DHS SCIENCE AND TECHNOLOGY

Master Question List for COVID-19 (caused by SARS-CoV-2)

Weekly Report

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Homeland Security

Science and Technology

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FOREWORD

The Department of Homeland Security (DHS) is paying close attention to the evolving Coronavirus Infectious Disease (COVID-19) situation in order to protect our nation. DHS is working very closely with the Centers for Disease Control and Prevention (CDC), other federal agencies, and public health officials to implement public health control measures related to travelers and materials crossing our borders from the affected regions.

Based on the response to a similar product generated in 2014 in response to the Ebolavirus outbreak in West Africa, the DHS Science and Technology Directorate (DHS S&T) developed the following "master question list" that quickly summarizes what is known, what additional information is needed, and who may be working to address such fundamental questions as, "What is the infectious dose?" and "How long does the virus persist in the environment?" The Master Question List (MQL) is intended to quickly present the current state of available information to government decision makers in the operational response to COVID-19 and allow structured and scientifically guided discussions across the federal government without burdening them with the need to review scientific reports, and to prevent duplication of efforts by highlighting and coordinating research.

The information contained in the following table has been assembled and evaluated by experts from publicly available sources to include reports and articles found in scientific and technical journals, selected sources on the internet, and various media reports. It is intended to serve as a "quick reference" tool and should not be regarded as comprehensive source of information, nor as necessarily representing the official policies, either expressed or implied, of the DHS or the U.S. Government. DHS does not endorse any products or commercial services mentioned in this document. All sources of the information provided are cited so that individual users of this document may independently evaluate the source of that information and its suitability for any particular use. This document is a "living document" that will be updated as needed when new information becomes available.

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We need to know the infectious dose for humans by all possible exposure routes in order to inform models, develop diagnostics and countermeasures, and inform disinfection efforts.
Transmissibility – How does it spread from one host to another? How easily is it spread? 4
SARS-CoV-2 is passed easily between humans through close contact and aerosol transmission.[31, 86, 284, 504]
Asymptomatic or pre-symptomatic individuals can transmit SARS-CoV-2[607] and play a large role in new case growth.[426]
Infection risk is particularly high indoors,[54] where interactions of less than 15 minutes can result in transmission.[471]
Household transmission is rapid,[16] and household contacts spread infection more than casual community contacts.[520]
Superspreading events (SSEs) appear common in SARS-CoV-2 transmission and may be crucial for controlling spread.
Rates of transmission on public transit are unclear but appear low;[266] the US CDC requires masks during travel.[84]
Children of any age can acquire and transmit infection in homes, schools, and community settings, though there is some evidence that younger children (<10-15) are less susceptible[412] and less infectious[422] than older children and adults.[267]
Individuals who have clinically recovered but test positive for COVID-19 are unlikely to be infectious.[438, 790]
We need to know the relative contribution of different routes of transmission and the effect of new variants.
Host Range – How many species does it infect? Can it transfer from species to species? 5
SARS-CoV-2 is closely related to other coronaviruses circulating in bats in Southeast Asia. Previous coronaviruses have passed through an intermediate mammal host before infecting humans, but the presence or identity of the SARS-CoV-2 intermediate host is unknown.[429, 443, 445] Current evidence suggests a direct jump from bats to humans is plausible.[74]
SARS-CoV-2 uses the same receptor for cell entry as the SARS-CoV-1 coronavirus that circulated in 2002/2003.
Animals can transmit SARS-CoV-2 to humans, but the potential role of long-term reservoir species is unknown.
Several animal species are susceptible to SARS-CoV-2 infection.
We need to know the best animal model for replicating human infection by various exposure routes.
Incubation Period – How long after infection do symptoms appear? Are people infectious during this time? 6
On average, symptoms develop 5 days after exposure with a range of 2-14 days. Incubating individuals can transmit disease for several days before symptom onset. Some individuals never develop symptoms but can still transmit disease.
It is estimated that most individuals are no longer infectious beyond 10 days after symptom onset.
The average time between symptom onset in successive cases (i.e., the serial interval) is approximately 5 days.
Individuals can shed virus for several weeks, though it is not necessarily infectious.
We need to know the incubation duration and length of infectivity in different patient populations.
Clinical Presentation – What are the signs and symptoms of an infected person? 7
Most symptomatic cases are mild, but severe disease can be found in any age group.[115] Older individuals and those with underlying conditions are at higher risk of serious illness and death, as are men.[546] Fever is most often the first symptom.
The best current estimate is that approximately 33% of individuals will remain asymptomatic after SARS-CoV-2 infection.[545]
COVID-19 is more severe than seasonal influenza, evidenced by higher ICU admission[785] and mortality rates.[582]
In the US, 34% of hospitalized patients required ICU admission, and 12.6% of hospitalized patients died from COVID-19.[499]
COVID-19 symptoms commonly persist for weeks[690] to months[102] after initial onset.
Adults >60[561] and those with comorbidities are at elevated risk of death.[691, 814]
Minority populations and essential workers are disproportionately affected by COVID-19.[503]
Children are susceptible to COVID-19,[185] though generally show milder[130, 462] or no symptoms.
We need to know the impact of new SARS-CoV-2 variants on presentation and disease severity.
Protective Immunity – How long does the immune response provide protection from reinfection? 8
Recovered individuals appear protected against reinfection for at least several months. Reinfection is generally rare, though novel variants may increase reinfection frequency. Antibody and T-cell responses persist in most patients for >6 months.
The impact of emerging SARS-CoV-2 variants on protective immunity and reinfection risk is unclear.
Reinfection with SARS-CoV-2 is possible but appears rare, though the true frequency is unknown.
The contribution of historical coronavirus exposure to SARS-CoV-2 immunity is unknown.[519]
We need to know the frequency and severity of reinfection, as well as the protective effects of immune components.
Clinical Diagnosis – Are there tools to diagnose infected individuals? When during infection are they effective? 9
Diagnosis of COVID-19 is based on symptoms consistent with COVID-19, PCR-based testing of active cases, and/or the presence of SARS-CoV-2 antibodies in individuals. Screening solely by temperature or other symptoms is unreliable.
Validated serological (antibody) assays are being used to help determine who has been exposed to SARS-CoV-2.
We need to identify additional factors that affect the accuracy of serological or PCR-based diagnostic tests.

