


COVID-19: MASK OR NO MASK?

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ASSOCIATION BETWEEN UNIVERSAL MASKING IN A HEALTH CARE SYSTEM AND SARS-COV-2 POSITIVITY AMONG HCWs

- Mass General Brigham (MGB): largest health care system in MA, with 12 hospitals and more than 75 000 employees
- In March 2020, MGB implemented a multipronged infection reduction strategy involving systematic testing of symptomatic HCWs and universal masking of all HCWs and patients with surgical masks
- This study assessed the association of hospital masking policies with the SARS-CoV-2 infection rate




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- Using EHR, HCWs providing direct and indirect patient care who were tested for SARS-CoV-2 RT-PCR identified between March 1 and April 30, 2020
- Primary criterion for testing HCWs - symptoms consistent with SARS-CoV-2 infection
- Job description information of each HCW obtained by linking their record to MGB Occupational Health Services and Human Resources databases




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- 3 phases during the study period:
 - Preintervention period: before implementation of universal masking of HCWs (March 1-24, 2020)
 - Transition period: until implementation of universal masking of patients (March 25–April 5, 2020) plus an additional lag period to allow for manifestations of symptoms (April 6-10, 2020)
 - Intervention period (April 11-30, 2020)



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- Positivity rates included
 - *First positive test result* for all HCWs in the numerator
 - HCWs *who never tested positive* PLUS those who *tested positive that day* in the denominator
- For each HCW, any tests subsequent to their first positive test result were excluded



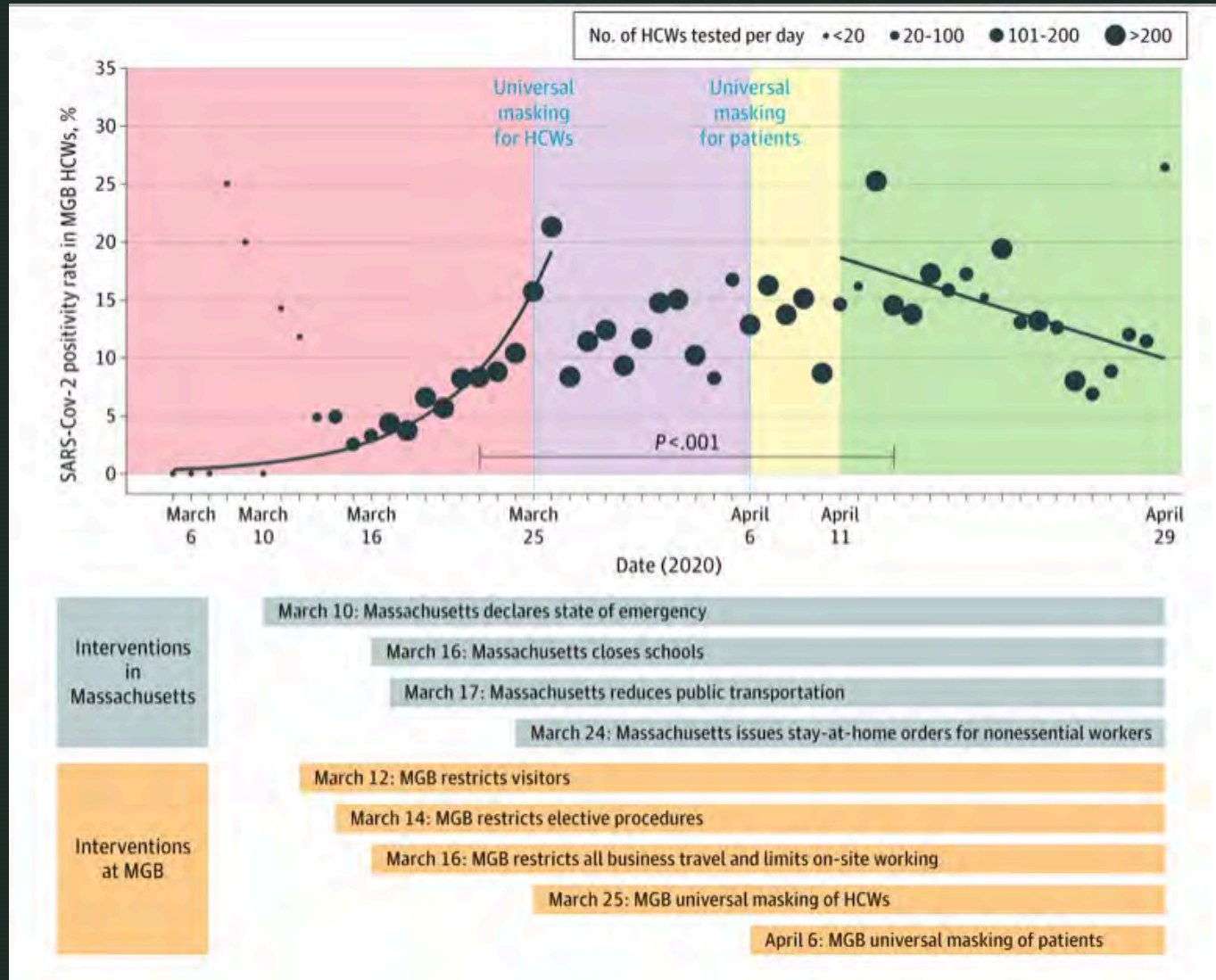
ASSOCIATION BETWEEN UNIVERSAL MASKING IN A HEALTH CARE SYSTEM AND SARS-COV-2 POSITIVITY AMONG HCWs

