



EDİTÖRE MEKTUP / LETTER TO THE EDITOR

Reusage of N95 mask in COVID 19 pandemic- strategies and vigilance

COVID 19'da N95 maskesinin yeniden kullanımı pandemik stratejiler ve ihtiyat

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To the Editor,

COVID-19, the current global pandemic is of tremendous concern to the occupational health community, because health care professionals would face the greatest risk of exposure. There are various rumors and myths circulating in the social media and other various online platforms regarding the reuse of N-95 respirators during the pandemic situation and hence it is essential to explore this current scenario based on the working mechanism and various decontamination and reuse strategies of N-95 respirators.

Table 1. Working mechanism of N95

Aerosol size	Mechanism of trapping
>1 micron	These particles cannot pass through the filtering material due to their inertia and hence collide and stick to the outer surface
< 0.1 micron	These particles exhibit constant Brownian movement and hence adhere to the outer surface

N95 is a disposable respirator with a filtering face piece that has been tested and certified by the *National Institute for Occupational Safety and Health* (NIOSH) which has minimum 95 % filter efficiency at the most penetrating particle size (0.3 micron) [1]. It has two elastomeric straps for holding the mask to the user's head and thus enabling the user to have a close facial fit. The pliable metallic nose piece allows the user to

adjust the fit at the nose. It cannot be used in an environment with an oily atmosphere ("N" stands for Nonresistant for oil). N95 Respirators are usually made of mats of non-woven fibrous material like polypropylene. The polypropylene material creates a tortuous path that helps with adhesion of particles to the fibers with the outer surface of the respirator without any hindrance to the airflow across the respirator². Working mechanism of N95 respirator is depicted in Table-1.

Recommendations for N95 usage

Ever since the outbreak of COVID-19 the usage of N95 respirators has increased exponentially not only by the health care workers but also by the general population. Hence the World Health Organization (WHO) has come up with certain recommendations for the usage of N95 respirators [3]. WHO have emphasized the usage of N95 mask only to the Health Care Professionals (HCP) who are involved in the following procedures.

- Aerosol-generating procedures (cardiopulmonary resuscitation, tracheostomy, tracheal intubation, non-invasive ventilation, manual ventilation before intubation and bronchoscopy),
- Collection and laboratory handling (centrifugation) of the respiratory sample of the suspected or confirmed case of the COVID-19 and for

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- Performing autopsies of the suspected or confirmed case of the COVID-19.

N95 respirator usage – Current Scenario during the COVID-19 pandemic

Why there is a crisis?

Any pandemic is unexpected and it imposes huge impact on health care society. COVID-19, being an aerosol borne pandemic, there is huge demand of surgical masks and N95 respirators and other Personal Protective Equipment (PPE) among the healthcare workers and the general population. The surge in the global demand is mainly due to the increasing number of COVID-19 cases and it is also further influenced by misinformation, fluster shopping, stock hoarding and widespread and inappropriate use of PPE by the general public. The capacity to expand PPE production and shipping them is also affected inadvertently due to lockdown in different parts of the world.

Solution: Can “REUSE STRATEGIES” combat the crisis?

In view of the above dilemma, we have come up with the important facts already available in the literature with special focus to the salient aspects which are useful for the current situation.

Reuse Strategies available in the Literature

N95 respirators are tight fitting protective respiratory device which filters 95% of the airborne particles when properly donned and it should be ideally discarded after each patient encounter and after aerosol generating procedures [4]. N95 respirators are evaluated, tested and approved by NIOSH (The National Institute for Occupational Safety and Health) & OSHA (The Occupational Safety and Health Administration). The ability to disinfect and reuse disposable N95 respirators is a much needed technique during this COVID-19 pandemic. The various techniques of decontamination of N-95 respirators and its role in the current scenario were explained in the Table- 2⁵⁻⁷.