Medical Treatments – Are there effective treatments? 10
COVID-19 treatment recommendations are provided by the WHO,[760] NIH,[524] Infectious Disease Society of America (IDSA),[62] and British Medical Journal (BMJ),[70] based on ongoing analysis of evidence from clinical trials.
Recommendations for the use of Remdesivir vary.
We need clear, randomized trials for treatment efficacy in patients with both severe and mild/moderate illness.
Vaccines – Are there effective vaccines? 11
Two vaccines are currently being administered under US FDA Emergency Use Authorization, which show protective efficacy.
We need to understand vaccine uptake and efficacy rates, as well as how well vaccines reduce transmission.
Non-pharmaceutical Interventions (NPIs) – Are public health control measures effective at reducing spread? 12
Broad-scale control measures such as stay-at-home orders and widespread face mask use effectively reduce transmission.
Individual behaviors (e.g., face masks, social distancing) have been associated with reduced risk of COVID-19 infection.[567]
Particular focus should be placed on minimizing large gatherings where superspreading events are more likely.[768]
Research is needed to plan the path to SARS-CoV-2 elimination via pharmaceutical and non-pharmaceutical interventions.
Lifting NPIs before widespread vaccine uptake is predicted to increase COVID-19 cases and deaths.[152, 562]
We need to understand the magnitude of measures necessary to limit spread of new SARS-CoV-2 variants.
Environmental Stability – How long does the agent live in the environment? 13
SARS-CoV-2 can survive on surfaces from hours to days and is stable in air for at least several hours, depending on the presence of UV light, temperature, and humidity.[59] Environmental contamination is not thought to be the principal mode of SARS-CoV-2 transmission in humans.
Viable SARS-CoV-2 and/or RNA can be recovered from contaminated surfaces; however, survivability varies.
In the absence of sunlight, SARS-CoV-2 can persist on surfaces for weeks.
SARS-CoV-2 survival in the air is highly dependent on the presence of UV light and temperature.
Stability of SARS-CoV-2 RNA in clinical samples depends on temperature and transport medium.
There is currently no evidence that SARS-CoV-2 is transmitted to people through food or food packaging.[341, 754]
We need to quantify the duration of viable SARS-CoV-2 on surfaces, not simply the presence of RNA.
Decontamination – What are effective methods to kill the agent in the environment? 14
Soap and water, as well as common alcohol and chlorine-based cleaners, hand sanitizers, and disinfectants are effective at inactivating SARS-CoV-2 on hands and surfaces.
Several methods exist for decontaminating N95 respirators[536] and other PPE.
We need additional SARS-CoV-2 decontamination studies, particularly with regard to indoor aerosol transmission.
PPE – What PPE is effective, and who should be using it? 15
Face masks appear effective at reducing infections from SARS-CoV-2. Healthcare workers are at high risk of acquiring COVID-19, even with recommended PPE.
We need to continue assessing PPE effectiveness with specific regard to SARS-CoV-2 instead of surrogates.
Forensics – Natural vs intentional use? Tests to be used for attribution. 16
All current evidence supports the natural emergence of SARS-CoV-2 via a bat and possible intermediate mammal species.
We need to know whether there was an intermediate host species between bats and humans.
Genomics – How does the disease agent compare to previous strains? 17
Current evidence suggests that SARS-CoV-2 accumulates mutations at a similar rate as other coronaviruses.
Several viral variants are being investigated for their effects on disease spread, severity, and immune response.[400]
Several human genomic regions, including those determining blood type,[821] affect COVID-19 prevalence and/or severity.[29]
There is some concern regarding SARS-CoV-2 strains involved in continued human and mink transmission.
We need to identify differences in transmissibility or severity caused by different SARS-CoV-2 mutations and variants.
Forecasting – What forecasting models and methods exist? 18
Several platforms provide digital dashboards summarizing the current status of the pandemic in US states and counties.
The US CDC provides ensemble forecasts of cases and deaths based on the arithmetic mean of many participating groups.[107]
Additional forecasting efforts are designed to assess the effects of interventions such as social distancing and vaccination.
We need to know how different vaccine uptake rates will affect the epidemic in the US and neighboring countries.

Infectious Dose – How much agent will make a healthy individual ill?

What do we know?

The human infectious dose of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is unknown by all exposure routes. Based on experimental studies with humans exposed to other coronaviruses, animals exposed to SARS-CoV-2, and modeling estimates, the median infectious dose is likely between 10 and 1,000 viral particles (plaque-forming units, PFU).

- The UK will initiate a human challenge study to determine the intranasal infectious dose of non-variant SARS-CoV-2.[168]

Non-human primates

- A total dose of approximately 700,000 plaque-forming units (PFU) of the novel coronavirus SARS-CoV-2 infected cynomolgus macaques via combination intranasal and intratracheal exposure (10^6 $TCID_{50}$ total dose).[619]
- Rhesus and cynomolgus macaques showed mild to moderate clinical infections at doses of 4.75×10^6 PFU (delivered through several routes), while marmosets developed mild infections when exposed to 1×10^6 PFU intranasally.[461]
- Rhesus macaques are effectively infected with SARS-CoV-2 via the ocular conjunctival and intratracheal route at a dose of ~700,000 PFU (10^6 $TCID_{50}$).[178] Rhesus macaques infected with 2,600,000 $TCID_{50}$ of SARS-CoV-2 by the intranasal, intratracheal, oral and ocular routes combined recapitulate moderate human disease.[509] A small study infected Rhesus macaques via ocular inoculation (1×10^6 $TCID_{50}$), resulting in mild infection; however, gastric inoculation did not result in infection (same dose), suggesting a limited role of gastric transmission. Interpretation is limited due to the small scale.[177]
- African green monkeys replicate aspects of human disease, including severe pathological symptoms (exposed to 500,000 PFU via intranasal and intratracheal routes),[772] mild clinical symptoms (aerosol exposures between 5,000 and 16,000 PFU),[304] and acute respiratory distress syndrome (ARDS), with small particle aerosol exposure doses as low as 2,000 PFU.[68]
- Aerosol exposure of three primate species (African green monkeys, cynomolgus macaques, and rhesus macaques) via a Collison nebulizer resulted in mild clinical disease in all animals with doses between 28,700 and 48,600 PFU.[351]
- Rhesus macaques have been suggested as the best non-human primate model of human COVID-19.[460]

Rodents and other animal models

- The SARS-CoV-2 median infectious dose in Golden Syrian hamsters via the intranasal route was experimentally estimated at 5 $TCID_{50}$ (~3.5 PFU).[623] Low-dose intranasal inoculation of ferrets (2,000 PFU) and Golden Syrian hamsters (1,800 PFU) with SARS-CoV-2 resulted in mild clinical symptoms, the production of infectious virus, and seroconversion.[501]
- Golden Syrian hamsters exposed to 80,000 $TCID_{50}$ (~56,000 PFU) via the intranasal route developed clinical symptoms reminiscent of mild human infections.[656] Golden Syrian hamsters infected with 100,000 PFU intranasally exhibited mild clinical symptoms and developed neutralizing antibodies,[126] and were also capable of infecting individuals in separate cages.
- Transgenic (hACE2) mice became infected after timed aerosol exposure (36 $TCID_{50}$/minute) to between 900 and 1080 $TCID_{50}$ (~630-756 PFU). All mice (4/4) exposed for 25-30 minutes became infected, while no mice (0/8) became infected after exposure for 0-20 minutes (up to 720 $TCID_{50}$, ~504 PFU).[49] This paper has methodological caveats (e.g., particle size).
- Ferrets infected with 316,000 $TCID_{50}$[371] or 600,000 $TCID_{50}$[612] of SARS-CoV-2 by the intranasal route show similar symptoms to human disease.[371, 612] Uninfected ferrets in direct contact with infected ferrets test positive and show disease as early as 2 days post-contact.[371] In a separate ferret study, 1 in 6 individuals exposed to 10^2 PFU via the intranasal route became infected, while 12 out of 12 individuals exposed to $>10^4$ PFU became infected.[630]

