

LITERATURE REVIEW SARS-CoV 2

By: Dr. Rose Ann Huynh, Laureen Gbordzoe, Swetha Maddipudi, Chloe Jensen, Olivia Chen,

Phillip Acosta, Jane Anderson, Chase Ballard, Cameron Holguin, Julian De La Chapa

Peer reviewed by: Dr. Jason Rosenfeld and Dr. Kelly Echevarria

Updated on 2/1/2021



MASKS

Impact on Health Systems



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MASK WEARING IN PUBLIC

- Mask use not only functions as source control but also offers personal protection to the mask wearer
- Non-medical mask materials with a filtration efficiency >90% include a blend of cotton/ chiffon, cotton/ silk and cotton quilt.
- The ideal combination of materials for fabric masks should include 3 layers; innermost layer: hydrophilic material (e.g. cotton or cotton blends), middle layer: a synthetic non-woven material (e.g. polypropylene), outermost layer: a hydrophobic material (e.g. polypropylene, polyester, or polyester blend). Masks should not have breathing valves or vents.
- State government mandates for community use of face masks or covers across 15 US states has been associated with a decline in daily COVID-19 growth rates from 0.9 1-5 days after signing orders to 2.0 over 21 days after signing.
- The average jet distance traveled by a cough covered by a two-layer stitched mask made of quilting cotton was 2.5 in as compared to an uncovered cough which traveled approximately 8 ft. The droplets from a cough covered by a single-layer bandana style covering had an average jet distance of 3 ft 7 in.
- EXTENDING USABILITY OF N95 RESPIRATORS
 - CDC guidelines provide principles for extending usage and reuse of filtering facial respirators, like N95s, in times of limited supply. Decontamination should reduce pathogen burden, retain functionality, and present no residual chemical hazard to mask users.
 - Ultraviolet germicidal irradiation (UVGI), vaporous hydrogen peroxide (VHP), and moist heat are the recommended methods for decontaminating N95 masks. Manufacturers should be contacted for guidance on the best mechanism for decontamination.
 - The University of Nebraska Medical School has developed a decontamination protocol for N95 respirators that uses UVGI to decontaminate 90 masks/round with a total exposure dose up to 900 mJ/cm².
 - The Washington University School of Medicine has implemented a VHP protocol that is capable of decontaminating 200 N95 respirators in 24 hours using a minimum dose of 700 parts per minute (PPM) of VHP.



TRANSMISSION

EFFECTIVENESS OF STAY AT HOME ORDERS AND EFFECTS OF RE-OPENINGS

- Stay at home orders
 - Data from four major cities in the United States has shown that with the implementation of more strict stay at home measures, the average percent change in the number of new cases daily had decreased.
- Re-openings
 - In the US, when looking at people ages 0-24, 2,871,828 people tested positive from March 1 - December 12, and the 18-24 age group made up 57.4% of those cases. There were spikes in the 18-24 age group that preceded subsequent spikes in other age groups, indicating that this age group may play a larger role in community spread.*
 - In Kansas, counties with no mask mandate saw an increase of 0.11 cases/100,000 people per day in COVID-19 incidence compared to counties with a mask mandate where there was a decrease of 0.08 cases/100,000 people per day.
 - In Florida, there was a 1.2 increase in COVID-19 cases among elementary school aged children (6-16) and a 1.3 increase in high school aged children (14-17) in counties that returned to in person schooling compared to no increase in cases in counties that continued online education.
 - Current evidence suggests that children have similar transmission rates as adults. Older children appear to have higher secondary attack rates compared to younger children.
 - There have been several reports of COVID outbreaks in different facilities that have re-opened (e.g. summer camps, nursing homes, and child care facilities) even when precautions were taken.
- *Recommendation:* Social distancing was working to flatten the curve. As businesses begin to open up and people return to work and school, caution should continue to be taken; with adequate ventilation rates, social distancing, low % occupancy of a room, low exposure time, and mask requirements, the benefits of re-opening can outweigh the risk of spread. These should be implored as much as possible as the need to gather in groups grows in order to minimize the increase in cases. As childcare facilities and schools open too, children should also wear masks; even though children tend to have milder symptoms, they are still able to transmit COVID-19. School re-openings have also been associated with increase in the number of cases in those places, therefore it may be beneficial to return to virtual schooling. There is also evidence that shows that the 18-24 age group may be playing a larger role in community spread, so the importance of COVID-19 safety precautions should be targeted to that age group.*