- Of 9850 tested HCWs, 1271 (12.9%) had positive results for SARS-CoV-2
 - 39 years median age
 - 73% female
 - 7.4% physicians or trainees
 - 26.5% nurses or physician assistants
 - 17.8% technologists or nursing support
 - 48.3% other

ASSOCIATION BETWEEN UNIVERSAL MASKING IN A HEALTH CARE SYSTEM AND SARS-COV-2 POSITIVITY AMONG HCWs


- Preintervention period: SARS-CoV-2 positivity rate increased exponentially from 0% to 21.32%, with a weighted mean increase of 1.16% per day and a case doubling time of 3.6 days
- Intervention period: positivity rate decreased linearly from 14.65% to 11.46%, with a weighted mean decline of 0.49% per day and a net slope change of 1.65% more decline per day compared with the preintervention period

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ASSOCIATION BETWEEN UNIVERSAL MASKING IN A HEALTH CARE SYSTEM AND SARS-COV-2 POSITIVITY AMONG HCWs

- Universal masking at MGB associated with significantly lower rate of SARS-CoV-2 positivity among HCWs
- May be related to decrease in transmission between patients and HCWs and among HCWs
- Limitations: Decrease in HCW infections could be confounded by other interventions inside and outside of the health care system such as restrictions on elective procedures, social distancing measures, and increased masking in public spaces




ASSOCIATION BETWEEN UNIVERSAL MASKING IN A HEALTH CARE SYSTEM AND SARS-COV-2 POSITIVITY AMONG HCWs

- Despite these local and statewide measures, case number continued to increase in Massachusetts throughout the study period, suggesting that the decrease in the SARS-CoV-2 positivity rate in MGB HCWs took place before the decrease in the general public




FACTORS ASSOCIATED WITH CLOTH FACE COVERING USE AMONG ADULTS DURING THE COVID-19 PANDEMIC

- Researchers surveyed 400 U.S. adults about whether they used cloth face coverings when they left the house in the past week
- Prevalence of face mask–wearing increased from 62% to 76% overall, with increases reported in all socioeconomic groups
- Lower rates of mask-wearing in May seen in the following groups
 - people in their 40s (68%)
 - people with lower incomes
 - people living with others at no cost (57%)