Modeling estimates

- The infectious dose of a pathogen can be estimated by the amount of genetic material passed between an infector and infectee (called "bottleneck" size);[666] using epidemiological data, sequencing data, and statistics, the average "bottleneck" size for SARS-CoV-2 has been estimated as ~1,200 viral particles, though exposure routes were not possible to identify.[587]
- Modeling aerosol exposures from 5 case studies suggests the inhalation ID_{50} for SARS-CoV-2 is approximately 361-2,000 viral particles, which is approximately 250-1,400 PFU.[590]

Related Coronaviruses

- Humans exposed intranasally to ~70 PFU of seasonal coronavirus 229E developed infections,[98] with a plausible intranasal ID_{50} of 10 $TCID_{50}$ (~7 PFU).[78, 515] The inhalation infectious dose of seasonal coronavirus 229E is unknown in humans.
- The infectious dose for severe acute respiratory syndrome coronavirus 1 (SARS-CoV-1) in mice is estimated to be between 67-540 PFU (average 240 PFU, intranasal route).[169, 173]
- A model-estimated ID_{50} for SARS-CoV-1 in humans is 280 PFU.[742]
- Genetically modified mice exposed intranasally to Middle East respiratory syndrome coronavirus (MERS-CoV) between 100-500,000 PFU show signs of infection. Infection with higher doses result in severe syndromes.[18, 148, 424, 809]

What do we need to know?

We need to know the infectious dose for humans by all possible exposure routes in order to inform models, develop diagnostics and countermeasures, and inform disinfection efforts.

- Human infectious dose by aerosol, surface contact (fomite), fecal-oral routes, and other potential routes of exposure
- Does exposure dose determine disease severity?
- What is the ratio of virus particles/virions to PFU for SARS-CoV-2?
- Does the SARS-CoV-2 infectious dose in humans differ by viral variant?

Transmissibility – How does it spread from one host to another? How easily is it spread?

What do we know?

SARS-CoV-2 is passed easily between humans through close contact and aerosol transmission.[31, 86, 284, 504]

- As of 2/23/2021, pandemic COVID-19 has caused at least 111,824,530 infections and 2,476,668 deaths globally.[347] In the US, there have been 28,191,010 confirmed COVID-19 cases and 500,443 confirmed deaths,[347] though both cases[28, 526] and fatalities are underestimates.[542, 771] Estimates of human transmissibility (R_0) range from 2.2 to 3.1.[477, 555, 616, 779, 808]
- A variant of SARS-CoV-2, called B.1.1.7, is associated with a 50-75% higher transmission rate than other strains,[165] and an increase in the reproduction number (R) of 0.4-0.7,[723] potentially due to higher viral loads in individuals with this variant.[368] Prevalence of the B.1.1.7 variant in the US has been doubling approximately every 10 days,[741] and modeling suggests that the B.1.1.7 variant will become the dominant US variant by March-April 2021.[250]
- Preliminary evidence suggests that the South African variant (called 501Y.V2 or B.1.351) also shows higher transmissibility.[689]
- SARS-CoV-2 can spread via aerosol or "airborne" transmission beyond 6 ft in certain situations[761] such as enclosed spaces with inadequate ventilation.[114] The risk of infection from fomites is believed to be low.[305]
- Exhaled breath may emit 10^5-10^7 genome copies per hour;[470] individual variation in aerosol particle generation is high.[197]
- Vertical transmission from mother to fetus is possible[210, 722] but rare.[692]
- Modeling suggests that 20-49 year-old adults drove late summer and fall surges in COVID-19 transmission in the US.[502]
- There is some initial evidence in the US[184] and Israel[26] that vaccination is reducing transmission rates.

Asymptomatic or pre-symptomatic individuals can transmit SARS-CoV-2[607] and play a large role in new case growth.[426]

- Individuals may be infectious for 1-3 days prior to symptom onset.[35, 746] Pre-symptomatic[71, 375, 667, 681, 788, 812] or asymptomatic[46, 331, 469] patients can transmit SARS-CoV-2,[456] and between 51%[349] (US) and 75.9%[653] (China) of infections are thought to have come from individuals who were not symptomatic at the time of transmission.[678]
- Asymptomatic individuals can transmit disease as soon as 2 days after infection.[680] Asymptomatic individuals transmit SARS-CoV-2 less often than symptomatic individuals,[64, 92, 687] causing 66% fewer secondary cases.[422] Most transmission occurs before symptoms begin[422] and within 5 days of symptom onset, as demonstrated by case studies[132] and models.[696]

Infection risk is particularly high indoors,[54] where interactions of less than 15 minutes can result in transmission.[471]

- SARS-CoV-2 may be spread by conversation and exhalation[11, 420, 638, 669] in indoor areas such as restaurants[234, 431] or offices.[230] Clusters are often associated with large indoor gatherings,[407, 556] including bars, restaurants,[800] and gyms.[128]
- Very few outbreaks have occurred in outdoor settings,[93] as outdoor air allows for effective dilution of aerosols.[72]

Household transmission is rapid,[16] and household contacts spread infection more than casual community contacts.[520]

- On average, 21.1%[693] of household contacts of infected index patients acquire SARS-CoV-2 (i.e., the "attack rate"). Attack rates are higher for symptomatic index cases, spouses of index cases, and adults,[473] though transmission to children may be underestimated.[280] 75% of household infections occurred within 5 days of illness onset in the index case.[280]
- In a US study, 31 of 58 households (54%) with a primary SARS-CoV-2 case showed evidence of secondary transmission; in 7 of these 31 households (23%), all household members became infected.[421] High viral load may increase transmission risk.[361]

Superspreading events (SSEs) appear common in SARS-CoV-2 transmission and may be crucial for controlling spread.

