

# LITERATURE REVIEW SARS-CoV 2

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

Peer reviewed by: Dr. Jason Rosenfeld.

updated on 6/22/2020

## Impact on Health Systems



### MASKS

#### MASK WEARING IN PUBLIC

- 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 ideal combination of materials for non-medical masks (e.g. fabric masks) should include 3 layers as follows: 1) hydrophilic material (e.g. cotton or cotton blends) as the innermost layer; 2) a synthetic non-woven material (e.g. polypropylene) as a middle layer; and 3) a hydrophobic material (e.g. polypropylene, polyester, or polyester blend) as the outermost layer. Mask wearing should be accompanied by proper hand hygiene and physical distancing practices.
- 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.
- Medical masks should have at least a 95% initial droplet filtration and adequate breathability. In times of limited supply, medical masks should be reserved for healthcare workers and at-risk individuals.
- Mask wearing by the general public can provide protection against primary infections from community contacts and protect against household transmission. Masks are especially useful in situations where social distancing is not possible to maintain.

#### 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/cm<sup>2</sup>.
- 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

- With continued adherence to stay at home orders, a model has shown that it may be effective in flattening the curve; it showed that the less strict people are in staying at home, the longer the stay at home orders will have to be in place in order to flatten the curve.
- 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.
- When comparing data from areas around the United States that put stay-at-home orders in place versus areas that did not, there was a decrease in both the number of weekly cases and fatalities. After three weeks, there was a 48.6% decrease in the number of weekly cases (approximately 390,000) and a 59.8% decrease in the number of weekly fatalities (approximately 41,000). Stay-at-home orders appear to play a role in decreasing the number of cases and fatalities, but other factors also likely contribute (closures of schools and non-essential businesses).

#### TRANSMISSION FROM SURFACES

- SARS-CoV-2 was shown to be viable on objects made out of plastic and stainless steel for up to 72 hours; caution should be taken when handling objects made out of these materials, 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.
- SARS-CoV-2 was found on copper for up to 4 hours and cardboard for up to 24 hours.
- SARS-CoV-2 was found to persist longer on smooth surfaces compared to other surfaces.
- All samples (from personal items, medical equipment, and floors) from COVID-19 positive patient rooms (from multiple hospitals) were negative after disinfection and sanitation (with a 0.1% hypochlorite solution); consistent disinfection may help reduce transmission.

#### TRANSMISSION IN DROPLET VS AEROSOL FORM

- A model showed that droplets less than 60  $\mu\text{m}$  can travel about 6 feet - 26 feet. Increased humidity was also shown to decrease the distance that the droplets can travel, but also increase the width that the droplet cloud (as from a sneeze) can extend.
- Aerosols of SARS-CoV-2 were found to travel up to about 13 feet.
- The clothing of personnel who were in rooms with SARS-CoV-2 patients were tested positive for viral RNA despite the absence of cough by the patient when they were in the room.
- Airborne precautions may be needed which is supported by evidence that showed 52/60 people became ill after attending a choir rehearsal with one attendee who had become symptomatic 3 days prior to the rehearsal. 32/52 of these cases were confirmed by positive tests for COVID-19 at a later date; this implies that the forceful exhalation during singing may have aerosolized the virus and allowed airborne transmission.
- Increasing ventilation and decreasing air-recirculation may reduce the transmission of airborne COVID-19.

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