2019-nCoV Literature Situation Report (Lit Rep)

June 26, 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

- **Based on the experience of 4 European countries, there is some evidence that school closures led to declines in the epidemic growth rates of COVID-19. Reopening of schools for all students in countries with low community transmission (Denmark and Norway) has not resulted in a significant increase in the growth rate of COVID-19 cases. Return of most students to school in countries with higher levels of community transmission (Germany) has been accompanied by increased transmission among students, but not school staff.** More
- **Pooled testing for SARS-CoV2 that combines samples from 8 individuals markedly increases throughput without appreciable loss in sensitivity.** More
- **A Cochrane review that included 38 different SARS-CoV-2 antibody tests determined that sensitivity was low in the first week following symptom onset (31%) and peaked at 91.5% in the third week.** More
- **A commercially-available rapid antigen test for SARS-CoV-2 was found to have a much lower sensitivity than viral culture or PCR.** More
- **UV-C light administered at 30 second cycles was found to decontaminate airport security bins for both methicillin-resistant *Staphylococcus aureus* (MRSA) and a surrogate for SARS-CoV-2.** More

Non-Pharmaceutical Interventions

- *[pre-print, not peer-reviewed]* Stage et al. compared daily hospitalization trends in northern European countries (Denmark, Norway, Sweden, and Germany), and found that the growth rate of COVID-19 cases declined approximately 9 days after implementation of school closures.
- Limited school attendance did not appear to significantly affect transmission.
- Reopening of schools for all students in countries with low community transmission (Denmark and Norway) has not resulted in a significant increase in the growth rate of COVID-19 cases. Return of most students to school in countries with higher levels of community transmission (Germany) has been accompanied by increased transmission among students, but not school staff.

  Stage et al. (June 26, 2020). Shut and Re-Open the Role of Schools in the Spread of COVID-19 in Europe. Pre-print downloaded June 26 from https://doi.org/10.1101/2020.06.24.20139634

Testing and Treatment

- Among people living with HIV, those who were one an anti-retroviral therapy (ART) regimen that included the medications tenofovir disoproxil fumarate (TDF) with emtricitabine (FTC) had lower risk

for COVID-19 and related hospitalization compared to HIV-infected individuals on other ART regimens.

del Amo et al. (June 26, 2020). Incidence and Severity of COVID-19 in HIV-Positive Persons Receiving Antiretroviral Therapy. Annals of Internal Medicine. https://doi.org/10.7326/M20-3689

- Mak et al. found that the rapid BIOCREDIT COVID-19 Ag test for SARS-CoV-2 antigen, which can provide results within 30 minutes and without specialized equipment, had a markedly lower sensitivity than viral culture or RT-PCR (29% to 82% compared to RT-PCR positive samples).
- These results indicate that testing of patients suspected of SARS-CoV-2 infection with antigen-based assay may produce more false negative results in clinical practice compared to RT-PCR testing.

Mak et al. (June 8, 2020). Evaluation of Rapid Antigen Test for Detection of SARS-CoV-2 Virus. Journal of Clinical Virology . *https://doi.org/10.1016/j.jcv.2020.104500*

- A literature review and meta-analysis (n=57 studies; 15,976 samples) compared 25 commercial antibody tests and numerous in-house assays. Pooled results across the 38 studies, stratified by time since symptom onset, found sensitivity was low during the first week (less than 30.1% across IgG, IgM, IgA, IgM/IgG, and total antibodies) and peaked in the third week (91.5%; 95%CI 87%, 94.4%). Specificity was high (>98%) during all time periods. Based on these estimates, the authors estimate positive and negative predictive values across three settings: 50% prevalence (healthcare workers reporting a history of respiratory symptoms), 20% prevalence (surveys in high-risk settings), and 5% prevalence (national surveys).

Deeks et al. (June 25, 2020). Antibody Tests for Identification of Current and Past Infection with SARS-CoV-2. The Cochrane Database of Systematic Reviews. https://doi.org/10.1002/14651858.CD013652

- Ben-Ami et al. found that pooled testing, using a strategy known as Dorfman pooling in batches of 8 samples, retained the sensitivity of individual testing. They then applied this strategy to 26,576 clinical samples, and demonstrated a 7.3-fold increase in throughput.
- All pools with positive samples were found to be positive, all pools with negative samples were negative, and 4 out of 5 pools containing a single indeterminate sample were labeled as indeterminate. Pools containing only 1-2 positive samples, each with a low amount of SARS-CoV-2, resulted in similar quantitative results to individual samples.