TRANSMISSION FROM SURFACES

- Virus viability is greatest on surfaces that are cooler, have lower humidity, and are not exposed to sunlight; with persistence on smooth, non-porous surfaces for up to 28 days under ideal conditions. These objects were found to have viable SARS-CoV-2 for different amounts of time: plastic and stainless steel (72 hours), cardboard (24 hours), and copper (4 hours). The greatest risk of transmission though is from airborne virus.
- No virus was detected after disinfection and sanitation of objects with a 0.1% hypochlorite solution. Other disinfecting chemicals (e.g. 75% ethanol, 10% bleach, advanced hand sanitizer) can also reduce the infectivity of SARS-CoV-2.
- *Recommendation:* Caution should be taken when handling objects made out of plastic, stainless steel, and cardboard, especially in higher risk settings such as the ICU, as the virus was found on computer mice, trash cans, and door handles in this setting. Disinfecting techniques should be continued.

For details and references please visit <https://oume.uthscsa.edu/longco/>

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TRANSMISSION CONTINUED

TRANSMISSION IN DROPLET VS AEROSOL FORM

- There is increasing evidence to support aerosol transmission
 - A study in South Korea showed potential transmission between apartment units that were connected by a ventilation shaft.*
 - In one study viral RNA was detected in exhaust filters that were over 50 m away from patient care areas.
- Increasing outdoor airflow may greatly decrease the airborne transmission rate of COVID-19.
- There is evidence that supports that COVID-19 can be spread via aerosols (ranked 8/9 on plausibility of aerosol transmission), but also evidence that supports it is not primarily spread by aerosols (measles which is spread by aerosols has a reproductive value of ~18 vs COVID-19 has a reproductive value of ~ 2.5).
- A model showed that droplets less than 60 μm can travel about 6 feet - 26 feet. Aerosols of SARS-CoV-2 were found to travel up to about 13 feet.
- Increasing ventilation and decreasing air-recirculation may reduce the transmission of airborne COVID-19. Experimental studies have been done that show there is better positioning for ventilation devices in order to decrease the chance of particles landing on surfaces due to ventilation.
- *Recommendation:* Forceful exhalation may be sufficient in aerosolizing SARS-CoV-2 therefore precautions should be taken when doing activities such as shouting and yelling. Opening windows may help reduce the transmission of COVID-19 indoors. Though there is a chance that aerosol transmission is not the primary method of transmission, evidence is increasing to support aerosol transmission; avoiding large crowds and poorly ventilated areas should still be practiced; evidence is growing for the aerosol spread of COVID-19 as well. How many and the location of ventilation devices should also be taken into consideration in order to optimize ventilation.

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Effects on Health

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Indirect Health Effects & Personal Impact



FOOD SECURITY

- Food insecurity rates in the US have doubled from 18% to 35% during the pandemic. Previous large observational studies suggest that living in food poverty increases the risk of developing childhood asthma, and that parents of children with CF are twice as likely to be living in food insecurity.
- One study found that self reported food security rates among low income Latinx families decreased from 76.9-80% in 2019 to 34.2-38.1% between May and September 2020.
- *Recommendation:* Clinicians should screen for food insecurity and connect patients with appropriate resources.

NONCOMMUNICABLE DISEASES & LIFE EXPECTANCY

- 75% of countries surveyed by the World Health Organization reported a considerable degree of disruption to noncommunicable disease services due to the pandemic. The CDC reported that by June 30th, 41% of US adults had delayed or avoided care due to the pandemic.
- There have been fewer patients admitted for strokes and myocardial infarctions, likely due to public health messages.
- The duration of lockdown is proportional to uncontrolled glycemia and diabetic complications.
- Children may experience unhealthy weight gain related to the pandemic. Unhealthy weight gain may be related to increased food insecurity caused by the pandemic or related to decreased physical activity because of closures.
- The average 2020 US life expectancy is estimated to decrease by 1.41 years. The Black-white life expectancy gap is estimated to increase by 50%, undoing 20 years of progress towards closing the gap.
- *Recommendation:* Practitioners should educate patients with chronic diseases about telemedicine options in order to ensure adequate management. Clinicians should also counsel parents on healthy practices to avoid unhealthy weight gain despite closures. This should include screening for food insecurity. Public health messages should encourage chronic disease management.

