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The Case for Masks: Health Care Workers Can Benefit Too

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As the coronavirus disease 2019 (COVID-19) crisis in the United States evolves, states and health care organizations are meeting the limits of their preparedness for surging cases that require critical care. Evidence to guide practice is scant. Five months into the pandemic, there are models of possible trajectories of the disease but there are still no clear, national recommendations to guide practice that could reduce the spread of infection in hospitals facing limited availability of personal protective equipment (PPE) including surgical masks and N95 masks. This confusion complicates the tradeoff decisions hospitals must now make between conserving supply for the immediate future, and limiting spread of infection now. Anticipating even greater need as the virus spreads in communities across the country, many have opted to limit the use of PPEs, especially N95 masks, to only certain clinical procedures and patient encounters. As *The New York Times* reported recently, doctors, nurses, and staff at hospitals across the country are sounding the alarm about risk of exposure.¹

But one solution may be hiding in plain sight, and it is rooted in basic high school physics. The largest respiratory droplets, which are expelled by coughing, sneezing, or speaking, come from the pharynx and upper respiratory tract.² This is also where the virus replicates the most.³ Volume is a cubic function, so these large droplets can hold exponentially more copies of the virus than small ones. The large ones quickly succumb to gravity due to their size, while the smaller aerosols, generated in the lower respiratory tracts of infected patients, can remain suspended in the air for several hours.⁴ This makes N95 respirators indispensable for

protecting health care workers treating critically ill patients; it also raises the question of whether more humble alternatives could block the large droplets outside critical care settings. As Dr Sui Huang lays out in a brilliant exposition of the problem, even makeshift masks create a physical barrier that limits where these droplets can land.⁵ While wearing them does not stop all exposure, it is curtailed, and studies of crude masks made from basic consumer materials suggest that they can make a difference.

Perhaps more importantly, masks drastically reduce the number of droplets that make it beyond the wearer's mask and into their surroundings. This insight may be critical for coronavirus. Preliminary analysis of nasals swabs from asymptomatic and symptomatic individuals indicate that they appear to have similar viral loads.⁶ Using a mask allows even those who do not suspect that they are infected to reduce the probability of transmission. Added to social distancing, this barrier could reduce the number of viral copies making contact with others and coming to rest on surfaces, waiting for the unwitting brush of a hand that later meets the face. Countries that have adopted uniform mask requirements, such as the Czech Republic, have benefitted from a more notable flattening of their epidemic curves than their counterparts.⁷ The US Centers for Disease Control and Prevention recently followed suit, recommending that the general public wear makeshift masks in public areas where social distancing is difficult.⁸ However, some health care organizations have remained slow to consider them for all employees coming into work.

While current rationing helps preserve the supply of N95s and procedural masks, it comes at the risk of adding to the problem

by infecting those working in hospitals. The same health care workers trying to avoid transmission from patients are susceptible to another source — each other. One study suggests that physicians spend around a quarter of their time caring for patients.⁹ Although that measure likely varies by specialty and may be far higher under current circumstances, it highlights the fact that health care involves significant interaction outside of patient care. Even with rapid advances in the use of telemedicine and remote work policies for nonessential workers, this still leaves plenty of opportunities to unwittingly pass the virus among unprotected colleagues. Reports from other countries indicate that, relative to other groups, health care workers are over-represented among confirmed cases. Estimates from several US states suggests that as many as 20% of COVID-19 cases may be among health care workers.¹⁰ The high numbers suggest that exposure beyond patient care is responsible for at least some transmission.¹¹ Adding to the problem is that higher inoculating doses of certain pathogens are hypothesized to result in more severe disease,^{12,13} and clinics and hospitals are the most likely places to encounter highly concentrated doses of the coronavirus. Initial analyses and anecdotal reports indicate that health care workers are becoming more ill than the general population.^{14,15}

The Joint Commission, which accredits hospitals, has endorsed allowing workers to use their own, privately owned masks and respirators.¹⁶ But even these resources run dry quickly. Some groups are already sewing masks for donation to hospitals that are critically short of PPE. We suggest that hospitals treat makeshift masks not only as substitute but also as a complement to PPE where none is currently being used due to rationing. Requiring that anyone on the premises of a patient care organization, whether in clinical or nonclinical workspaces, cover their nose and mouth with a mask — homemade if necessary — is a valuable measure in its own right. Some hospitals, including ours, have already adopted this policy. We urge that this become a universal policy across

the country in all health care institutions and nursing homes.

There are important caveats. Manufactured versions (surgical masks) remain the preferred, if scarce, choice. Homemade options would need to be donned and doffed properly and properly sterilized. Not all materials are well-suited for the task, but past research does shed light on which materials would perform the best.¹⁷

The math of COVID-19 has not worked in our favor, but it is not set in stone. Even if we cannot completely prevent transmission, we can take simple steps to reduce its spread. Asking that the general public wear homemade masks was a step in the right direction. We recommend that all persons entering clinics and hospitals, in clinical settings as well as any other nonclinical areas where health care workers convene, should wear a mask. This can be a surgical mask if possible, but a makeshift homemade mask should be permitted if surgical masks are unavailable or are in short supply. We must consider it as a small investment that pays compound interest by safeguarding health care workers, and flattening the curve by reducing the likelihood of spreading the virus among themselves, their patients, and families.

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