FACTORS ASSOCIATED WITH CLOTH FACE COVERING USE AMONG ADULTS DURING THE COVID-19 PANDEMIC

- Public health messages should target audiences not wearing cloth face coverings and reinforce positive attitudes, perceived norms, personal agency, and physical and health benefits of obtaining and wearing cloth face coverings consistently and correctly



HAIR STYLISTS AT A HAIR SALON WITH A UNIVERSAL FACE COVERING POLICY

- Lack of SARS-CoV-2 transmission at Missouri hair salon where face masks were required by city ordinance
- Two stylists tested positive for SARS-CoV-2
- Before their results came back, they saw 139 customers while symptomatic
- Of the 100 clients who were interviewed, 98% were also wearing face coverings



HAIR STYLISTS AT A HAIR SALON WITH A UNIVERSAL FACE COVERING POLICY

- No clients developed symptoms
- 4 household contacts of one stylist tested positive
- Broader implementation of face covering policies could mitigate the spread of infection in the general population



HOW CAN MASKS HELP?

- SARS-CoV-2 spreads predominantly in respiratory droplets
- Transmission can occur if droplets reach mouth, nose or eye of someone nearby, either directly or from an unwashed hand that's touched contaminated surface
- When an infected person wears face cover, droplets can be caught by mask rather than being expelled



HOW CAN MASKS HELP?

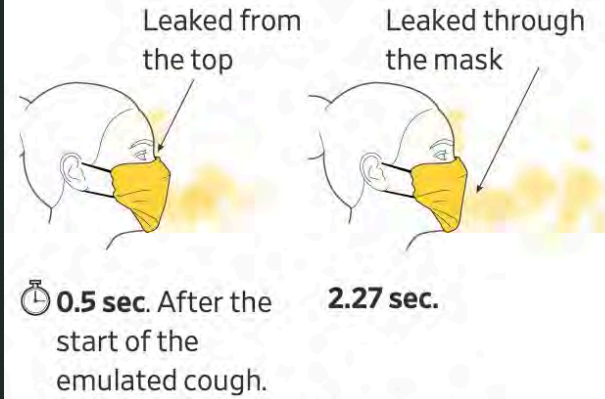
- This could be especially useful against COVID-19, because evidence suggests that a third to half of transmissions occur from asymptomatic patient
- In theory, wearing a face covering could also help protect people who are uninfected

HOW CAN MASKS HELP?

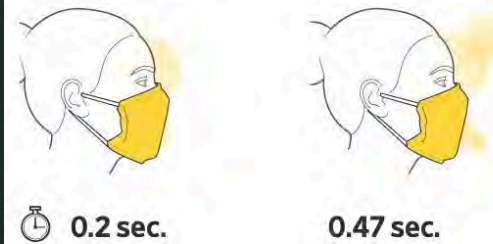
Stemming the Spread

Researchers simulated droplet dispersal from a heavy cough using different types of common masks.

