AAMC Novel Coronavirus Update
November 11, 2020

To help filter through the large volume of news about the novel coronavirus, Ross McKinney Jr., MD, AAMC chief scientific officer, with assistance from his team in the Scientific Affairs unit at the AAMC, has initiated this science-focused newsletter.

This newsletter will be published once per week on Wednesdays.

Opt-in to receive future updates.

Contact AAMC Lead Science Policy Specialist Anu Dev, PhD, with any other questions or requests.

To access the latest AAMC updates and resources on COVID-19, visit aamc.org/coronavirus. For resources on COVID-19 medical research, read more here.

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Today's Numbers

- World: 51,788,782 confirmed cases (1,277,717 deaths)
  - 3,942,157 new cases this week (3,440,092 new cases last week)
- United States: 10,313,369 (240,265)
  - 848,063 new cases this week (604,533 new cases last week)
  - 7,087 deaths this week (6,414 deaths last week)
  - 155,271,200 total tests
- U.S. Hot Spots
  - Illinois: 80,025 new cases in last 7 days (60% increase in daily cases)
  - Texas: 47,830 (24%)
  - California: 44,672 (43%)
  - Ohio: 37,147 (49%)
  - Florida: 36,899 (20%)

For the most up-to-date data, refer to the Johns Hopkins COVID-19 Map. Details of other U.S. hot spots can be found at the Washington Post’s coronavirus data webpage.

The Institute for Health Metrics and Evaluation at the University of Washington Medicine is projecting hospital resource use in the United States based on COVID-19 deaths.

Lead News

Pfizer and BioNTech announced that preliminary results from the study of their mRNA SARS-CoV-2 vaccine BNT162b2 demonstrated more than 90% efficacy. The information
in the press release was limited, but there were reported to be 94 endpoint events (i.e., cases of symptomatic COVID-19) ascertained among more than 43,538 volunteers who had received their second dose of vaccine seven days or more prior to their COVID-19 diagnosis. 42% of the enrollees were said to be from diverse backgrounds. The company reported no safety concerns, and it plans to present the data to the Food and Drug Administration (FDA) for an emergency use authorization (EUA) as soon as half the enrollees are two months out from their second vaccination. [Editor's comment: This is extremely important news, for many reasons, although significant questions remain. With only a small number of cases in the vaccinated cohort, it remains unproven that serious disease will be less common as a result of vaccination. It is also not clear if vaccine recipients are less likely to be contagious than the control group. However, both are reasonable assumptions given the potency of the protection against asymptomatic COVID-19. Other questions that will require time to answer include the duration of immunity and whether the challenges of distributing BNT162b2 can be met given its cold chain (-70 degrees Celsius) requirements. Finally, the fact that BNT162b2 is a spike protein-directed vaccine bodes well for the many vaccines to follow that also chose the same molecular target.]

Treatment News

The FDA authorized the use of Eli Lilly’s monoclonal antibody bamlanivimab for treatment of COVID-19 in an EUA that came with certain key stipulations. The antibody is only useful in mild-to-moderate COVID-19 in patients age 12 or older who weigh at least 40 kilograms. It needs to be administered by an intravenous infusion that takes roughly an hour and requires a several hour observation period thereafter. In patients treated early enough, the drug can reduce the rate of hospitalization or emergency room visits. In one study, the rate of hospitalization in high-risk patients fell from 10% to 3% with treatment. Once someone is hospitalized or requires oxygen treatment, the drug is no longer indicated for use. Patients requiring high-flow oxygen may even do worse if treated with bamlanivimab. Distribution of bamlanivimab will be coordinated by the Department of Health and Human Services Office of the Assistant Secretary for Preparedness and Response and based on a state’s COVID-19 hospitalizations and reported cases. [Editor’s comment: Used early, bamlanivimab shows promise as an effective drug. The challenges will be that patients need to be diagnosed quickly (i.e., there needs to be a rapid turnaround on their diagnostic polymerase chain reaction [PCR] or antigen test) and that they need to be treated by intravenous infusion at a facility comfortable with treating patients infected with SARS-CoV-2. While bamlanivimab will be fairly expensive, the government is initially buying the drug from Eli Lilly and not charging patients for its use. The other challenge is going to be manufacturing the drug. At a time when more than 130,000 patients are diagnosed with SARS-CoV-2 infection every day, the company anticipates being able to produce 1 million doses and having 100,000 doses ready to ship by the end of 2020.]

