TRANSMISSION PATTERNS

SARS-CoV-2 Transmission From People Without COVID-19 Symptoms

Johansson et al. used a decision analytical model to assess the extent to which transmission of SARS-CoV-2 was driven by asymptomatic or pre-symptomatic individuals in multiple scenarios. An incubation period at a median of 5 days was set for all estimates using data obtained from a meta-analysis of 8 studies from China. The duration of the infectious period was kept as 10 days with peak infectiousness varying between 3 to 7 days. Under the baseline assumption of 30% asymptomatic infection rate, it was estimated that asymptomatic transmissions accounted for 59% of all SARS-CoV-2 transmissions. In different sensitivity analyses, this value ranged between 50% to 67%. Authors conclude that identifying and isolating symptomatic cases is not an adequate strategy to sufficiently reduce transmissions, and they emphasize social distancing and asymptomatic screening to control the pandemic.

Opening of Large Institutions of Higher Education and County-Level COVID-19 Incidence — United States, July 6–September 17, 2020

In August 2020, as the United States began to see a decline in new COVID-19 cases nationwide, some colleges and universities decided to resume in-person classes while others opted to keep all instruction online. This study compared COVID-19 incidence and testing rates per 100,000, test positivity via RT-PCR, and the percentage of counties that were identified as hotspots between in-person, remote, and non-university counties. Outcomes were recorded 21 days before and after instruction began. In a comparison before and after instruction, the number of tests conducted for both in-person and remote instruction increased by 14.1% and 4.2% respectively but decreased by 1% in non-university counties. The test positivity and incidence increased at institutions conducting in-person learning by 1.1% and decreased in both remote and non-university counties by 1.8% and 0.6%, respectively. Overall, in-person universities saw a 56% increase in incidence, 30% increase in hotspot occurrence, and increases in both testing and positive results. The authors suggest better adherence to recommended practices, such as masks and social distancing, and increasing testing capabilities for colleges to safely return to in-person instruction.

First Detection of SARS-CoV-2 spike protein N501 mutation in Italy in August, 2020

Fiorentini et al. classified a new variant of SARS-CoV-2, VOC-202012/01, which contains a mutation in the spike protein. This is of particular concern as the N501Y mutation involves one of the amino acid residues which determine a tight interaction between the SARS-CoV-2 receptor-binding domain and its cellular receptor angiotensin-converting enzyme 2 (ACE2). A bioinformatic analysis was conducted on the SARS-CoV-2 virus detected in a 59-year-old man with a history of SARS-CoV-2 infection persistence. The analyses have found that the MB61-Aug SARS-CoV-2 isolate has accumulated thirteen amino acid changes by the end of November compared with earlier Italian strains. Furthermore, the research team
found that N501T substitution was detected in both the MB61-Nov and MB61-Aug SARS-CoV-2 isolate, providing evidence that the amino acid residue 501 mutation was present in Italy in August 2020. The findings of the study illuminate the need to identify new variants of SARS-CoV-2 which may have the potential to increase viral spread and/or escape from vaccine-induced immunity.

NON-CLINICAL TRENDS

Using Lorenz Curves to Measure Racial Inequities in COVID-19 Testing

Mody et al. investigated racial inequities and disparities in COVID-19 testing through a cross-sectional study examining data on COVID-19 tests, hospitalizations, and zip code-level demographics in St. Louis, Missouri, between March and August 2020. Modified Lorenz curves were generated to assess the disparities in COVID-19 testing compared to disease burden (hospitalizations). It was found that 22.9% of tests were conducted in 23 zip codes where half of the hospitalizations had occurred, with a majority of these zip codes being over 50% Black. In 86 zip codes that accounted for 25% of hospitalizations, 52.9% tests were conducted, and all of these areas were less than 50% Black. Authors suggest inadequate and inequitable testing scale-up to be a factor in these disparate outcomes, and recommend proactive public health responses to address this inequity.

Praying for Hand Soap and Masks: Health and Human Rights Violations in U.S Immigration Detention during the COVID-19 Pandemic

Physicians for Human Rights and Harvard Medical School faculty and students partnered to record experiences of 50 recently released individuals from 20 different US detention centers in 12 different states from July 13th to October 3rd, 2020. The inadequacies in these facilities regarding their COVID-19 responses are but are not limited to: 85% of detainees found out about COVID-19 in the news, 80% were never able to social distance in the eating area, 96% reported they were not socially distant while sleeping, 42% of participants noted not having access to soap at one point during their detention, 82% reported not having access to sanitizer at all in the facility, 26% reported never seeing surfaces be disinfected, and 86% reported the inadequate protective conditions. Of the participants who had reported or protested issues related to COVID-19 in the detention centers, 56% experienced acts of intimidation such as verbal abuse, pepper spray, and solitary confinement. Of the 52% percent of interviewees that noted at least one comorbidity, 86% told staff and were not given separate rooms. Twenty-one of 50 interviewees reported having COVID-19 symptoms; however, only 18 of these individuals felt comfortable reporting their symptoms, of whom, none were tested or isolated. This study demonstrates that the U.S. Immigration and Customs Enforcement facilities did not adhere to their own Pandemic Response Requirements and Centers for Disease Control guidance, as well as the U.S Constitution. The authors suggest releasing those in detention centers in order to shelter safely.

