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2020-04-22 DAILY UNM GLOBAL HEALTH COVID-19 BRIEFING

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DAILY UNM GLOBAL HEALTH COVID-19 BRIEFING

April 22, 2020

Executive Summary

NM Governor update. NM case update. 20 million tests/day. 2nd COVID wave? Contact tracing civil liberties. Missouri sues China. National parks reopening. Malaysia mass transmission. South Africa deploys 70k troops. COVID impact measurement. N95 H_2O_2 decontamination. COVID hit US earlier. Homeless shelter prevalence. Hong Kong interventions. Pediatric severity meta-analysis. Italian prediction model. Chinese re-emergence travelers. Pet cats positive. CDC: food delivery. Telehealth transformations. Sustaining distancing. Testing infographic. Policy simulation. CDC homeless testing. Pre-surgery testing. Korean lab guidelines. Anesthetic machine daily checks. ADHD management. Oncology department reorganization. REMS vs. MEWS. Saliva vs. nasopharyngeal collection. Automated immunoassays. RT-LAMP detection. Clinical hematology lab. Repeated testing RT-PCR. Quest increases capacity. Self-collection validation. Chinese antiviral leads. Vaccine macaque success. Thrombolysis therapy. Azithromycin stem cells. Computational drug discovery. 50 clinical trials registered. Viral clade fatality. qSOFA revisited. Neonatal sepsis. Disinfecting blood. JAMA prediction video. Dental survey. Viral sepsis mechanism. Unrecognized hypoxia. Coagulation surge.

Our continuously curated practice guidelines in the context of COVID-19 can be found here.

You may submit content for future briefings here.

NM Highlights

- NM Governor gives live update

  Gov. Michelle Lujan Grisham and state officials hosted a remote news conference this afternoon to provide an update on COVID-19 efforts in New Mexico.

- 6 new deaths and 139 additional confirmed COVID-19 cases reported in NM

  The total positive cases and total deaths in the state are 2210 and 71, respectively. As of today, the state has performed 41,232 tests, there are 121 individuals currently hospitalized for COVID-19, and 547 COVID-19 cases have recovered. New NMDOH portal featuring epidemiologic breakdown of cases.

US Highlights

- The US needs to do 20 million tests a day to reopen safely, according to a new plan

  The report, produced by 45 cross-disciplinary experts assembled by Harvard University's Edmond J. Safra Center for Ethics, says we need to be doing 5 million tests a day by early June in order to start reopening the country, increasing to 20 million by midsummer to fully end the shutdown. That needs to be complemented with scaling up contact tracing and ensuring that those who need to isolate can be properly supported.

- NY governor cautioned potential 2nd COVID-2 wave as Trump lauds state plans to reopen

  President Trump is supporting U.S. states that are loosening stay-at-home guidelines, allowing many non-essential businesses to reopen. But New York governor Cuomo warned of a potential "second wave" if restrictions are relaxed irresponsibly. "This is no time to act stupidly and more people are going to die if we are not smart", said Cuomo.

- U.S. lawmaker says COVID-19 digital contact tracing should be voluntary and limited

  "The federal government must provide leadership, coordination, and guidance to ensure that contact tracing efforts are

effective and do not infringe upon individuals' civil liberties, including the right to privacy," Senator Edward Markey, a Democrat and online privacy advocate, wrote in a letter to Vice President Mike Pence. He said that any digital coronavirus contact tracing should be voluntary, transparent and collect only the information needed to identify who might be at risk.

- Missouri using taxpayer dollars to sue China over COVID

  Missouri Attorney General Eric Schmitt filed the civil lawsuit against the Chinese government, Chinese Communist Party and other Chinese officials and institutions. "The Chinese government lied to the world about the danger and contagious nature of COVID-19, silenced whistleblowers, and did little to stop the spread of the disease," Mr Schmitt said in the lawsuit.

- U.S. plans to reopen national parks

  The national parks and public lands will be opened and will follow COVID-19 guidelines. More details on plans for the reopening of specific parks will be provided following guidance from Office of Management and Budget and the President's plan for Opening Up America Again.