Following the same basic principle as a vaccine or a monoclonal antibody, researchers at the University of Pittsburgh have developed “nanobodies” produced by llamas to efficiently neutralize SARS-CoV-2. The nanobodies are actually derived from antibodies produced by a llama that bind to the spike protein of SARS-CoV-2 and neutralize it. They are able to be produced in bulk from microbes, resist lyophilization, and can be administered by aerosolization. The nanobodies actually bind to a different part of the spike protein’s receptor binding domain than neutralizing antibodies, but the practical effect is the same. [Editor’s comment: This therapeutic strategy looks very clever, although the research is still at a relatively early stage. Superficially, it appears it might be easier to produce and administer these nanobodies than similarly effective monoclonal antibodies. Further research is needed.]
Novartis’ arthritis drug canakinumab (Ilaris) **failed in a Phase 3 study to improve survival without invasive ventilation in hospitalized COVID-19 patients**. The placebo-controlled study also failed its secondary endpoint, overall survival, with no difference between the treated and control standard of care arms. [Editor’s comment: The hope was that canakinumab, an antibody directed at IL-1 beta, could help mitigate the cytokine storm seen in severe COVID-19. It didn’t.]

Although it has many miles yet to travel, investigators from New York developed a novel intranasal fusion inhibitory lipopeptide that prevents direct contact SARS-CoV-2 transmission in ferrets. The report, published as a non-peer-reviewed preprint in bioRxiv, uses a lipopeptide fusion inhibitor to limit the fusion of the coronavirus lipid envelope with cell membranes of respiratory epithelial cells. Ferrets have often been used as model animals for influenza transmission, so the basic methodologies were already available. When administered as a once-daily spray, ferret-to-ferret direct transmission of SARS-CoV-2 was completely inhibited, while 100% of the control animals became infected. [Editor’s comment: The hope is that a once-a-day nontoxic nasal spray will be able prevent person-to-person SARS-CoV-2 transmission. It’s an interesting bridging alternative to vaccines and might be useful for other enveloped viruses in the future.]

**Science: Can a Nose-full of Chicken Antibodies Ward Off Coronavirus Infections?**

**Reuters: Medicago's COVID-19 Vaccine Triggers Immune Response in Early-Stage Trial**

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**Clinical News**

Researchers examined whether long-term exposure to air pollution increases the severity of COVID-19 health outcomes, using an ecological regression analysis to determine any potential association. While this analysis is unable to adjust for individual-level risk factors or provide insight into the mechanisms underlying the relationship, the data nonetheless show that higher historical PM2.5 exposures are positively associated with higher county-level COVID-19 mortality rates after accounting for many area-level confounders.

An analysis from the Centers for Disease Control and Prevention (CDC) looked at hospital readmission for COVID-19 patients in the United States between March and August 2020. In a cohort of 106,543 patients, 9% were readmitted to the same hospital within two months of discharge, with multiple readmissions occurring in 1.6% of patients. The most common primary discharge diagnoses from hospital readmission were diseases of the circulatory, digestive, or respiratory systems. Risk factors for readmission include being 65 years old or older, the presence of certain chronic conditions, hospitalization within the three months preceding the first COVID-19 hospitalization, and discharge to a skilled nursing facility or with home health care.

A study from the CDC found that stay-at-home orders and public mask mandates, combined with contact tracing, led to an 82% reduction in COVID-19 incidence, 88% reduction in hospitalizations, and 100% reduction in mortality in Delaware from April to June 2020. This data shows that a combination of mitigation measures can reduce the occurrence of new COVID-19 incidence and associated deaths.

One advantage of having a National Health Service (NHS) is access to massive numbers of medical records. As described in a non-peer-reviewed preprint in medRxiv, investigators in the United Kingdom performed a cohort study including 12 million adults to answer questions about whether living with children changes the risk for COVID-19. On the one hand, children might bring home other non-SARS-CoV-2 coronaviruses, and those exposures might decrease the risk of serious disease. On the other hand, children
have been small but effective vectors for influenza spread. Looking at adults between February and August receiving primary care through the NHS, in more than 9 million adults 65 years old or younger, living with children 0-11 years old was not associated with increased risk of documented SARS-CoV-2 infection, COVID-19 hospitalization, or intensive care unit admission, and it decreased the rate of COVID-19-related deaths. Living with children 12-18 years old did increase the risk of infection — but not other outcomes. For the approximately 2.5 million adults older than 65, there was no association with infection or bad outcome related to living with children.

In a fascinating article in *Nature* that evaluated data from cellphones to measure the effects of mobility on COVID-19 transmission rates, investigators found evidence that lower-income neighborhoods (census block groups, or CBGs) tended to have more mobility and more intense aggregation in small spaces — both of which correlated with transmission rates for COVID-19. The authors evaluated data from the 10 largest statistical metropolitan areas and mapped the hourly movements of 98 million people. Their points of interest were grocery stores, restaurants, and religious establishments. Restaurants were, especially early in the pandemic, a key site for superspreader events. 10% of restaurants predicted 85% of the superspreader events at points of interest. Reducing capacity for restaurants was found to be an effective strategy to decrease SARS-CoV-2 transmission events. Low-income CBGs had less reduction in mobility because people were not as able to sequester themselves at home. [Editor’s comment: Models are typically prone to unexpected artifacts, but this data set is particularly interesting and seems to fit with our preconceived expectations. Staying at home and avoiding full-capacity restaurants are a sound strategy — if you can afford it.]