CLINICAL PRESENTATION AND MANAGEMENT

Distinct disease severity between children and older adults with COVID-19: Impacts of ACE2 expression, distribution, and lung progenitor cells
This retrospective study conducted in China aimed to examine the expression patterns of angiotensin-converting enzyme 2 (ACE2), which is the cell-entry receptor of SARS-CoV-2, and the role of lung progenitor cells in older COVID-19 patients and children. The authors analyzed clinical characteristics of patients with laboratory-confirmed COVID-19 (173 children, 126 adults) from four hospitals in China between January 17th, 2020 to March 25th, 2020. A significant relationship between age and disease severity was discovered (p=0.001); patients over 50 years of age were more likely to develop critical (2.7%) and severe (35.1%) pneumonia compared to patients below 16 years of age (0.6% severe pneumonia). Older patients were more likely to have severe symptoms such as fever, sore throat, cough (p<0.05) and more likely to be admitted to the ICU (p=0.001) compared to the children patients. The expression levels of ACE2 and lung progenitor cells among adult patients were generally decreased compared to children. When examining sites of ACE2 distribution among older patients, the ACE2+ cells were mainly located in the alveolar region and decreased at the bronchus. The authors conclude that these risk factors may impact recovery and disease severity from pneumonia caused by SARS-CoV-2 infection among adult patients.

6-month consequences of COVID-19 in patients discharged from hospital: a cohort study

This cohort study aimed to assess long-term health outcomes of patients with COVID-19 who were discharged from Jin Yin-tan Hospital in Wuhan, China between January and May 2020. A total of 1733 discharged patients (52% men, 48% women) underwent physical examinations, blood tests, and interviews relating to symptom evaluation and health-related quality of life in a follow up period between June and September 2020. Disease severity was assessed using a seven-category scale, ranging from 1 (“not admitted to hospital with resumption of normal activities”) to 7 (“death”). Upon follow-up, 76% of patients reported at least one symptom, the most common being fatigue or muscle weakness, sleep difficulties, and anxiety or depression (63%, 25%, and 23%, respectively). Patients who were admitted to the hospital requiring high flow nasal cannula, non-invasive or invasive mechanical ventilation, or extracorporeal membrane oxygenation (severity scale 5-6), had increased difficulty with mobility, pain or discomfort, and anxiety or depression compared to patients who were admitted to the hospital but did not require supplemental oxygen (severity scale 3). Of the 390 patients who received lung function tests and high-resolution chest CTs, 22% of scale 3 patients had lung diffusion impairments compared to 56% of scale 5-6 patients. Of the 94 patients with blood antibodies tested, the seropositivity (96.2% vs. 58.5%) and median titres (19.0 vs. 10.0) of the neutralising antibodies were significantly lower at follow up as compared to the acute phase. In accordance with previous literature, patients who were most severely ill throughout their hospital stay experienced heightened pulmonary diffusion and chest imaging impairments, along with fatigue, anxiety or depression, and muscle weakness.

Prevalence and risk factors for delirium in critically ill patients with COVID-19 (COVID-D): a multicentre cohort study
This cohort study by Pun et al included 69 intensive care units (ICUs) across 14 countries to investigate the prevalence and risk factors of delirium and coma in critically ill COVID-19 patients. Data from patients aged ≥18 years and admitted to ICUs with SARS-CoV-2 before April 28, 2020 were included. Of the 2088 patients included in the study cohort, 87.5% of patients were invasively mechanically ventilated throughout their hospitalization. The study findings revealed that 64% of patients were given sedatives, namely benzodiazepines, and 70.9% were given propofol, for a median of 7 days. In addition, 81.6% of patients were comatose for a median of 10 days and 54.9% were delirious for a median of 3.0 days. In terms of understanding risk of delirium, hospital practices such as mechanical ventilation, sedative, opioid, antipsychotic use, vasopressor infusions, and use of restraints were associated with higher risk of delirium the following day (p≤0.04). Family visitation, however, was associated with lower risk of delirium (p<0.0001). Additional factors independently associated with fewer days alive without delirium or coma were older age, male sex, smoking and alcohol abuse, use of vasopressors, and invasive mechanical ventilation (on day one). Authors suggest that benzodiazepine use and family visitation could be considered modifiable risk factors for delirium and coma reduction in COVID-19 patients.