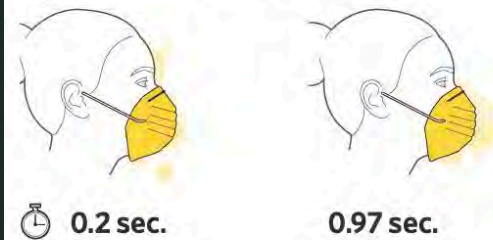
Folded handkerchief



Homemade face mask

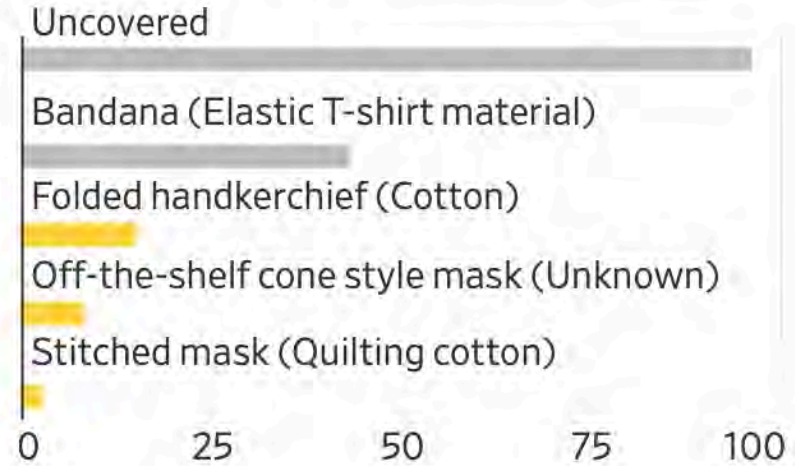


Off-the-shelf cone style mask (non N95 mask)



HOW CAN MASKS HELP?

Average distance traveled by airborne droplets. (in inches)



*Researchers found that, of the masks they studied, a stitched, double-layered cotton mask was most effective in preventing droplets from being emitted forward. Most of the escape was from the gap between the nose and mask. Droplets traveled further out of the cone mask and also escaped from the top edge.

Source: Siddhartha Verma, Manhar Dhanak and John Frankenfield of Florida Atlantic University
Alberto Cervantes/THE WALL STREET JOURNAL



HOW CAN MASKS HELP?

- If you're going to use a mask, it's vital to do so correctly or you could become infected through contact with it
- Put it on with clean hands, replace it as soon as it becomes damp, remove it from behind without touching the front, wash your hands afterward, and dispose of the mask properly
- WHO counsels against reusing masks that are made for a single use



MASK EXEMPTIONS

- Few guidelines exist regarding medical exemptions
- CDC's recommended exemptions
 - Children younger than 2 years
 - People with difficulty breathing
 - Anyone unable to place or remove the masks
 - Certain categories of disability
- Clinicians must make individual determinations as to whether a patient should be exempt from mask wearing



MASK EXEMPTIONS

- Some individuals, particularly children, with sensory processing disorders may be unable to tolerate masks
- Facial deformities incompatible with masking
- Individual with a chronic pulmonary illness at *higher risk for severe disease* from SARS-CoV-2
- Same individual infected with SARS-CoV-2 would likely also be at *higher risk for spreading* viral illness because many pulmonary illnesses are associated with a chronic cough



MASK EXEMPTIONS

- Chronic pulmonary disease in itself compelling reason for masking, rather than a category of exemption
- Risk-benefit ratio must be carefully considered




MASK EXEMPTIONS

- In general, breathing of people with mild asthma, both young and old, should not be impeded by the wearing of facial coverings
- Concerns about oxygen and carbon dioxide among patients with more severe lung disease should not play a role in asthma
- Since younger adults with COVID-19 seem to have fewer or no symptoms and may actually be carrying the virus unknowingly
- This should be the main population who should wear masks to prevent transmission to others




MASK EXEMPTIONS

- Patient education regarding the purpose of the mask and the overall advice to stay out of situations where social distancing is not being practiced
- Take the time to discuss options, patient usually understands and will try wearing a mask




COULD MASKS CURTAIL THE POST-LOCKDOWN RESURGENCE OF COVID-19 IN THE US?

- Number of US states are currently experiencing alarming post-lockdown resurgence
- Mathematical model for addressing key question of whether or not universal use of face masks can halt such resurgence
- Cumulative mortality data for Arizona, Florida, New York and the entire US during their respective pre-lockdown and lockdown periods, show that pre-symptomatic and asymptomatically-infectious individuals are, by far, the main drivers




COULD MASKS CURTAIL THE POST-LOCKDOWN RESURGENCE OF COVID-19 IN THE US?

- Implication of this result is that detecting and isolating individuals with clinical symptoms alone (even if all of them are found) may not be sufficient to effectively curtail the spread
- To achieve such control, it is crucially necessary that pre-symptomatic and asymptotically-infectious individuals are rapidly detected and isolated
- Study highlights the importance of early implementation of the community lockdown measures




COULD MASKS CURTAIL THE POST-LOCKDOWN RESURGENCE OF COVID-19 IN THE US?