International Highlights

- Massive transmission in a single gathering in Malaysia

  About 21, 920 samples were tested after a gathering of over 19, 000 people of different origins. The results indicate that 1,701 tested positive for COVID-19. Authors underscore the need to ban mass gathering during the pandemic to curb disease spread.

- South Africa deploys 70,000 troops to enforce lockdown

  Security forces need assistance to enforce the stringent lockdown restrictions set in place, despite the consequence of prison or heavy fines if the restrictions are broken.

Economics, Workforce, Supply Chain, PPE Highlights

- Aerosolized hydrogen peroxide decontamination of N95 respirators for re-use

  Current results from both respirator fit testing and virologic testing indicate that the process is effective on the basis of zero failure rate on fit-testing of selected respirators, and on complete decontamination of multiple virus species by aHP treatment, comparable to that observed with commercial spore-based biological indicators of sterilization.

Epidemiology Highlights

- COVID-19 detected weeks prior to the first reported death in US

  The CDC confirmed the earliest known COVID-19 deaths were during flu season in California on February 6, 17, and March 6. Previously, the first reported death was in Washington on February 29. Additional cases are hypothesized to have been mistaken for the flu. None of the three patients had traveled suggesting community spread.

- Assessment of SARS-CoV-2 infection prevalence in homeless shelters

  CDC reports that 1,192 residents and 313 staff members were tested in 19 homeless shelters. When testing followed identification of a cluster, high proportions of residents and staff members had positive test results for SARS-CoV-2 in Seattle (17% of residents; 17% of staff members), Boston (36%; 30%), and San Francisco (66%; 16%).

- Non-pharmaceutical interventions slow transmission in Hong Kong

  An observational study showed Hong Kong maintained a daily effective reproductive number near 1 for a period of 8 weeks. This was associated with non-pharmaceutical interventions including border restrictions, quarantine, isolation, and distancing. Influenza transmissibility in the community was reduced by an estimated 44% (95% CI 34–53%) during this time.

- Pediatric COVID-19: systematic review and meta-analysis

  Nine different case series were included. COVID-19 has distinct features in children. The disease severity is mild to moderate. More than half presented with fever. Current diagnosis is based mainly on typical ground glass opacities on chest CT, epidemiological suspicion and contact tracing.

- Novel SEIR model extensions to assess Italian interventions

  A new model was proposed that predicts the course of the epidemic to help plan an effective control strategy. The model considers eight stages of infection: susceptible (S), infected (I), diagnosed (D), ailing (A), recognized (R), threatened (T), healed (H) and extinct (E), collectively termed SIDARTHE. The results demonstrate that restrictive social-distancing measures will need to be combined with widespread testing and contact tracing to end the ongoing COVID-19 pandemic.

- There is no international standard on measuring COVID impact

  Death rates, death counts, population factors, political factors, health services, and testing are all measured and influenced by different factors making comparisons difficult.

- Re-emergence of cases in northwest China due to overseas travel

  21 new reported cases in the northwestern province of Shaanxi, all travelers on a flight from Moscow. Fast-track channels to speed entry of business and technical visitors are under discussion to stabilize trade while preventing and controlling infections in China.

- Two pet cats have tested positive for coronavirus in New York state

  The US Department of Agriculture (USDA) and Centers for Disease Control and Prevention (CDC) announced that two pet cats had tested positive for coronavirus. One of the pets was tested when it showed signs of respiratory illness after its owner tested positive. The other cat's owners had not been tested for coronavirus. There are limited, isolated cases of pets catching coronavirus and scientists think it unlikely that a pet could transmit coronavirus to a person.

Healthcare Policy Recommendations

- CDC: Social distance when ordering and accepting delivery food

  CDC suggests ordering online or by phone, having the delivery person leave items in a safe spot outside the home, and then wash hands after bringing in items.

- How telehealth transformed healthcare delivery during COVID-19

  Using examples reported by US healthcare organizations including the authors, they describe the role telehealth has played in transforming healthcare delivery during 3 phases of the pandemic: 1) Stay-at-Home Outpatient Care; 2) Initial COVID-19 Hospital Surge, and 3) Post-Pandemic Recovery. Within each of these three phases, we examine how people, process and technology work together to support a successful telehealth transformation.

