

COVID-19 Research Watch

June 22, 2020

MODELS

[The impact of COVID-19 and strategies for mitigation and suppression in low-middle-income countries](#)¹

The COVID-19 epidemic models described in the study incorporate factors such as demography and social contact patterns, health care availability and co-morbidities in low- and middle-income countries. Unlike in some high-income countries, mitigation strategies (defined as interventions that reduce transmission but R_t remains above 1) would not be sufficient to prevent the overwhelming of health care systems in lower-income countries. Alternatively, suppression strategies (interventions reducing R_t to below 1) would result in a slower progress toward herd immunity, therefore would have to be kept in place for longer, causing wider health and economic consequences. The priority should be to increase the availability of oxygen support to mitigate the health impact alongside enhancing the capacity for surveillance and widescale testing to reduce the spread of infection and tailor appropriate NPIs. In the longer-term, ensuring equitable provision of pharmaceutical interventions to lower income countries once they are developed should be a global priority.

[Isolation of potent SARS-CoV-2 neutralizing antibodies and protection from disease in a small animal model](#)²

Neutralizing antibodies (nABs) from patient donors who were infected with SARS-CoV-2, were used on two epitopes: the receptor binding domain (RBD) and non-receptor binding domain on the spike protein to test protection using an animal model. The neutralizing antibodies were tested on a Syrian hamster model at five different concentrations to evaluate dose-response. The hamsters were inoculated with SARS-CoV-2. Hamsters were weighed as a measure of disease and lung tissue was collected to measure viral load. Results suggest that the animals who received 2mg (average of 16.5 mg/kg) or 500 μ g (average of 4.2 mg/kg) of neutralizing RBD-A antibody, presented with no weight loss and low viral loads whereas the controls lost an average of 13.6% of their body weight, those that received low doses of AB (0.9, 0.2, 0.06 mg/kg also lost significant body weight. The data suggest that an antibody serum concentration required for protection against SARS-CoV-2 in this model was found to be 22 μ g/ml of nAb which has full protection and a serum concentration of 12 μ g/ml of nAb results in a 50% reduced disease that was measured via weight loss. The RBD-A epitope nABs that compete with Angiotensin-Con-verting Enzyme-2 are better for prophylactic and therapeutic applications and may help find neutralizing epitopes to guide future vaccine design.

[Global, regional, and national estimates of the population at increased risk of severe COVID-19 due to underlying health conditions in 2020: a modelling study](#)³

This analysis was used to provide regional, national and global estimates for the number of people with a higher risk of severe COVID-19 based on underlying medical conditions. To determine the appropriate adjustment factors for multimorbidity and clustering, two large multimorbidity studies were analyzed. The study estimated that globally, 1.7 billion people (22%) have at least one underlying health condition that increases their risk for severe COVID-19, and that 349 million (4%) would require hospital admission if infected. Chronic respiratory disease, chronic kidney disease, cardiovascular disease, and diabetes were the most prevalent and influential health conditions for individuals aged 50 and older. Countries with older populations (Japan, Puerto Rico, and many European countries), African countries with high HIV/AIDS prevalence (Lesotho and eSwatini), and small island nations with high diabetes prevalence (Mauritius and Fiji) have the greatest share of increased risk populations. Males represent a larger portion of those that are high risk with 6% of all males,

compared to 3% of females. Severe COVID-19 risk varies considerably, with 1/900 people <20y and 1/5 people age >70 at risk. This information may inform countries to protect these most vulnerable at-risk individuals through intense physical distancing, personal protective equipment (including face masks) and testing for people in contact with at-risk individuals, increased availability of tools to aid in the understanding of personal risk factors, as well as inform priorities for vaccination, when available.