- Most new infections come from a few infectious individuals (overdispersion parameter k = 0.2-0.5).[15, 205, 398, 404, 732, 811]

Rates of transmission on public transit are unclear but appear low;[266] the US CDC requires masks during travel.[84]

- Several studies have identified plausible transmission on airplanes.[45, 138, 314, 367, 511] Fluorescent tracer research on commercial airplanes suggests a low risk of aerosol or surface transmission during flights, though key parameters remain uncertain.[657]
- On trains in China, transmission rates were high for those in the same row as an infectious individual (1.5-3.5% attack rate), though low for non-neighboring passengers.[327] Outbreaks have also occurred on public buses.[468]

Children of any age can acquire and transmit infection in homes, schools, and community settings, though there is some evidence that younger children (<10-15) are less susceptible[412] and less infectious[422] than older children and adults.[267]

- There is evidence of high transmission rates to and from children in the home,[334, 403, 421, 557] at school,[281, 343] and in the community,[312, 583, 660] and children transmit seasonal coronaviruses to household members at least as often as adults.[57] However, there have also been suggestions that children are both less susceptible to COVID-19[473] and less infectious,[820] resulting in low secondary transmission rates in schools.[247, 318, 787, 822] Transmission in schools generally follows community incidence[119] and can be influenced by lack of adherence to distancing and mask policies;[264] guidelines for reopening schools in the US have been generated by the CDC.[118]
- Contact tracing has found lower rates of transmission to and from younger children (<10-15) compared to adults,[391] but similar rates in older children.[163, 559, 682] In a study of 5,544 patients, though, children of all ages all had similar viral loads.[472]
- Children are also less likely than adults to test positive for COVID-19 via RT-PCR[752] despite being infected,[192, 699] underestimating pediatric COVID-19 infections.[163, 487]

Individuals who have clinically recovered but test positive for COVID-19 are unlikely to be infectious.[438, 790]

What do we need to know?

We need to know the relative contribution of different routes of transmission and the effect of new variants.

- How infectious are young children compared to adults?
- What is the emission rate of infectious particles while breathing, talking, coughing, singing, or exercising?
- Do novel SARS-CoV-2 variants differ in viral load or rates of emission from infected individuals?

Host Range – How many species does it infect? Can it transfer from species to species?

What do we know?

SARS-CoV-2 is closely related to other coronaviruses circulating in bats in Southeast Asia. Previous coronaviruses have passed through an intermediate mammal host before infecting humans, but the presence or identity of the SARS-CoV-2 intermediate host is unknown.[429, 443, 445] Current evidence suggests a direct jump from bats to humans is plausible.[74]

- Early genomic analysis indicates similarity to SARS-CoV-1,[817] with a suggested bat origin.[149, 817]
- Positive samples from the South China Seafood Market strongly suggests a wildlife source,[120] though it is possible that the virus was circulating in humans before the disease was associated with the seafood market.[58, 151, 786, 799]
- Viruses similar to SARS-CoV-2 were present in pangolin samples collected several years ago,[388] and pangolins positive for coronaviruses related to SARS-CoV-2 exhibited clinical symptoms such as cough and shortness of breath.[428] However, pangolins may be incidental hosts of coronaviruses.[410]

SARS-CoV-2 uses the same receptor for cell entry as the SARS-CoV-1 coronavirus that circulated in 2002/2003.

- Experiments show that SARS-CoV-2 Spike (S) receptor-binding domain binds the human cell receptor (ACE2) stronger than SARS-CoV-1,[776] potentially explaining its high transmissibility.
- Changes in proteolytic cleavage of the Spike protein can also affect cell entry and animal host range.[488]

Animals can transmit SARS-CoV-2 to humans, but the potential role of long-term reservoir species is unknown.

- Infected mink have been linked to human infections in workers at mink farms.[548]
- White-tailed deer are susceptible to SARS-CoV-2 via intranasal inoculation and can efficiently transmit the virus to other deer through indirect contact.[550] Their potential status as a reservoir species is unknown.
- In the US, researchers experimentally exposed big brown bats (*Eptesicus fuscus*) to SARS-CoV-2 via the oropharyngeal and nasal route and found no subsequent signs of infection, clinical symptoms, or transmission.[295]
- Deer mice can be experimentally infected with SARS-CoV-2 via intranasal exposure (10^4 or 10^5 $TCID_{50}$)[211] and are able to transmit virus to uninfected deer mice through direct contact.[276] Their capacity as a reservoir species is unknown.
- Rabbits are susceptible to SARS-CoV-2 via the intranasal route (dose = 10^4-10^6 $TCID_{50}$) and develop asymptomatic infections, though infectious virus can be found in the nose for up to 7 days after exposure.[512] Their reservoir potential is unknown.
- Bank voles (*Myodes glareolus*) seroconvert after SARS-CoV-2 exposure, but do not exhibit clinical symptoms and do not transmit infection to others.[710]

Several animal species are susceptible to SARS-CoV-2 infection.

- Animal model studies suggest that Golden Syrian hamsters and ferrets are susceptible to infection.[126, 371] In the Netherlands, farmed mink developed breathing and gastrointestinal issues, which was diagnosed as SARS-CoV-2 infection.[2] SARS-CoV-2 cases in mink on US farms show high mortality rates, and farms have implemented strict biosecurity measures.[390] Infected mink in the US have been linked to human infections.[5]
- Several non-human primates are also susceptible to infection with SARS-CoV-2 including cynomolgus macaques,[619] African green monkeys,[772] and Rhesus macaques.[461]
- Raccoon dogs (mammals related to foxes) are susceptible to COVID-19 (10^5 intranasal exposure dose) and were shown to transmit infection to other raccoon dogs in neighboring enclosures.[246]
- Domestic cats are susceptible to infection with SARS-CoV-2 (100,000-520,000 PFU via the intranasal route[652] or a combination of routes[294]), and can transmit the virus to other cats via droplet or short-distance aerosol.[652] Serial passage of SARS-CoV-2 in domestic cats attenuates transmissibility, suggesting that they are not long-term reservoirs.[50]
- Wild cats (tigers and lions)[743] can be infected with SARS-CoV-2, although their ability to spread to humans is unknown.[479, 805] Studies have confirmed that human keepers transmitted SARS-CoV-2 to tigers and lions at the Bronx Zoo.[53]
- Captive gorillas have tested positive for SARS-CoV-2, and experience mild symptoms (cough, congestion).[260]
- Ducks, chickens, and pigs remained uninfected after experimental SARS-CoV-2 exposure (30,000 CFU for ducks and chickens,[652] 100,000 PFU for pigs,[652] ~70,000 PFU for pigs and chickens[639] all via intranasal route).[652] When pigs were inoculated by the oronasal route (10^6 PFU), minimal to no signs of clinical disease were noted.[580]
- Chicken, turkey, duck, quail, and geese were not susceptible to SARS-CoV-2 after experimental exposures.[677]
- Cattle exposed to SARS-CoV-2 showed no clinical disease but exhibited low levels of viral shedding in the nose, which could be residual virus from the exposure dose.[711]
- Dogs exposed to SARS-CoV-2 produced anti-SARS-CoV-2 antibodies[75] but exhibited no clinical symptoms.[652, 662]
- In Italy, approximately 3-6% of domestic dogs and cats showed detectable neutralizing antibodies to SARS-CoV-2, though no evidence exists of transmission from dogs or cats to humans.[564]

What do we need to know?

We need to know the best animal model for replicating human infection by various exposure routes.

- What is the intermediate host(s) (if any)?
- Which animal species can transmit SARS-CoV-2 to humans?
- Can SARS-CoV-2 circulate in animal reservoir populations, potentially leading to future spillover events?

Incubation Period – How long after infection do symptoms appear? Are people infectious during this time?

What do we know?

On average, symptoms develop 5 days after exposure with a range of 2-14 days. Incubating individuals can transmit disease for several days before symptom onset. Some individuals never develop symptoms but can still transmit disease.