- Sustaining social distancing policies to prevent a dangerous second peak of COVID-19 outbreak

  Our results predict potentially disastrous implications of ending these policies too soon, based on projections made from a Susceptible-Exposed-Infectious-Removed (SEIR) epidemic model. Even when infection rates appear to be slowing down or decreasing, prematurely returning to "business as usual" produces a severe second peak far worse than the first.

- SLAS releases infographic to explain COVID-19 testing

  The Society for Laboratory Automation and Screening (SLAS) released an infographic designed to educate patients and public about blood-derived and virus-derived COVID-19 testing, how the tests are conducted and the pros and cons of each.

- Simulation in COVID-19: practical tips and resources from Norway, Denmark, and the UK

  The authors share how simulation techniques could be utilized in hospitals during COVID-19 as training tools and for the analysis of work structures and processes. An overview is provided of helpful resources and a collection of scenarios and support for center based and in situ simulations.

Practice Guidelines

- CDC recommends early testing in homeless shelters to help prevent spread

  Use PPE and apply social distancing. In shelters with identified clustered cases (>=2 cases in 2 weeks), consider testing all residents and staff regardless of symptoms. Consider regular testing in shelters before identifying clusters.

- UK recommendations on testing for COVID-19 in patients planned for surgery

  The UK recommends that patients scheduled for surgery are assumed to be potential carriers of the virus throughout the duration of their hospital stay, even if they pass an initial screen for temperature, respiratory symptoms, and exposure or travel history. A flowchart is presented to help guide COVID-19 testing and surgery planning for these patients.

- Korean guidelines for laboratory diagnosis of COVID-19

  Korean Society for Laboratory Medicine and the Korea Centers for Disease Prevention and Control propose guidelines for diagnosing COVID-19 in clinical laboratories. These include the selection of test subjects, selection of specimens, diagnostic methods, interpretation of test results, and biosafety. The detailed information about specimen handling is provided.

- A new technique for daily checks of anesthetic machines to ventilate the lungs

  The authors describe a new process for daily checks of anesthetic machines. Each circuit disconnection potentially generates an infectious aerosol and risks tracheal tube displacement and lung derecruitment. The authors concluded that multiple circuit disconnections are unsatisfactory and devised a process for daily checks with a single disconnection per patient.

- ADHD management during the COVID-19 pandemic

  The European ADHD Guidelines Group proposes approaches for diagnosis, follow-up assessments, behavioral management, and pharmacological management of ADHD in the context of pandemic challenges.

- Italian survey on reorganization of medical oncology departments

  122 oncologists participated in this survey. Results show that the following measures for oncology facilities have been promptly implemented throughout the country: use of protective equipment, triage of patients accessing the hospital, delay of non-urgent visits and use of telemedicine.

- Mortality prediction: REMS rapid scoring is more effective than MEWS, especially for patients <65 years

  138 medical records of critically ill patients with COVID-19 were analyzed. The authors compared two rapid scoring systems used on admission in mortality prediction. Performance characteristics of the Rapid Emergency Medicine Score (REMS) was better than those of the Modified Early Warning Score (MEWS) (area under the ROC curve 0.86 (95% CI: 0.74–0.94) vs. 0.60, (95% CI 0.46–0.73). For those under 65 y.o. the same parameter for REMS was 0.863 vs. 0.60 for MEWS. An optimal cut-off of REMS had a sensitivity of 89.5%, a specificity of 69.8%, a PPV of 39.5%, and a NPV of 96.8%.

Testing

- Saliva is more sensitive for SARS-CoV-2 detection than nasopharyngeal swabs

  Saliva was demonstrated as a viable and more sensitive alternative to nasopharyngeal swabs in early hospitalization and is more consistent during extended hospitalization. Saliva could enable at-home sample collection for accurate large-scale testing.

- Development of the first fully automated IgM and IgG immunoassays

  Fully automated CLIA to determine IgM and IgG antibodies to SARS-CoV-2 developed in China. Tests showed clinical specificity of IgM 97.33/99.49% (hospitalized/normal) and IgG 97.43/99.15% (hospitalized/normal). Sensitivity was 85.88/96.62% (IgM/IgG) for RT-PCR confirmed cases and 73.08/86.54% (IgM/IgG) for suspected cases.