- Study finds pandemic would have been almost completely suppressed from significantly taking off if
 - Lockdown measures were implemented 2 weeks earlier, and
 - Sizable percentage of the residents of 4 jurisdictions wore face masks during the respective lockdown periods
- Simulated pandemic in 4 jurisdictions under 3 levels of lifting of community lockdown, namely mild, moderate and high



COULD MASKS CURTAIL THE POST-LOCKDOWN RESURGENCE OF COVID-19 IN THE US?

- Severity of the projected second waves depends on the level of lifting of the community lockdown
- For high level of lifting of community lockdown measures, increased use of face masks after the lockdown period greatly reduces the burden of the pandemic in each jurisdiction
- In high lockdown lifting scenario, none of the 4 jurisdictions will experience a second wave if half of their residents wear face masks consistently after their respective lockdown period



COULD MASKS CURTAIL THE POST-LOCKDOWN RESURGENCE OF COVID-19 IN THE US?

- Diagnostic testing strategy increasing maximum detection rate of asymptomatic infected individuals, followed by contact tracing and self-isolation of the detected cases, greatly reduces the burden of the pandemic in all 4 jurisdictions, particularly if also combined with a universal face mask use strategy
- Universal use of face masks in public, with at least moderate level of compliance, could halt the post-lockdown resurgence of COVID-19, in addition to averting the potential for and severity of a second wave in each of the four jurisdictions




MASKS AND BLOOD O₂ LEVEL

- Patients usually
 - Complain of short of breath
 - Concerned about dropping oxygen level
- Oxygen level does not drop
- Mostly due to feeling of mask as an impediment to getting air in



MASKS AND CO₂ RETENTION

- Mask does not cause CO₂ retention
- For the mask to trap enough exhaled CO₂ and for us to breathe enough of that CO₂ back in to raise our CO₂ level, it has to be a pretty tight-fitting mask
- With the type of masks we are suggesting that people wear, that's very unlikely to occur



PATIENTS WITH CERTAIN TYPE OF LUNG DISEASE

- Things can be done in office
 - Have patients put mask on for few minutes and make sure they feel comfortable with it
 - Oximeter for patients to see that their oxygen levels don't change when they are breathing through the mask for a period of time
- Measurement of CO₂ retention not easy, but most patients with COPD or pulmonary fibrosis don't have an elevated CO₂ at baseline; education helpful in those situations
- In most cases, they aren't going to retain enough CO₂ to have problems wearing a mask



PATIENTS WITH CERTAIN TYPE OF LUNG DISEASE

- Only small percentage of patients with lung disease are CO₂ retainers
- Many of those patients being seen by pulmonary specialists
- Be more cautious with, to make sure they aren't wearing anything that is tight fitting or that makes them work harder to breathe
- It's not that the mask is causing CO₂ retention, but increased work of breathing may make it harder to exhale CO₂



MASKS AND ASTHMA

- Breathing of people with mild asthma, both young and old, should not be impeded by wearing of facial coverings
- Concerns about oxygen and carbon dioxide among patients with more severe lung disease should not play a role in asthma
- Since younger adults with COVID-19 seem to have fewer or no symptoms and may actually be carrying virus unknowingly, this should be main population who should wear masks to prevent transmission to others