Some countries are very intense in their management of COVID-19. Singapore is an example, and several researchers there published a very thorough evaluation of the risks and benefits of contact tracing in the *Lancet*. Between January and April, 7,770 close contacts were evaluated after contact with 1,114 PCR-confirmed cases of COVID-19. The secondary attack rates were 5.9% for households, 1.3% for work contacts, and 1.3% for social contacts. Risk factors included sharing a bedroom, speaking to an index case for 30 minutes or longer, and being exposed to multiple nonhousehold contacts.

*mBio*: Molecular Architecture of Early Dissemination and Massive Second Wave of the SARS-CoV-2 Virus in a Major Metropolitan Area

**Policy News**

*[STAT News]*: Biden Transition Team Unveils Members of COVID-19 Task Force

**Coronavirus and Health Equity**

A [new analysis from the Assistant Secretary for Planning and Evaluation (ASPE)](https://www.hhs.gov/about/news/2021/12/01/aspe-graphic-covid-19-equity-data.html) found that the United States has significantly decreased the proportion of COVID-19 cases missing race/ethnicity data from 75% overall in April to 38% by August with all 50 states and the District of Columbia now reporting this information on infections and deaths (though only seven are currently reporting race/ethnicity data for testing and 17 are reporting for hospitalizations). Among other findings, the ASPE reports that by July, over 5% of the Navajo Nation had contracted COVID-19 — higher than every other U.S. state and New York City.

*[Kaiser Family Foundation]*: COVID-19 Risks and Impacts Among Health Care Workers by
Race/Ethnicity

*NEJM*: Community Health Workers and Covid-19 — Addressing Social Determinants of Health in Times of Crisis and Beyond

*JAMA*: Four COVID-19 Lessons for Achieving Health Equity

*STAT News*: The Hidden Public Health Hazard of Rapid COVID-19 Tests

*World Bank*: Gender Repercussions of COVID-19

*STAT News*: ‘We’re Being Left Behind’: Rural Hospitals Can’t Afford Ultra-cold Freezers to Store the Leading COVID-19 Vaccine

Research News

Whether SARS-CoV-2 is transmitted by aerosols has remained a persistent question that researchers have found challenging to address. As described in *bioRxiv*, investigators in the Netherlands used a ferret model that they believe demonstrates the potential for aerosol spread. They situated an uninfected ferret in the upper of two cages stacked on top of each other and connected the upper and lower cages with an airflow system that included several right-angle bends, steel mesh, and a roughly one-meter distance. An infected ferret was placed in the lower cage. The investigators believed larger droplets would be trapped despite directed airflow. In four animal pairs, SARS-CoV was transmitted to all four recipient ferrets. For SARS-CoV-2, two of the four ferrets were infected. The system control, H1N1 influenza A, was also efficiently transmitted. [Editor’s comment: It’s an interesting experiment, but the artificiality of the model and the relatively small sample size leaves room for skepticism. Perhaps the bell curve for SARS-CoV-2 transmittable particles is between our artificially defined standards for aerosols (less than five microns) and droplets. In this study, particles greater than 10 microns were conveyed from one cage to the next.]

*Lancet*: Persistence of Viral RNA, Pneumocyte Syncytia and Thrombosis are Hallmarks of Advanced COVID-19 Pathology

*Nature*: Distinct Antibody Responses to SARS-CoV-2 in Children and Adults Across the COVID-19 Clinical Spectrum

*Science*: Preexisting and de Novo Humoral Immunity to SARS-CoV-2 in Humans


Testing News

The FDA issued the first EUA for a serology test that detects neutralizing antibodies from recent or prior SARS-CoV-2 infection. Previously approved tests are based on the detection of binding antibodies, which do not necessarily decrease viral infection. The role of neutralizing antibodies in immunity against SARS-CoV-2 is still being investigated, and the FDA cautions that results from a serology test should not be used to diagnose an active infection or as a basis to discontinue public health measures that stem viral spread.
Changes in the supply chain caused by COVID-19 testing have led to scarcity of supplies to test patients for infections other than COVID-19, according to a survey conducted by the American Society for Microbiology and the Association of Supply Chain Management. Responses from 127 labs indicated that 30% are experiencing shortages of the swabs, chemicals, and other equipment needed to conduct and process medical tests.

**Other COVID-19 News**

The World Health Organization reported that 214 human cases of COVID-19 have been identified in Denmark with SARS-CoV-2 variants associated with farmed minks, leading the country to cull more than 17 million animals. As additionally noted, the minks in Denmark are the only known instance of the virus infecting an animal, mutating, and transferring back to humans. However, some researchers say that fears are overblown and that these new strains are not likely to increase transmission or make the virus more severe.

*Lancet*: Challenges in Creating Herd Immunity to SARS-CoV-2 Infection by Mass Vaccination

For questions, contact Anu Dev, PhD, AAMC lead science policy specialist.

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