might have to work for prolonged duration especially in emergency and surgery procedures as also in educational settings where the learners are in their training phases and might require more time to accomplish routine dental procedures as stepwise approval is needed. Dental surgeons feeling unwell; like headache and dizziness due to discomfort from usage of KN95 respirators might not only be harmful their health but also affect their clinical decision making. Evidence is very limited and inconclusive for the harm caused by prolonged usage of KN95 respirator in clinical settings as the initial standard was N95 respirator [4]. Only one such study has been carried out in the real situation as in during surgeries, but it was using the surgical face masks and not the respirators [5]. Other studies among nurses working actual work settings reveal that communication difficulties, compliance and tolerance issues [15,16].

## Conclusion

The present pandemic necessitates the use of PPE consisting of respirators [2,3]. Dentists, dental hygienists, nurses, paramedics and anaesthesiologists being a few of the health care workers are at the greatest risk to encounter exposure to the virus and

get infected. So, maintaining their health is going to conserve the healthcare manpower to sail us through these unprecedented times of Covid-19. Also, if it does cause harm this needs to be taken into consideration in guidelines for respirator use. The benefits as to risks of using KN95 mask should be weighed against potential respiratory consequences associated with extended KN95 respirator usage as it's an efficient and economical alternative to N95 respirator. N95 respirator has been shown to affect the oxygen saturation of blood and increase breathing resistance on prolonged use in various studies [1,6,10].

The findings will be useful for the development and formulation of guidelines and policy for the long duration usage of KN95 respirators by health care workers. Safer alternatives for surgeons who regularly have long procedures like modified masks [16] with reservoirs of oxygenated air can be utilized [17]. Thus, we would conserve and safeguard our invaluable health care workforce in the present Covid-19 pandemic.

## Acknowledgement

None.

## Conflict of Interest

No conflict of interest.

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