- By general consensus, the incubation period of COVID-19 is between 5[399] and 6[747] days.[792] Fewer than 2.5% of infected individuals show symptoms sooner than 2 days after exposure.[399] However, more recent estimates using different models calculate a longer incubation period, between 7 and 8 days.[592] This could mean that 5-10% of individuals undergoing a 14-day quarantine are still infectious at the end.[592]
- There is evidence that younger (<14) and older (>75) individuals have longer COVID-19 incubation periods, creating a U-shaped relationship between incubation period length and patient age[376] while adolescent and young adult populations (15-24 years old) have been estimated at ~2 days.[433]
- Individuals can test positive for COVID-19 even if they lack clinical symptoms.[46, 125, 285, 691, 812]
- Individuals can be infectious while asymptomatic,[116, 624, 691, 812] and asymptomatic and pre-symptomatic individuals have similar amounts of virus in the nose and throat compared to symptomatic patients.[35, 369, 823]
- Peak infectiousness may be during the incubation period, one day before symptoms develop.[308] Infectious virus has been cultured in patients up to 6 days before the development of symptoms.[35]
- Of individuals quarantining after a COVID-19 contact in the home, 81% of those testing negative on day 7 also tested negative on day 14; 19% of individuals undergoing a 7-day quarantine, then, were at risk of developing and potentially transmitting COVID-19.[622] The percentage of individuals at risk declined to 7% for those still asymptomatic and test-negative 10 days after contact.[622] This indicates that quarantines of less than 14 days still carry some risk of disease and transmission, and that care should be taken after completing a shortened quarantine period (e.g., wearing a mask, avoiding close contact).[622]

It is estimated that most individuals are no longer infectious beyond 10 days after symptom onset.

- A systematic review of published studies on SARS-CoV-1, SARS-CoV-2, and MERS-CoV found none that reported isolation of infectious virus from COVID-19 patients beyond 9 days from symptom onset, despite high viral loads by genetic tests.[124]
- While the amount of virus needed to infect another individual is unknown, mild-moderate COVID-19 cases appear to be infectious for no longer than 10 days after symptom onset, while severely ill or immunocompromised patients may be infectious for 20-70 days[39] after symptom onset; individuals can also transmit infection before symptoms appear.[727]
- Asymptomatic individuals are estimated to be infectious for between 5.76[569] and 9.5 days.[328]

The average time between symptom onset in successive cases (i.e., the serial interval) is approximately 5 days.

- On average, there are approximately 4[191] to 7.5[425] days between symptom onset in successive cases of a single transmission chain (i.e., the serial interval). Based on data from 339 transmission chains in China and additional meta-analysis, the mean serial interval is between 4.4 and 6.0 days.[190, 597, 792]
- The serial interval of COVID-19 has declined substantially over time as a result of increased case isolation,[22] meaning individuals tend to transmit virus for less time.
- The generation time (time between infection events in a chain of transmission) for SARS-CoV-2 is estimated as 4-5 days.[277]

Individuals can shed virus for several weeks, though it is not necessarily infectious.

- Children are estimated to shed virus for 15 days on average, with asymptomatic individuals shedding virus for less time (11 days) than symptomatic individuals (17 days).[464]
- Asymptomatic and mildly ill patients who test positive for SARS-CoV-2 take less time to test negative than severely ill patients.[411]
- Patients infected by asymptomatic or young (<20 years old) individuals may take longer to develop symptoms than those infected by other groups of individuals.[747]
- Viral RNA loads in the upper respiratory tract tend to peak within a few days of symptom onset and become undetectable approximately two weeks after symptoms begin.[726] The duration of the infectious period is unknown,[726] though patients can test positive for SARS-CoV-2 viral RNA for extended periods of time, particularly in stool samples.[726]
- Patients being released from the hospital may still exhale detectable levels of SARS-CoV-2 RNA (~7,000 genome copies per hour), though the infectivity of these patients is unknown.[816]

What do we need to know?

We need to know the incubation duration and length of infectivity in different patient populations.

- What is the average infectious period during which individuals can transmit the disease?
- How soon can asymptomatic patients transmit infection after exposure?
- Does the incubation period correlate with disease severity or exposure dose?
- Do novel SARS-CoV-2 variants alter the incubation period of COVID-19? Do they affect the generation time or serial interval?

Clinical Presentation – What are the signs and symptoms of an infected person?

What do we know?

Most symptomatic cases are mild, but severe disease can be found in any age group.[115] Older individuals and those with underlying conditions are at higher risk of serious illness and death, as are men.[546] Fever is most often the first symptom.

- Most symptomatic COVID-19 cases are mild (81%).[691, 766] Fever,[33, 285] cough,[285] and shortness of breath[117, 129, 330] are generally the most common symptoms, followed by malaise, fatigue, and sputum/secretion.[159] Chills, muscle pain,[510] skeletal pain,[320] sore throat, gastrointestinal symptoms,[621] neurological symptoms,[437] delirium,[364] and dermatological symptoms[159] also occur with COVID-19.[117] While fever is the most common early symptom,[392] many individuals do not exhibit fever at all.[720, 797]
- Headaches are common, may persist for weeks, and may be associated with shorter disease duration.[103] Gastrointestinal symptoms (particularly abdominal pain) may be associated with increased risk of severe disease.[803]
- Loss of taste or smell is highly predictive of COVID-19[495] and appears more common in mild cases,[406] though mild/moderate cases with loss of taste or smell had higher viral loads than those without loss of taste or smell.[344]
- In children, loss of taste or smell, nausea or vomiting, headache, and fever were predictive of COVID-19 infection.[372] Approximately 28% of children experienced loss of taste or smell, lasting 2-15 days (average = 5.7).[385]
- It is likely that infection with the B.1.1.7 variant results in up to 70% higher mortality than non-variant SARS-CoV-2.[322] Individuals infected with the B.1.1.7 variant report lower rates of taste and smell loss, but higher rates of cough, sore throat, fatigue, fever, and myalgia than those infected with non-variant SARS-CoV-2.[672]

The best current estimate is that approximately 33% of individuals will remain asymptomatic after SARS-CoV-2 infection.[545]

- Detailed modeling in New York City, however, suggests that the asymptomatic ratio could be much higher (>80%).[678]

COVID-19 is more severe than seasonal influenza, evidenced by higher ICU admission[785] and mortality rates.[582]

In the US, 34% of hospitalized patients required ICU admission, and 12.6% of hospitalized patients died from COVID-19.[499]

- Higher SARS-CoV-2 RNA loads at initial screening or upon admission are associated with greater risk of death.[88, 270, 474, 750]
- SARS-CoV-2 attacks blood vessels in the lung[96] and is associated with hyperactive platelets,[73] leading to clotting complications and ARDS.[14, 716] Clotting affects multiple organs[602] and is present in 15-27% of cases.[463]
- COVID-19 also causes pneumonia,[552] cardiac injury,[654] secondary infection, kidney damage,[34, 676] pancreatitis,[25] arrhythmia, sepsis, stroke,[489, 573] respiratory complications,[712] and shock.[285, 330, 728, 814]

COVID-19 symptoms commonly persist for weeks[690] to months[102] after initial onset.