- Rapid detection of SARS-COV-2 with RT-LAMP

  Reverse transcription loop-mediated isothermal amplification (RT-LAMP) which is specific to SARS-CoV-2 has been developed. This method is comparable with the RT-PCR and is simple to perform, less expensive, time-efficient, and can be used in clinical laboratories for preliminary detection.

- Review on clinical hematology laboratory role in COVID-19

  The laboratory's role in diagnosis and the current state of biomarkers including lymphopenia, leukocytosis, neutrophilia, and thrombocytopenia are discussed.

- Researchers call for repeated testing due to false-negative suspicions of RT-PCR testing

A systematic review of 5 studies (n=957) concluded that up to 29% of patients could have RT-PCR false-negative result.

- Quest Diagnostics Inc. scaling up IgG antibody blood tests in upcoming weeks

  Quest aims to identify those with immunity to allow people to go back to work.

- Protocol to validate the sufficiency of provider-observed home-collected samples

  The authors are planning to document the ability of patients to self-collect specimens for SARS-CoV-2 viral detection and serology. Participants will be mailed a specimen collection kit, engage in a telehealth session with a healthcare provider through a HIPPA-compliant video meeting, and collect specimens while observed by the provider. The methods to validate multiple sample types for RNA-PCR and for serology tests are proposed.

Drugs, Vaccines, Therapies, Clinical Trials

- Antiviral drug candidates target the SARS-CoV-2 main protease

  In an article in Science, Chinese researchers reported the discovery of two lead compounds targeting the SARS-CoV-2 main protease. Both exhibited antiviral inhibitory activity, and both had good pharmacokinetics properties in vivo. One also exhibited low toxicity.

- An experimental vaccine protects from infection with SARS-CoV-2 in rhesus macaque model

  A team at the Peking Union Medical College in Beijing injected rhesus macaques with three doses of an inactivated SARS-CoV-2 vaccine. Four animals given a high vaccine dose had no detectable virus in their throat or lungs seven days after infection. Animals that received a lower dose showed some signs of infection, but levels of virus were much lower than in animals that received no vaccine. The company has received approval to start human safety trials.

- Pre-terminal state gas exchange abnormalities may be responsive to thrombolysis therapy

  Researchers reported that four patients with refractory respiratory failure requiring mechanical ventilation and shock with evidence of elevated dead-space ventilation showed improvement when given systemic tPA. Patients given Heparin + tPA because of increased risk of VTE and elevated D-dimer experienced improved alveolar ventilation and oxygenation.

- Hypothesis: azithromycin reduces viral invasion, including lung stem cells

  SARS-CoV-2 invades host cells via two receptors: angiotensin-converting enzyme 2 (ACE2) and CD147 (also known as Basigin or EMMPRIN). Hypothesis is that azithromycin could block cell invasion through its impact on these receptors, could reduce invasion of lung stem cells that express ACE2, and be key in repair and recovery.

- Binding features of 10 FDA-approved drugs with the main protease from SARS-CoV-2

  The authors document the binding features of 10 drugs that might target the protease. Conivaptan and Azelastine are mainly involved in hydrophobic interactions with active site residues, and both maintain close proximity to the protease binding pocket during simulation. These data need further in vitro and in vivo evaluation to repurpose these drugs.

- Protein simulation identifies drugs targeting critical SARS-CoV-2 enzymes

  A study modeling protein interactions identified existing and potential new drugs targeting critical viral enzymes. Talampicillin, Lurasidone, and two novel drug-like compounds bind protease Mpro. Rubitecan, Lopazolam, and two novel drug-like compounds bind TMPRSS2, a serine membrane protein used for cell entry. Analysis used Protein Data Bank archive with existing proteins showing >90% homology with viral proteins.

- Virtual screening reveals velpatasvir, ledipasvir, and other potential drug repurposing candidates

  16 purchasable drug candidates were screened and proposed with a 3D SARS-CoV-2 3C-like protease molecular model. The antivirals ledipasvir or velpatasvir are particularly attractive as therapeutics with minimal side effects. The drugs Epclusa (velpatasvir/sofosbuvir) and Harvoni (ledipasvir/sofosbuvir) could be effective owing to their dual inhibitory actions on two viral enzymes.