MENTAL HEALTH

- Psychiatric symptoms such as depression, stress, and anxiety in the general population may have increased since the pandemic with .40% of adults struggling with mental health or substance abuse; young adults, essential workers, unpaid caregivers of adults, immigrants*, and racial/ethnic minorities are experiencing these symptoms at higher rates.
 - There is some evidence that psychiatric symptoms increased at the beginning of the pandemic but then returned to baseline levels by June. More research is necessary to determine the effects of extended pandemic conditions.
 - Healthcare workers are especially at risk. Home Health Care workers reported feeling vulnerable but invisible.
 - In a Canadian cross-sectional study of mothers of kids aged 0-8, the levels of clinically significant depression and anxiety both were dramatically increased compared to pre-COVID levels.
 - A study of LGBTQ+ individuals found higher levels of stress and depression compared to pre-COVID studies.
 - A UK study of families with children who have special education needs or disabilities found that many families reported increased anxiety and fear.
 - A cross-sectional survey of peripartum women found increased levels of clinically significant anxiety/depression were associated with excessive information seeking, worries about child wellbeing, and access to medical care.
 - An observational study in outpatient clinics showed that immigrant patients experienced worsening anxiety and depressive symptoms during the pandemic - telephone based psychiatry care was found to help with managing care.*
- Since 57% of children who receive mental health services receive it from school, there is reduced access to mental health care for children whose schools closed. This disproportionately affects LGBTQ+ youths since many of them utilize mental health services.
- A cross-sectional study of people with alcohol use disorders in the UK found that lockdown was a risk factor for increased alcohol consumption, including harmful levels. However, some participants actually decreased their alcohol consumption.
- While the weekly number of EMS activations for overdoses has remained stable, the number of overdose related cardiac arrests increased between March and August by 48.5% compared to 2019 levels.
- *Recommendation:* Practitioners should screen for psychiatric symptoms, address patient concerns, and connect patients with mental health resources, including affordable and telemedicine options where possible. Public health efforts should include efforts to prevent psychiatric symptoms, like financial support and promoting social connectedness. Public health efforts should also include substance use harm reduction efforts. Clinicians should screen for increased substance use and connect patients at risk of harmful substance use with liaison services.

GENDER EQUALITY, DOMESTIC VIOLENCE, CHILD ABUSE & NEGLECT

- A study of working parents found that 36% of surveyed dual-earner couples adopted a strategy for childcare in which the wife worked and did all or most of the childcare, and that this group had the lowest measures of well-being and job performance.
- There may be increased risk of domestic violence compared to pre-COVID-19 levels due to increased stress and financial insecurity as well as decreased social support, especially in the LGBTQ+ population.
- Child abuse reporting in several states have decreased by up to 70% percent compared to pre-COVID-19 levels. In the United States, 67% of substantiated reports come from victim-serving professionals like educators, so reduced reporting likely indicates that child abuse and neglect are continuing unreported due to school closures. In Chicago, child abuse was reported less in 2020 than 2019 and one study showed that cases were reported less often than may have actually occurred A majority of cases that were reported were at residential locations.*
- Child ED visits related to abuse and neglect decreased by up to 53% compared to 2019, with a nadir in late March. In contrast, abuse related visits requiring hospitalization remained relatively stable. Domestic violence reports have increased dramatically around the world, by as much as three-fold during lockdown in China. Some reports also include the use of COVID-19 as a weapon for emotional abuse.
- *Recommendations:* As clinicians are some of the few remaining reporters, they should screen for signs of domestic violence, child abuse or neglect.

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CHILDHOOD VACCINATIONS

- A World Health Organization poll found that in 85% of 61 countries that responded, childhood immunization rates had decreased since January which may reflect parental concern of exposing children to the disease.
- A Colorado study found that childhood vaccine administration had decreased by 78% for children 3-9, and 82% for ages 10-18 between January and May.
- *Recommendations:* Clinicians should continue outreach efforts for bringing children up to date with routine vaccinations, including educating parents on the importance of preventing serious illness with vaccines even during the pandemic. Making vaccine administration available with limited contact (for example, via a drive-thru vaccine clinic) could also ease parental concerns.

STIGMA & RACISM

- In one survey, a quarter of respondents felt that healthcare workers should have restrictions placed on their freedoms to avoid infecting people with COVID-19. Nearly a third would avoid healthcare workers to avoid infection. These indicate increased stigma.
- In a survey of Chinese American families, nearly half of parents and youth reported being directly targeted by COVID-19 racial discrimination online. Higher levels of parental and youth perceived racism and racial discrimination were associated with poorer mental health in parents and youth.
- A survey of a population of undergraduate pharmacy students in New Zealand, of which half were Asian, found that 13% of students experienced direct racism, 35% reported indirect racism and 37% reported racism associated with COVID-19 affected their well-being.*
- *Recommendation:* Clinicians should be sensitive to the challenges Asian American families may face due to racism during the pandemic.