Ben-Ami et al. (June 22, 2020). Large-Scale Implementation of Pooled RNA Extraction and RT-PCR for SARS-CoV-2 Detection. Clinical Microbiology and Infection. *https://doi.org/10.1016/j.cmi.2020.06.009*

- Bonelli et al. found that the LIAISON SARS-CoV-2 S1/S2 IgG antibody assay, a semi-quantitative antibody test that has a throughput of 170 tests/hour with the first tests available within 35 minutes, has a sensitivity of 85.7% and a specificity of 97%-98.5% for samples collected 15 or more days after diagnosis.

Bonelli et al. (June 24, 2020). Clinical And Analytical Performance Of An Automated Serological Test That Identifies S1/S2 Neutralizing IgG In COVID-19 Patients Semiquantitatively. Journal of Clinical Microbiology. *https://doi.org/10.1128/JCM.01224-20*

Modeling and Prediction

- Roques et al. modeled the COVID-19 epidemic in France, and estimated that lockdown reduced the effective reproductive number by a factor of 7 (R_e = 0.47, 95%CI 0.45, 0.50), and that only 3.7% of the population (95%CI 3.0%, 4.8%) would be infected by the beginning of May, far below the herd immunity threshold.

  Roques et al. (June 5, 2020). Impact of Lockdown on the Epidemic Dynamics of COVID-19 in France. Frontiers in Medicine. https://doi.org/10.3389/fmed.2020.00274

- *[pre-print, not peer-reviewed]* Moon and Scoglio built an individual-based contact network model and a compartmental transmission model for COVID-19. They coupled these models to assess the effectiveness of contact tracing for COVID-19 control under four different re-opening strategies ranging from 0% to 75% of contacts traced. They found tracing 20% of contacts is enough to reduce the epidemic size by half under all strategies, and that above a threshold, increasing effectiveness of contact tracing results in a smaller number of quarantined individuals due to a reduced number of confirmed cases.

  Moon and Scoglio. (June 26, 2020). Contact Tracing Evaluation for COVID-19 Transmission during the Reopening Phase in a Rural College Town. Pre-print downloaded June 26 from https://doi.org/10.1101/2020.06.24.20139204

Public Health Policy and Practice

- *[pre-print, not peer-reviewed]* A county-level analysis found an inverse association between influenza vaccination rates among people age 65 or older and the COVID-19 mortality rate in the US (β values -3.29 to -5.65 depending on approach to adjustment). This effect persisted after adjustment for potential confounders related to demographic, clinical, and environmental characteristics, and was robust to several sensitivity analyses.

  Zanettini et al. (June 26, 2020). Influenza Vaccination and COVID19 Mortality in the USA. Pre-print downloaded June 26 from https://doi.org/10.1101/2020.06.24.20129817

- UV-C light administered at 10-, 20-, or 30-second cycles from one inch above a plastic airport security bin reduced contamination by both methicillin-resistant *Staphylococcus aureus* (MRSA) and multiple viruses used as surrogates for SARS-CoV-2. The 30 second cycle met criteria for decontamination for both organisms.

  Cadnum et al. (May 22, 2020). Evaluation of Ultraviolet-C Light for Rapid Decontamination of Airport Security Bins in the Era of SARS-CoV-2. Pathogens & Immunity. https://doi.org/10.20411/pai.v5i1.373

Other Resources and Commentaries

- Asymptomatic Transmission and the Infection Fatality Risk for COVID-19: Implications for School Reopening – Clinical Infectious Diseases (June 25)
- School-Based Health Centers during Academic Disruption: Challenges and Opportunity in Urban Mental Health – Psychological Trauma (June 25)
- The State of Health Care Quality Measurement in the Era of COVID-19 – JAMA (June 25)
- Primary Care Practice Finances In The United States Amid The COVID-19 Pandemic – Health Affairs (June 25)
- Air Pollution and Covid-19: The Role of Particulate Matter in the Spread and Increase of Covid-19's Morbidity and Mortality – International Journal of Environmental Research and Public Health (June 22)

- Paying for Medicaid - State Budgets and the Case for Expansion in the Time of Coronavirus – NEJM (June 11)
- Analysis of Factors Affecting the Prognosis of COVID-19 Patients and Viral Shedding Duration – Epidemiology and Infection (June 25)
- Covid-19 and Lack of Linked Datasets for Care Homes – BMJ (June 24)
- Hyperlocal Postcode Based Crowdsourced Surveillance Systems in the COVID-19 Pandemic Response – Frontiers in Public Health (June 9)
- Multisystem Inflammatory Syndrome in Children (MIS-C) Related to COVID-19: A New York City Experience – Journal of Medical Virology (June 25)
- Novel Coronavirus 2019 Transmission Risk in Educational Settings – Clinical Infectious Diseases (June 25)

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