PHARMACEUTICAL INTERVENTIONS

[Common Drug Reduces Coronavirus Deaths, Scientists Report⁴](#)

The press release cited research that administering a steroid, dexamethasone, to COVID-19 patients in the ICU, especially those on ventilators, significantly lowered the death rate of severely ill patients. Dexamethasone is now being used in the United Kingdom as of Tuesday, June 16, but the data from the initial large study has not yet been released or peer reviewed. Before dexamethasone can be standardized as a COVID-19 treatment, extensive research has to be completed on the efficacy and safety of this drug. From the preliminary study, a total of 2104 patients were randomized to receive dexamethasone (6 mg once daily) either orally or by intravenous injection for 10 days and compared to 4321 patients randomized to usual care alone. Dexamethasone reduced deaths by one third in ventilated patients (RR 0.65 [95% CI: 0.48 to 0.88]; $p = 0.0003$) and by a fifth in other patients who received oxygen only (RR 0.80 [0.67 to 0.96]; $p = 0.0021$). There was no benefit among those patients who did not require respiratory assistance (1.22 [0.86 to 1.75]; $p = 0.14$). Based on these results, 1 death would be avoided by treating around 8 ventilated patients or around 25 patients requiring only oxygen.

NON-PHARMACEUTICAL INTERVENTIONS

[Public Attitudes, Behaviors, and Beliefs Related to COVID-19, Stay-at-Home Orders, Nonessential Business Closures, and Public Health Guidance — United States, New York City, and Los Angeles, May 5–12, 2020⁵](#)

From May 5 to May 12, 2020, the US CDC conducted a survey among adults in New York City and Los Angeles, as well as a broad US-based cohort, to measure attitudes and beliefs about Covid-19 mitigation measures. A total of 4,042 adults participated by answering questions about stay-at-home orders, nonessential business closures, and public health guidance (eg: face masks and social distancing). Approximately 90% of adults in NYC, 80% in LA, and 84% of adults across the US agreed their state's Covid-19 responses were appropriate or not restrictive enough. In addition, approximately 82% in the NYC cohort, 74% in the LA cohort, and 75% of adults in the US reported they would feel unsafe if restrictions were lifted nationwide. Survey results were stratified by various factors, including age, urban versus rural location, and essential worker status. This data can be used to inform future and specific public health mitigation strategies and reopening policies.

[Measuring the effectiveness of an automated text messaging active surveillance system for COVID-19 in the south of Ireland, March to April 2020⁶](#)

Researchers in the Cork/Kerry region of Ireland measured the effectiveness of an automated text-based surveillance system for early detection of positive Covid-19 cases. The researchers enrolled 1,336 asymptomatic close contacts of known positive cases asked to self-quarantine for 14 days. A daily automated text message was sent to each participant during their 14-day follow-up period to inquire about symptoms and assess the need for Covid-19 testing. The surveillance system found 120 (9%) of the close contacts required testing and 35 (2.6%) of those tested were positive. The detection rate of 2.6% showed that

automatic active surveillance is successful at eliciting early identification of symptomatic contacts and cases. However, the implementation of such a system is made difficult by the need for robust and expansive resources to ensure success.

TRANSMISSION PATTERNS

[Temperature, Humidity, and Latitude Analysis to Estimate Potential Spread and Seasonality of Coronavirus Disease \(COVID-19\)](#)⁷

This study analysed the link between meteorological conditions and COVID-19 outbreaks in 50 cities with and without community transmission of COVID-19 worldwide. The humidity, latitude, and temperature of various cities were analyzed alongside the extent of COVID-19 transmission. Countries with significant community transmission by March 10, 2020 were located between 30 and 50 degrees N, had mean, typically stable temperatures between 5 and 11 degrees Celsius, and low specific and absolute humidity. The findings are consistent with COVID-19 as a seasonal virus, with increased breakouts occurring in areas with a limited range in climate.