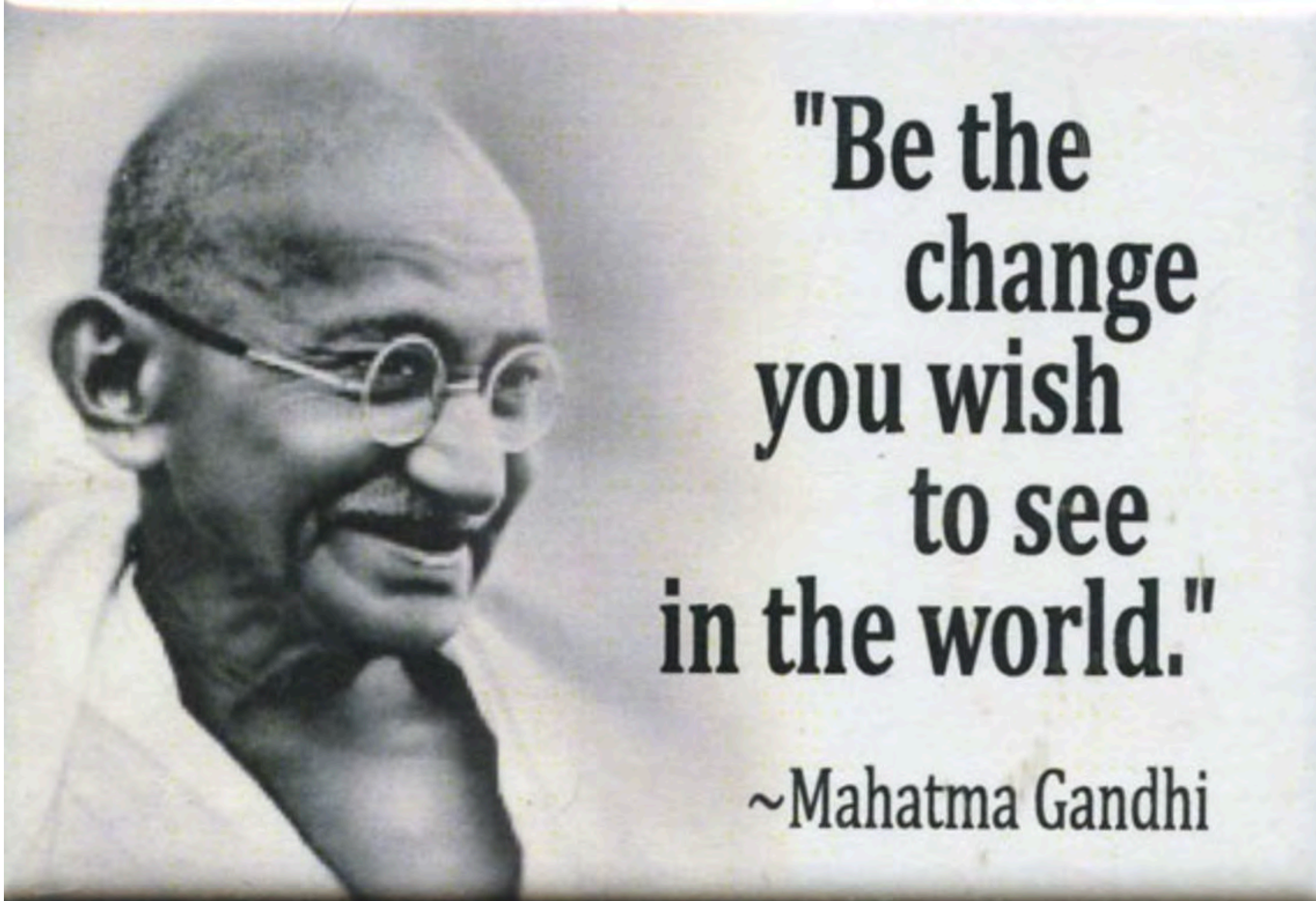
MASKS AND ASTHMA

- Exemptions for mask wearing for mild asthma should be discouraged and dealt with on a case-by-case basis if there is a particular concern for that individual



CONCLUSION

- CDC Director Robert Redfield and other agency officials conclude in a *JAMA* editorial: "At this critical juncture when COVID-19 is resurging, broad adoption of cloth face coverings is a civic duty, a small sacrifice reliant on a highly effective low-tech solution that can help turn the tide favorably in national and global efforts against COVID-19"



**"Be the
change
you wish
to see
in the world."**

~Mahatma Gandhi