- The WHO has released a case reporting form to standardize the collection of long-term COVID-19 symptom data.[773]
- Most (88%) individuals infected with COVID-19 (n=86) showed evidence of lung damage six weeks after clinical recovery.[286] In China, fatigue and muscle weakness persisted for at least 6 months in the majority (63%) of COVID-19 patients, with severe initial disease resulting in worse long-term respiratory outcomes.[329] Chronic COVID-19 requires reduced workloads in ~45% of patients, and results in the inability to work in 22% of patients 6 months after initial symptoms.[167]
- In a long-term study, approximately 30% of patients reported persistent symptoms such as fatigue, loss of taste or smell, and "brain fog" up to 9 months after initial symptom onset.[453] The likelihood of post-COVID syndrome may be higher in those with more symptoms in the first week,[679] though persistent respiratory symptoms appear unrelated to initial severity.[701]
- In the US, between 9%[401] and 20%[186] of hospitalized patients experienced at least 1 hospital readmission within 2 months of COVID-19 recovery, and 29% of hospitalized patients in the UK were re-admitted within 6 months of discharge.[40]

Adults >60 years old[561] and those with comorbidities are at elevated risk of death.[691, 814]

- Cardiovascular disease, obesity,[17, 575] hypertension,[804] diabetes,[486] cancer,[733] down syndrome,[144] and respiratory conditions all increase the CFR.[691, 814] Prior kidney disease may increase disease severity,[538] especially for those undergoing dialysis.[685]
- Estimates of the average age-specific infection fatality rate, or the true percent of individuals who die after acquiring COVID-19, were identified in a large meta-analysis: 0-34 years = 0.004%; 35-44 years = 0.068%; 45-54 years = 0.23%; 55-64 years = 0.75%; 65-74 years = 2.5%; 75-84 years = 8.5%; 85 and older = 28.3%.[418]

Minority populations and essential workers are disproportionately affected by COVID-19.[503]

- Black, Asian, and Minority Ethnic populations, including children,[47] acquire SARS-CoV-2 infection at higher rates than other groups[236, 272, 551, 589] and are hospitalized[254, 591] and die disproportionately.[317, 490] Hispanic and Black COVID-19 patients tend to die at younger ages than white patients.[775] Social vulnerability is associated with greater SARS-CoV-2 transmission risk.[162]
- Pregnant women with COVID-19 have slightly higher mortality rates compared to those without COVID-19 (though overall mortality is low).[346] COVID-19 does not appear to elevate rates of stillbirth.[674]

Children are susceptible to COVID-19,[185] though generally show milder[130, 462] or no symptoms.

- 21% to 28% of children (<19 years old) may be asymptomatic.[462, 558, 593] Most symptomatic children show mild or moderate symptoms.[271, 558] Severe symptoms in children[447] and infants[90, 462] are more likely in those with complex medical histories.[649]
- A rare inflammatory condition in children (MIS-C)[263] is linked to COVID-19 infection,[617, 700] though the prevalence is unknown. Children with any initial symptoms can develop MIS-C,[262] and MIS-C affects black children disproportionately.[409]

What do we need to know?

We need to know the impact of new SARS-CoV-2 variants on presentation and disease severity.

- We need to understand the frequency, mechanism, and clinical implication of chronic ("long-haul") COVID syndrome.[145-146]
- What are the pathogenic pathways of SARS-CoV-2 infection in children,[516] and why are their illnesses typically mild?[259]
- What mechanisms are involved in enhanced severity of SARS-CoV-2 variants?

Protective Immunity – How long does the immune response provide protection from reinfection?

What do we know?

Recovered individuals appear protected against reinfection for at least several months. Reinfection is generally rare, though novel variants may increase reinfection frequency. Antibody and T-cell responses persist in most patients for >6 months.

- In a study of healthcare workers in the UK, those with SARS-CoV-2 antibodies from prior exposure (n=1,167) were protected from reinfection for a median of 127 days (no symptomatic reinfection, 3 subsequent positive PCR tests).[466]
- SARS-CoV-2 antibodies circulate in patients for at least 3-6 months after infection.[226, 287, 618, 620] Mild COVID-19 infections can induce detectable immune responses for at least 3 months.[620] Antibody levels are largely unaffected by patient age.[226]
- Neutralizing antibody responses are present within 8-19 days after symptom onset[455, 684] and can persist for months.[725] Individuals with more severe infections developed higher neutralizing antibody levels that persisted longer than those with asymptomatic or mild infections.[644] The antibody IgM appears to contribute substantially to SARS-CoV-2 neutralizing ability, with IgG also contributing to a lesser extent.[255] Asymptomatic cases generate weaker antibody responses to SARS-CoV-2.[137]
- Multiple components of the human immune response to SARS-CoV-2, including circulating antibodies, memory B cells, and memory T cells, are detectable for at least 6-8 months after infection regardless of initial symptom severity, though the presence or quantity of these components cannot imply protective immunity *per se*.[161]
- Antibody levels declined in 156 healthcare workers who tested positive for SARS-CoV-2, with 28% dropping below detectable levels when tested after 60 days, suggesting caution in single time-point assays to detect prior SARS-CoV-2 infection.[643]
- SARS-CoV-2 specific memory B cells are involved in the human immune response, and provide evidence of B cell-mediated immunity after mild-moderate COVID-19 infection.[540] T-cell responses may persist for at least 6 months, though they appear stronger in individuals with more severe COVID-19 cases.[824] While memory B and T cells both persist for at least 6 months, there is some variability in the persistence of specific antibodies (e.g., IgG vs. IgA).[248, 651]
- Strong, early inflammatory immune responses are associated with more severe clinical presentation.[175]
- Asymptomatic patients appear to mount robust T-cell responses, express higher levels of interferon-gamma and interleukin-2, and have more coordinated production of pro-inflammatory and regulatory cytokines than symptomatic patients.[405]
- In a 35-year study of 10 men, reinfection with seasonal coronaviruses occurred 1-3 years after initial infection.[196] Previous studies on coronavirus immunity suggest that neutralizing antibodies may wane after several years.[97, 782]
- There is evidence that SARS-CoV-2 antibodies are passed from mother to child, though the protective effect is unknown.[237]

The impact of emerging SARS-CoV-2 variants on protective immunity and reinfection risk is unclear.

- Unpublished work suggests that the South African variant (called 501Y.V2 or B.1.351) is able to escape neutralization from some SARS-CoV-2 antibodies, and that prior SARS-CoV-2 infection may not protect against 501Y.V2 reinfection.[764]
- SARS-CoV-2 containing mutations common to several variants shows reduced responses to serum from vaccinated patients,[740] though unpublished data from Moderna suggest a robust immune response to the B.1.1.7 variant, and a lower response to the 501Y.V2 (B.1.351) variant.[781]
- Mutations in the B.1.1.7 variant Spike protein N-terminal domain (NTD) increased resistance to neutralization in laboratory assay, suggesting that attention should be paid to epitopes outside the Spike receptor binding domain (RBD).[273]

Reinfection with SARS-CoV-2 is possible but appears rare, though the true frequency is unknown.