**PATHOPHYSIOLOGY**

**Immunological memory to SARS-CoV-2 assessed for up to 8 months after infection**

The goal of this study was to gain a better understanding of immune memory after SARS-CoV-2 infection. The study included 188 participants (80 males, 108 female) from the United States between the ages of 19 and 81 years old with confirmed COVID-19 cases which were mild, moderate, severe, or asymptomatic. Of those participants, 254 samples were collected between 6 and 250 days post symptom onset (PSO). Results from the cross-sectional analysis show that SARS-CoV-2 Spike IgG titers were stable from 20-240 days PSO. Spike-specific memory B cells were more abundant at 6 months compared to 1 month PSO. SARS-CoV-2 memory CD4+ T cells were 93% (53/57) detectable 1 month PSO and 92% (33/36) detectable ≥6 months PSO. SARS-CoV-2 memory CD8+ T cells were 70% (40/57) detectable 1 month PSO and 50% (18/36) detectable ≥ 6 months PSO. The authors suggest that each component of SARS-CoV-2 immune memory exhibited different kinetics and understanding immune memory to SARS-CoV-2 will improve vaccines and diagnostic testing.

**NON-PHARMACEUTICAL / PUBLIC HEALTH INTERVENTIONS**

**Mitigation Policies and COVID-19–Associated Mortality — 37 European Countries, January 23–June 30, 2020**

Fuller et al. examined different COVID-19 mitigation strategies implemented by various European countries to compare varying timelines and mortality rates. The mitigation policies included cancellation of public events, school closures, gathering restrictions, workplace closures, border closures, internal movement restrictions, public transport orders, stay at home recommendations, and stay-at-home orders. These policies were measured by the Oxford Stringency Index (OSI), a scale ranging from 0 to 100, with 100 being the strictest
policies put in place, and measured on the day a country reached the COVID-19 mortality threshold of 0.02 COVID-related deaths per 100,000 people. A linear regression model was used to compare the OSI when the mortality threshold was reached. Findings showed that the earlier the policies were put in place the fewer people died, with a one-unit increase in standard deviation of OSI resulting in 12.5 fewer deaths per 100,000 people. The authors suggest that further studies should be conducted to determine which policies are the most effective and when they should be put in place to save the most lives.

MENTAL HEALTH

Effects of the COVID-19 pandemic on primary care-recorded mental illness and self-harm episodes in the UK: a population-based cohort study

Carr et al. conducted a population-based cohort study using primary care electronic health records from general practices available on the United Kingdom Clinical Practice Research Datalink. The researchers aimed to assess trends in primary care-recorded common mental illness, episodes of self-harm, psychotropic medication prescribing, and general practitioner referrals to mental health services during the COVID-19 emergency in the United Kingdom. The study population included 11,946,696 patients from 1362 general practices in England alongside 2,263,811 patients from 355 general practices in Northern Ireland, Scotland, and Wales. In April 2020, the incidence of primary care-recorded depression, anxiety disorders, antidepressant prescribing, and self-harm decreased sharply compared to expected rates. Rates then increased in May and June and returned to expected rates in September 2020. The authors found that the largest reductions were observed in the most under-resourced populations. The findings of the study illuminate a temporary but marked reduction in the number of people with existing mental illness accessing primary care following episodes of self-harm. The implications of the study suggest addressing delays in mental health diagnosis and treatment in under-resourced communities.

PEDIATRIC PRESENTATION

Trends in Pediatric Hospitalizations for Coronavirus Disease 2019

Levin et al. performed cross sectional analyses of 5,364 pediatric (19 years and younger) COVID-19 hospitalizations in 22 different states to examine severity and spread of COVID-19 among this population. The average cumulative hospitalization rate in this study increased from 2 per 100,000 children in the beginning of the study to 17.2 of 100,000 children. The highest pediatric hospitalization rates at the beginning of the study were found in New Jersey (5.0 per 100,000) and Colorado (4.4 per 100,000); however, by the end of the study, the highest rates shifted to South Dakota (33.7 per 100,000) and Arizona (32.8 per 100,000). The lowest pediatric hospitalization rates at the start of the study were found in Hawaii and Rhode Island (both 0 per 100,000) but at the end of the study New Hampshire replaced Rhode Island at 1.0 per 100,000 and Hawaii increased to 4.3 per 100,000 hospitalizations. Several states saw significant growth and variance including Utah from 0.3 to 15.5 per 100,000 hospitalizations. This study suggests that pediatric hospitalizations may offer reasons for concern.
ADDITIONAL RESOURCES
UCSF Library COVID-19 Research and Information Resources
UCSF Institute for Global Health Sciences COVID-19 Resources
UC Davis One Health Institute COVID-19 FAQs
Harvard Viswanath Lab Myths vs Facts

Note on this Document: This document was assembled by graduate and doctoral students attending the University of California, San Francisco with the intent of facilitating the rapid dissemination of information to the global community in order to help during this time. Diana Etwaru, Disha Nangia, Caihla Petiprin, Lina Salam, Micaela Reyna, and Shivali Joshi contributed to these summaries. This work is volunteer based.

References:


