2019-nCoV Literature Situation Report (Lit Rep)

August 12, 2020

The scientific literature on COVID-19 is rapidly evolving and these articles were selected for review based on their relevance to Washington State decision making around COVID-19 response efforts. Included in these Lit Reps are some manuscripts that have been made available online as pre-prints but have not yet undergone peer review. Please be aware of this when reviewing articles included in the Lit Reps.

Key Takeaways

- **The filtration efficiency of properly-fitted expired and sterilized N95 masks was found to exceed 95%. The filtration capacity of other face mask alternatives commonly used in healthcare settings ranged from 38% to 83%.** More
- **Viable SARS-CoV-2 virus was isolated from air samples collected up to 4.8 meters away from hospitalized patients with confirmed COVID-19 and respiratory symptoms.** More
- **An agent-based modeling study demonstrated that fewer students per classroom (student to teacher ratio of 7:3 versus 15:2) and grouping siblings together resulted in significantly fewer infected cases and student-days lost due to closure in a simulated childcare setting.** More
- **Among healthcare professionals in a large German university hospital, the cumulative incidence of anti-SARS CoV-2 seropositivity by ELISA was 1.8%, which fell to 0.5% after additional confirmatory testing. This illustrates the low positive predictive value of antibody testing in the context of low prevalence of past infection.** More

Transmission

- *[pre-print, not peer-reviewed]* Lednicky et al. collected air samples containing viable SARS-CoV-2 from the hospital room of two patients with COVID-19 with respiratory symptoms. One patient had been admitted the evening prior to sampling, while the second was in the process of being discharged during sampling and had previously tested negative after an earlier positive test. Viable virus was isolated from air samples collected 2 to 4.8m away from the patients, with estimates of viable viral concentrations ranging from 6 to 74 $TCID_{50}$ units/L of air. The room had six air changes per hour with triple filter treatment, coil condensation, and UV-C irradiation of exhaust air prior to recycling 90% back to the room.

  Lednicky et al. (Aug 4, 2020). Viable SARS-CoV-2 in the Air of a Hospital Room with COVID-19 Patients. Pre-print downloaded Aug 12 from https://doi.org/10.1101/2020.08.03.20167395

- Among 248 household contacts of 107 pediatric COVID-19 index cases, 17% of the contacts (n=41) were subsequently SARS-CoV-2 positive (average follow-up of 11 days). However, all but one contact was determined to have had the same exposure as the pediatric index case.
- Index cases were isolated in hospitals or community treatment centers after diagnosis. If the case needed direct care by an uninfected guardian, that guardian was provided with an N95 mask, gloves, full body suit, and goggles.

- In the one positive contact that didn't share an exposure with the index case, the pediatric index case was determined to be the most likely source of exposure, constituting a secondary attack rate of 0.5% [*EDITORIAL NOTE: while this secondary attack rate is low, index cases were strictly isolated after their diagnosis was confirmed. Corresponding secondary attack rates from adult index cases are not presented in this study.*]

  Kim et al. (Aug 2020). Role of Children in Household Transmission of COVID-19. Archives of Disease in Childhood. https://doi.org/10.1136/archdischild-2020-319910

- Scherchan et al. report on SARS-CoV-2 RNA detection in wastewater samples in southern Louisiana. While viral RNA was detected in 2 out of 15 wastewater samples, viral RNA was only detected in untreated samples and was not detected in any secondary treated or final effluent samples.

  Sherchan et al. (June 2020). First Detection of SARS-CoV-2 RNA in Wastewater in North America: A Study in Louisiana, USA. The Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2020.140621

Vaccines

- A cross-sectional study conducted on a convenience sample of Italian university students (n=934) found that 86% would accept a COVID-19 vaccine, while the remainder expressed that they would not or were unsure (i.e. vaccine hesitancy).

  Barello et al. (Aug 2020). "Vaccine Hesitancy" among University Students in Italy during the COVID-19 Pandemic. European Journal of Epidemiology. https://doi.org/10.1007/s10654-020-00670-z

Clinical Characteristics and Health Care Setting

- Sickbert-Bennett et al. assessed the fitted filtration efficiencies (FFEs) for face mask alternatives used by clinicians interacting with patients during the COVID-19 pandemic. They found that expired N95 respirators with intact elastic straps and respirators subject to sterilization had no decrease in FFE compared with new N95s. Incorrectly sized N95 respirators had slightly decreased performance (90-95%). Among 2 imported respirators authorized by the CDC but not approved by NIOSH, FFE was 77-80%, while among other not approved alternatives, FFE ranged from 38% (surgical masks with ear loops) to 83% (SAS Safetycorp 8617 Duckbill).