- Infection with COVID-19 appears to provide at least an 83% reduction in the risk of reinfection for at least 5 months (compared to the risk of new infection in previously uninfected patients),[296, 475] and reinfection was plausibly identified in 44 out of 6,600 COVID-19 patients.[408] This study, which followed >20,000 healthcare workers in the UK, was conducted prior to the emergence of the B.1.1.7 variant, and the impact of this and other variants on reinfection risk are unknown.[296]
- A prospective cohort study identified possible reinfections in 10% of Marine recruits who had evidence of prior infection.[415]
- Researchers in Hong Kong[378] and the US[697] have identified COVID-19 reinfections. Reinfections have been either less[378] or more severe[697] than the initial infection. The infectiousness of re-infected individuals is unknown.
- There is some evidence that individuals can be infected with multiple SARS-CoV-2 strains simultaneously.[160] The frequency and severity of multiple infections, especially considering novel circulating variants, is unknown.

The contribution of historical coronavirus exposure to SARS-CoV-2 immunity is unknown.[519]

- Children do not appear to be protected from SARS-CoV-2 infection by historical exposure to seasonal coronaviruses.[645] Serum from patients exposed to seasonal coronaviruses did not neutralize SARS-CoV-2,[588] despite some cross-reactivity.[703]
- Spike protein responses were found in $CD4^+$ T cells of ~30-40% of unexposed patients,[279] suggesting some cross-reactivity between other circulating human coronaviruses and SARS-CoV-2[81, 279] that might affect symptom severity.[484]

What do we need to know?

We need to know the frequency and severity of reinfection, as well as the protective effects of immune components.

- How do different components of the immune response contribute to long-term protection?
- How does initial disease severity affect the type, magnitude, and timing of any protective immune response?
- How long does protective immunity last for children compared to adults?
- What is the probability of reinfection, particularly with SARS-CoV-2 variants?
- How does prior infection with SARS-CoV-2 affect immune responses resulting from vaccination?[635]

Clinical Diagnosis – Are there tools to diagnose infected individuals? When during infection are they effective?

What do we know?

Diagnosis of COVID-19 is based on symptoms consistent with COVID-19, PCR-based testing of active cases, and/or the presence of SARS-CoV-2 antibodies in individuals. Screening solely by temperature or other symptoms is unreliable.

- As of 2/19/2021 the FDA has granted emergency use authorization to 331 test and sample collection devices, including 247 molecular tests and sample collection devices, 70 antibody, and 14 antigen tests. There are 37 authorized molecular tests for home-collected samples with one prescription at-home molecular test, one prescription at-home antigen test, and one OTC at-home antigen test.[241] The US FDA also issued an EUA for an at-home test kit capable of testing for both COVID-19 and influenza,[221] and has granted an EUA for the Ellume COVID-19 at-home antigen test, available without a prescription to symptomatic and asymptomatic individuals at least two years of age.[200, 239] The US FDA is creating guidance for diagnostic, therapeutic, and vaccine developers to evaluate the impact of SARS-CoV-2 variants on their products.[240]
- The US CDC recommends that anyone who has been in contact with a positive COVID-19 case should be tested.[122]
- The timing of diagnostic PCR tests impacts results. The false-negative rate for RT-PCR tests is lowest between 7 and 9 days after exposure, and PCR tests are more likely to give false-negative results before symptoms begin (within 4 days of exposure) and more than 14 days after exposure.[384] Low viral loads can lead to false-negative RT-PCR tests.[441]
- The duration of PCR-detectable viral samples is longer in the lower respiratory tract than the upper respiratory tract; nasopharyngeal sampling is most effective (89%) between 0 and 4 days after symptom onset but falls significantly (to 54%) by 10 to 14 days.[480] After 10 days, alternative testing methods (e.g., lower respiratory samples) may be necessary.[480]
- The UK variant B.1.1.7 affects the S-gene portion of some PCR diagnostic assays, though most assays use multiple SARS-CoV-2 targets and diagnostic accuracy is not expected to be affected.[774] The US FDA is tracking the potential efficacy of diagnostics on new COVID-19 variants.[242]
- It is recommended that nasopharyngeal swabs, mid-turbinate swabs, anterior nasal swabs, saliva, or combined anterior and oropharyngeal swabs be used instead of oropharyngeal swabs alone to increase sensitivity.[299]
- In children, viral loads from saliva correlated better with clinical outcomes than viral loads from nasopharyngeal swabs.[141]
- Rapid tests based on RT-PCR or standard laboratory nucleic acid amplification tests (NAATs) are preferred over rapid isothermal NAATs in symptomatic individuals to reduce the chance of false-positives.[299]
- Symptom-based screening at airports was ineffective at detecting cases (9 identified out of 766,044 passengers screened),[183] and intensive screening on a US military base during mandatory quarantine did not identify any COVID-19 cases.[416]
- Exhaled breath condensate may be an effective supplement to nasopharyngeal swab-based PCR.[629, 648]
- Foam swabs lead to more accurate diagnostic tests than polyester swabs for collecting patient samples, though polyester swabs are good enough to be used in case of a shortage in foam swabs.[303]
- Low-sensitivity tests (like lateral flow assays) may be beneficial despite lower accuracy, because they reduce the time necessary to identify and subsequently contain potential outbreaks.[491]
- Immunological indicators[42, 204, 245, 253, 307, 332, 518, 581, 668, 683, 729, 802] blood glucose levels,[734] oxygen levels[373] and bilirubin levels[450] may help identify future severe cases,[139] and decision-support tools for diagnosing severe infections exist.[485, 661, 778]
- High-throughput diagnostic are comparable in sensitivity and specificity to PCR, and may increase sampling speed.[574] A high-throughput diagnostic assay for screening asymptomatic individuals has received US Emergency Use Authorization.[76, 243]
- Infrared temperature readings may be misleading when used at the entrance of buildings with low outdoor temperatures.[194]
- Self- or caregiver-taken diagnostic swabs could be as accurate as those taken by healthcare workers in some instances.[302]
- Wearable technology may be able to detect COVID-19 days before symptoms begin,[311, 664] and several attempts to create mobile applications for disease notification are underway.[292, 705]
- Aerosol detection devices are capable of identifying SARS-CoV-2 in the air (minimum of approximately 6,000 particles).[665]

Validated serological (antibody) assays are being used to help determine who has been exposed to SARS-CoV-2.