- 50 New COVID-19 Trials registered today at clinicaltrials.gov

  Treatment trials: ACE and ARB inhibitors; hydroxychloroquine, imatinib, favipiravir, telmisartan; tocilizumab; IL-2; sarilumab; etoposide; convalescent plasma; virazole; almitrine; nivolumab; trimethoprim/sulfamethoxazole; measles-mumps-rubella

vaccine; anakinra; alteplase; t-PA. At time of writing, a total of 777 were active, 34 completed, and 3 posted results.

Other Science

- Distinct viral clades may partially explain the discrepancy in predicted deaths across U.S.

  Sequence analysis from 2310 viral isolates reveals that residue at 614 of the viral spike protein is changed from an aspartic acid (D) to a glycine (G) between two viral clades. The G and D strains are predominantly on the East Coast and West Coast, respectively. Point mutations in a murine spike protein can result in increased virulence through instability of the viral machinery and altered viral to cell membrane fusion.

- qSOFA is not applicable for COVID-19 detection

  The 2-point threshold for qSOFA, a clinical score to identify septic patients, was tested to determine applicability for COVID-19 patients. COVID-19 patients received low clinical scores, deeming the qSOFA scoring not applicable.

- Late-onset neonatal sepsis with COVID-19: a case report

  NEJM reports the case of a 3-week-old boy with nasal congestion, tachypnea, and reduced feeding. He underwent intubation and received hemodynamic support in the pediatric intensive care unit. Chest radiography showed bilateral linear opacities, and a nasal swab was positive for SARS-CoV-2. Although children are less likely than adults to have severe Covid-19, this case illustrates that it can occur and can be successfully managed with standard PICU protocols.

- Disinfecting donated blood with UV-light and riboflavin-based treatment inactivates virus

  The Mirasol Pathogen Reduction Technology System reduced the titer of the virus in plasma (n=5) and platelet (n=3) products below the limit of detection in tissue culture. The mean log reductions in the viral titers were >=3.40 and >=4.53 for the plasma units and platelet units, respectively.

- A video on how prediction models are built, used, and misused

  JAMA Editor, Howard Bauchner, discusses how prediction models are built, used, and misused with Marc Lipsitch, DPhil, Harvard T.H. Chan School of Public Health.

- Knowledge, attitudes and practices of dental practitioners: global survey results

  An online questionnaire was distributed among dentists across the globe using a combination of convenience and snowball sampling. High/Good knowledge and practice scores were observed among 92.7% and 79.5 % of the dentists, respectively (a total N=860). Good knowledge scores were significantly associated with qualifications ($p = 0.04$) and years of practice ($p = 0.02$); good practice scores were associated with qualifications only ($p = 0.03$).

- "Viral sepsis" mechanism is hypothesized for COVID-19

  After multiple rounds of discussion among basic science researchers, pathologists, and clinicians working on COVID-19, the authors hypothesize that a process called viral sepsis is crucial to the disease mechanism of COVID-19.

- Hypoxia without breathing problems-- pulse oximeter screening recommended

  NY Times article by ER doctor: Many patients did not report any sensation of breathing problems, even though their chest X-rays showed diffuse pneumonia and their oxygen was below normal. Pulse oximetry screening for Covid pneumonia could provide an early warning system for the kinds of breathing problems associated with Covid pneumonia.

- New York doctors notice surge in thickened blood and clots

  This Health News report included patients under the age of 49 with no obvious risk factors. Protocols have been developed to treat patients with blood thinning therapies regardless of clotting evidence. The American Society of Hematology states the benefits are currently unknown for treated patients that have no signs of clotting.

Contributing team members: Christophe G. Lambert, Shawn Stoicu, Ingrid Hendrix, Lori Sloane, Anastasiya Nestsiarovich, Praveen Kumar, Nicolas Lauve, Hannah Groves, Kathryn Foos, Emma Wolinsky, Ariel Hurwitz, Alexandra Yingling, Elly Munde, Evans Raballah, Cristian Bologa, Jens Langsjoen, Gregory Mertz, Kristine Tollestrup, Orrin Myers, Douglas J. Perkins.