  Sickbert-Bennett et al. (Aug 11, 2020). Filtration Efficiency of Hospital Face Mask Alternatives Available for Use During the COVID-19 Pandemic. JAMA Internal Medicine. https://doi.org/10.1001/jamainternmed.2020.4221

- *[pre-print, not peer-reviewed]* A longitudinal cohort study of frontline healthcare professionals in a large German university hospital (n=217 participants, corresponding to 1,080 weekly measurements over 6 weeks) found a cumulative incidence of 1.8% for seroconversion to anti-SARS CoV-2 seropositivity by ELISA. Confirmatory testing indicated that only 1 of the 8 initial positive results were true positives, resulting in a true cumulative incidence of 0.5%. The authors caution that the results of a single positive serology test should be interpreted with caution in a low prevalence setting.

  Behrens et al. (Aug 7, 2020). Strategic Anti-SARS-CoV-2 Serology Testing in a Low Prevalence Pandemic The COVID-19 Contact (CoCo) Study in Health Care Professionals. Pre-print downloaded Aug 12 from https://doi.org/10.1101/2020.08.06.20169250

- *[pre-print, not peer-reviewed]* A matched (age, sex, Charlson comorbidity index) cohort study of individuals tested for COVID-19 in Korea (n=122,722) found no evidence of association between a diagnosis of mental illness in the preceding 6 months and COVID-19 test positivity. A subgroup analyses found those with schizophrenia-related disorders had a higher likelihood of test positivity (OR=1.36, 95%CI 1.02-1.81).
- Restricted to a matched sub-cohort of confirmed cases (n=3,608), mental illness was associated with a significantly higher likelihood of death (OR=1.84, 95%CI 2.07-3.15) and non-significantly higher likelihood of severe illness (OR=1.17, 95% CI 0.76-1.81). A sensitivity analysis indicated that an alternative explanation for the observed relationship between mental illness and death due to unmeasured confounding factors was unlikely.

  Jeon et al. (Aug 7, 2020). Association of Mental Disorders with SARS-CoV-2 Infection and Severe Health Outcomes a Nationwide Cohort Study. Pre-print downloaded Aug 12 from https://doi.org/10.1101/2020.08.05.20169201

Modeling and Prediction

- *[pre-print, not peer-reviewed]* Phillips et al. used an agent-based model to generate predictions of SARS-CoV-2 infection and student-days lost within a hypothetical childcare center with 50 children and educators under existing proposals for childcare and school re-opening in Ontario, Canada.
- Scenarios with student to teacher ratios of 7:3 with co-habiting students (e.g., siblings) grouped together had the lowest risk (lowest effective reproductive number). A 15:2 configuration generated a well-defined epidemic curve even with classroom closure protocols in place, while smaller (8:2 and 7:3) configurations produced a more sporadic series of infection events.
- Under higher density configurations (15:2) the mean duration of student days lost to closures ranged from 145 to 215 days depending on transmission conditions compared to 13 to 16 days in a lower density configuration (7:3).

  Phillips et al. (Aug 11, 2020). Model-Based Projections for COVID-19 Outbreak Size and Student-Days Lost to Closure in Ontario Childcare Centres and Primary Schools. Pre-print downloaded on August 12 from https://doi.org/10.1101/2020.08.07.20170407

Other Resources and Commentaries

- Change in Global Transmission Rates of COVID-19 through May 6 2020 – PloS One (Aug 6)
- Covid-19: Where Are We on Immunity and Vaccines? – BMJ (Aug 5)
- The Unrecognized Threat of Secondary Bacterial Infections with COVID-19 – MBio (Aug)
- COVID-19 Vaccine Guidelines – Nature Reviews Drug Discovery (Aug 5)
- COVID-19 and Children: Adding Another Piece to the Puzzle – Clinical Infectious Diseases (Aug 8)
- COVID-19 Casts Light on Respiratory Health Inequalities – The Lancet Respiratory Medicine (Aug)
- Is the Host Viral Response and the Immunogenicity of Vaccines Altered in Pregnancy? – Antibodies (Aug 4)
- COVID-19-Related Perceptions, Context and Attitudes of Adults with Chronic Conditions: Results from a Cross-Sectional Survey Nested in the ComPaRe e-Cohort – PloS One (Aug 6)
- What Should Be the Ideal Definite COVID-19 Case Definition? – Clinical Infectious Diseases (Aug 8)
- Successful Elimination of Covid-19 Transmission in New Zealand – The New England Journal of Medicine (Aug 7)
- COVID-19 Crisis Impacts on Parent and Child Psychological Well-Being – Pediatrics (Aug 6)
- Primary Immunodeficiency Diseases in COVID-19 Pandemic: A Predisposing or Protective Factor? – The American Journal of the Medical Sciences (July 29)

- Markedly Heterogeneous COVID-19 Testing Plans among US Colleges and Universities – Medrxiv (Aug 11)
- Considering Indirect Benefits Is Critical When Evaluating SARS-CoV-2 Vaccine Candidates – Medrxiv (Aug 11)
- Drive-through Satellite Testing: An Efficient Precautionary Method of Screening Patients for SARS-CoV-2 in a Rural Healthcare Setting – Journal of Primary Care & Community Health (Aug 6)

Report prepared by the UW MetaCenter for Pandemic Preparedness and Global Health Security and the START Center in collaboration with and on behalf of WA DOH COVID-19 Incident Management Team