CLINICAL DIAGNOSTIC TESTS

[Meta-analysis of diagnostic performance of serological tests for SARS-CoV-2 antibodies and public health implications](#)⁸

This meta-analysis included nine studies examining the performance of antibody tests, including six commercially available kits and three in-house tests (ELISA, CMIA, or CLIA assays). Among the commercially available kits, the Beijing Wantai kit (Beijing Wantai Biological, Beijing, China), was used in three of the publications, demonstrating a sensitivity ranging from 0.93 to 0.98 and a specificity ranging from 0.99-1.00 for total Ab detected. For IgM detection, the kit demonstrated a sensitivity ranging from 0.83 to 0.93 and specificity ranging from 0.99 to 1.00, and for IgG detection the kit demonstrated sensitivity ranging from 0.65 to 0.89 and specificity ranging from 0.99 to 1.00. The Xiamen InnoDx Biotech kit (Xiamen InnoDx Biotech Co., Xiamen, China), was used in one of the included studies, and demonstrated a sensitivity of 0.86 and specificity of 0.99 for IgM Ab detection, and a sensitivity of 0.96 and specificity of 0.99 for total Ab detection. The pooled summary estimates of sensitivity across all serological tests included in the systematic review were 0.82 for IgM, 0.85 for IgG, and 0.85 for total Ab. Pooled summary estimates for specificities were 0.98 for IgM, 0.99 for IgG, and 0.99 for detection of total Ab.

NON-CLINICAL TRENDS

[Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland \(SEROCoV-POP\): a population-based study](#)⁹

Complete data from 2766 participants (ages 5 and older) across 1339 households was included in this seroprevalence study. Seropositivity was determined using a commercially available ELISA kit (Euroimmun; Lübeck, Germany #EI 2606-9601 G). The authors found that, compared to those aged 20-49, participants aged 5-9 and those over 65 were the least likely to be sero-positive (RR= 0.32 and RR = 0.50). The researchers provided several plausible explanations regarding the over 65 age group, including that social distancing efforts among older adults may have been successful, or the possibility that older individuals may develop fewer antibodies. In addition, the authors estimated seroprevalence in the general population ranged from 4.8% in the first week of the study to 10.8% in the fifth week. The authors suggest that their findings that the immunological landscape has not changed greatly, we cannot rely on a reduced number of susceptibles in the general population to slow the pandemic.

CLINICAL PRESENTATION AND CLINICAL MANAGEMENT

[Prevalence of Gastrointestinal Symptoms and Fecal Viral Shedding in Patients With Coronavirus Disease 2019: A Systematic Review and Meta-analysis](#)¹⁰

A systematic review and meta-analysis of 23 published and 6 preprint studies conducted between November 1, 2019 to March 30, 2020 discovered that between 10-12% of the total 4,805 patients included in the analysis with SARS-CoV-2 experienced gastrointestinal problems. In the pooled analysis, approximately 7.4% of patients experienced diarrhea, and 4.6% reported nausea or vomiting. Aspartate aminotransferase levels above reference estimates were reported in 20% of patients and alanine aminotransferase levels were reported above reference estimates in 14.6% of patients. In addition, SARS-CoV-2 shedding in stool was observed in 40.5% of patients. Based on viral shedding in stool, the authors suggest SARS-CoV-2 may potentially be transmitted via the fecal-oral route though further studies are required.

[Factors Associated With Surgical Mortality and Complications Among Patients With and Without Coronavirus Disease 2019 \(COVID-19\) in Italy](#)¹¹

A tightly matched (1:2 ratio) cohort study was conducted in a hospital in Brescia, Italy in general, vascular, thoracic, orthopedic and neurosurgery wards to evaluate early surgical complications in 41 COVID-19 surgical patients. Of the 123 patients in the combined cohort, 30-day mortality was significantly higher in COVID-19 patients than controls (odds ratio [OR], 9.5; 95% CI, 1.77-96.53). Complications in surgery were higher among COVID-19 patients than controls (OR, 4.98; 95% CI, 1.81-16.07), with pulmonary complications being the most common (OR, 35.62; 95% CI, 9.34-205.55), and thrombotic complications also significantly associated (OR, 13.2; 95% CI, 1.48-∞). The increased frequency of complications should be considered when making decisions about surgeries for patients with COVID-19.

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. Harry Lin, Anika Kalra, Caihla Petiprin, Sigal Maya, Micaela Reyna, and Mana Anvar contributed to these summaries. This work is volunteer based.

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