Standard Operation Procedure issued by Premier Academic and Research Institute in India for extended use of N95 respirators:

All India Institute of Medical Sciences (AIIMS), New Delhi being the center of national importance

working under Ministry of Health and Family Welfare (MoHFW) in India had issued Standard Operating Procedure for extended use of N-95 respirators by Health Care Workers on 08.04.2020⁸. The strategy employed is to give each health care worker five N95 masks out of which four is used and one is kept as a reserve for any emergency. After using a mask, at the end of the day, it is advised to keep it in a brown colored paper bag and the same mask is reused after four days. This cycle is repeated and hence a total of 5 masks can be reused over a period of 20 days. This cycle is explained in Table-2. The viability of SARS COV-2 on various surfaces has been studied and it is depicted in Table-3⁹. SARS COV-2 survives maximum of 72 hours in plastic. This could be the plausible reason behind the SOP issued by AIIMS, New Delhi.

Role of public in the pandemic crisis

The COVID-19 pandemic has a huge influence in the mental status of the general public. People started believing blindly about the false and unauthenticated information circulating through various platforms of social media. People started hoarding personal protective equipment without knowing the importance of them to the frontline health care workers. In order to curb this issue, the Ministry of Health and Family Welfare (MoHFW) had issued advisory and manual on making a homemade protective cover for face and mouth [10]. In addition to that, the Ministry of Health and Family Welfare, Government of India, also suggested sterilization methods for reusing homemade face covers. Pressure boiling for 10 minutes or cleaning with soap and water and proper drying under hot sun for at least 5 hours were few suggested techniques. The homemade face cover is not recommended for health care professionals or those working with or in contact with COVID 19 patients or are patients themselves as these categories of people are required to wear specified protective equipment. The people who are living in densely populated areas across India will be benefited by this measure. Homemade face covers will not give full protection, but still reduce the chances of inhaling droplets still in the air from an infected person. Reusing without washing or sharing the homemade face masks should not be done at any cost

Table 2. Various methods of decontamination

S.NO	Technique	Effective decontamination cycle	Duration	Major concerns	Role in pandemic
1.	70-75% Ethyl alcohol	0	10 minutes	Loss of electrostatic charge leading to reduced filtration efficiency	Not effective
2.	Dry heat @ 70°C	1-2	60 minutes	Melting and degradation of respirator Facial fit reduces after each cycle	Not effective
3.	Autoclave @ 121°C for 15 minutes	1	15 minutes	Filtering efficiency and respirator integrity is lost	Not effective
4.	Ultraviolet Germicidal Irradiation (260-285nm)	3	30 minutes	Particle penetration capacity increases after many cycles of decontamination Breaking strength decreases after many cycles of decontamination Different pathogens require different doses of Ultraviolet irradiation	Effective with proper vigilance
5.	Pressurized Hydrogen Peroxide Vapor	30-50	10 minutes	De-gassing phase is 4 hours Requires specialized apparatus like Bioquell The elastomeric straps tends to break after 30 decontamination cycles	Very much effective but resource limited

Table 3. Schedule of reusage






Mask 1	Mask 2	Mask 3	Mask 4	Mask 5
				
Day 1	Day 2	Day 3	Day 4	Reserve
Day 5	Day 6	Day 7	Day 8	Reserve
Day 9	Day 10	Day 11	Day 12	Reserve
Day 13	Day 14	Day 15	Day 16	Reserve
Day 17	Day 18	Day 19	Day 20	Reserve

Table4. Surface viability of SARSCOV-2

Surface	Viability Of Sars Cov-2
Plastic	72 hours
Stainless steel	48 hours
Cardboard	24 hours
Copper	8 hours
Aerosol	3 hours

To conclude, the Public should be aware of the mode of transmission of COVID-19 so that they will know the importance of hand washing and social distancing. Hoarding of surgical masks and N95 respirators should not be done by the general public.

Homemade face masks along with standard reusing techniques should be encouraged. Regular hand washing with soap and water or alcohol based hand rub. Maintaining social distancing not only in crowded places, but also at home. The Public should

be made aware of the coughing and sneezing etiquettes. Proper disposal of the disposable masks or respirators should be encouraged as an improper method of disposable masks serves as a source of infection and disease transmission.

Although various modes of disinfection of N95 respirators discussed above, the prime necessity is the vigilance of each and every method of disinfection. Improper method of disinfection is dangerous since it serves as the source of infection of COVID-19 and various other life threatening infections.

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