- Repeated serological testing is necessary to identify asymptomatic[586] and other undetected patients.[636]
- Research has shown high variability in the ability of tests by different manufacturers to accurately detect positive and negative cases.[395, 751] Meta-analysis suggests that lateral flow assays (LFIA) are less accurate than ELISA or chemiluminescent methods (CLIA), but that the target of serological studies (e.g., IgG or IgM) does not affect accuracy.[439] Lateral flow assay results differ more from ELISA when administered early in disease course (e.g., 3-7 days after symptom onset).[306] The FDA has excluded several dozen serological diagnostic assays based on failure to conform to updated regulatory requirements.[217]
- In a study with pregnant women, rapid antibody (lateral flow assay) testing resulted in a 50% positive predictive value and 50% false positive rate, which are lower than the values touted for non-pregnant populations.[209]

What do we need to know?

We need to identify additional factors that affect the accuracy of serological or PCR-based diagnostic tests.

- What is the relationship between disease severity and the timing of positive serological assays?
- Are certain subpopulations (e.g., those with blood cancers)[525] more likely to show false-negative tests?
- How likely are children of different ages to test positive via RT-PCR?
- Given different immunological responses for men compared to women,[686] as well as for adults compared to children,[748] are distinct diagnostic tests or medical treatments required for the different groups?

Medical Treatments – Are there effective treatments?

What do we know?

COVID-19 treatment recommendations are provided by the WHO,[760] NIH,[524] Infectious Disease Society of America (IDSA),[62] and British Medical Journal (BMJ),[70] based on ongoing analysis of evidence from clinical trials.

Treatment recommendations

- For hospitalized, critically ill patients on mechanical ventilation or ECMO (with organ failure and ARDS), dexamethasone is strongly recommended; if no dexamethasone, the use of alternative corticosteroids (hydrocortisone, methylprednisolone, prednisone) is recommended.[131, 323, 554, 560, 673, 698, 777] Methylprednisolone may increase the duration of viral shedding.[688]
- For hospitalized patients with severe (reduced oxygen, SpO2 ≤94%) but not critical disease, there is a conditional recommendation for dexamethasone treatment.[323]
- For hospitalized patients, it is recommended that treatment with convalescent plasma only proceed in the course of a clinical trial, as treatment benefits are not uniformly reported (knowledge gap).[23, 335, 354, 356, 482, 565, 603, 659] Convalescent plasma is more beneficial when given early in treatment, with high SARS-CoV-2 antibody titers.[355]
- For any subset of patients, there is a strong recommendation against the use of hydroxychloroquine or hydroxychloroquine plus azithromycin[4, 13, 77, 104, 227, 258, 363, 493, 543, 598, 642] and lopinavir/ritonavir[100, 251, 278, 432] due to lack of observed benefit.
- There is a conditional recommendation against the use of famotidine for the sole purpose of COVID-19 treatment.[62]
- For hospitalized patients with non-severe illness, SpO2 ≥94%, and no supplemental oxygen, there is a conditional recommendation against the use of glucocorticoids.[323]
- For hospitalized patients, conditional recommendation against the routine use of tocilizumab as current clinical results are mixed in benefit,[309-310, 421, 478, 500, 514, 634, 675] and tocilizumab may increase mortality if given late in disease course.[717] Results from the RECOVERY trial, however, show benefits to early administration of tocilizumab.[325]
- The BMJ publishes a tool that shows treatment options based on patient comorbidities and disease severity.[69]

Recommendations for the use of Remdesivir vary.

- The US FDA has approved the use of Remdesivir in hospitalized patients 12 years and older,[223] with an Emergency Use Authorization for other patient groups.[214, 522]
- In the US, there is a conditional recommendation for Remdesivir treatment in hospitalized, severe patients.[61, 553, 739]
- In the US, for hospitalized patients on supplemental oxygen but not mechanical ventilation, there is a conditional recommendation of 5 day course of Remdesivir vs. 10 day course.[62]
- In the US, in hospitalized patients not on supplemental oxygen, there is a conditional recommendation against the routine use of Remdesivir,[62] though it may be considered for patients at high risk of severe disease.[524]
- The WHO and BMJ, however, recommend against Remdesivir use in patients of any severity.[70, 760]
- For mild and mobile patients, there is a conditional recommendation against the routine use of antibody treatments bamlanivimab or casirivimab plus imdevimab, unless the patients are at increased risk for severe disease.[62, 524]
- For hospitalized patients with severe disease who are not on mechanical ventilation and cannot receive corticosteroids, there is a conditional recommendation for the use of baricitinib plus Remdesivir.[62, 359]
- For hospitalized patients, treatment with Remdesivir, baricitinib, or corticosteroids is recommended only in clinical trials.[62]

Clinical trial updates

- Clinical trials of convalescent plasma treatment in mild, older adult patients reduced progression to severe disease[434] but continues to show no benefits in severely ill COVID-19 patients.[362] Further clinical trials for mild COVID-19 are needed.
- Regeneron's REGN-COV2 treatment has received Emergency Use Authorization to treat mild/moderate COVID-19 patients,[606] but not hospitalized patients with high oxygen requirements.[605] The IDSA conditionally recommends against routine use of casirivimab/imdevimab (REGN-COV2) in ambulatory patients.[63]
- Eli Lilly's bamlanivimab has received Emergency Use Authorization from the US FDA for use in recently diagnosed, mild to moderate COVID-19 patients,[436] but not for hospitalized patients.[467] Due to lack of clear benefit from clinical trials, IDSA guidelines strongly recommend against the use of bamlanivimab in those hospitalized with severe COVID-19, and conditionally recommend against its routine use in ambulatory patients.[63]
- Preliminary clinical trial results suggest that high doses of anticoagulants may reduce rates of mechanical ventilation in those with mild-moderate COVID-19.[523] The WHO conditionally recommends anticoagulants at a standard dosing level.[755]

Common treatment medications for existing disease pre-COVID-19 diagnosis

- Prior use of statins,[483, 632] RAAS inhibitors,[737] anticoagulants,[176] and ACE inhibitors[457] do not appear to elevate COVID-19 risk.
- Insulin use may increase mortality risk compared to other type 2 diabetes treatments[798] such as metformin.[80, 348, 387, 465]

What do we need to know?

We need clear, randomized trials for treatment efficacy in patients with both severe and mild/moderate illness.

- Does time to viral clearance correlate with symptom severity or time to symptom resolution?
- What treatment, or combination of treatments, is most effective for different disease severities and patient demographics?
- What is the efficacy of transmission-blocking peptides[393] and nasal sprays in humans?[172]

Vaccines – Are there effective vaccines?

What do we know?

Two vaccines are currently being administered under US FDA Emergency Use Authorization, which show protective efficacy.

- As of 2/22/2021, approximately 44,138,118 people have received the first dose of an approved coronavirus vaccine, while 19,438,495 have received both doses.[109] The US CDC and WHO advise that pregnant women may be vaccinated.[481] The US CDC advises that second doses of Pfizer/BioNTech and Moderna vaccines can be given up to six weeks after initial doses.[110]
- A retrospective analysis of 62,000 individuals in several US states found that both Pfizer/BioNTech and Moderna vaccines had 88% efficacy in terms of reducing symptomatic infections, alongside reductions in hospitalization rates and duration for those who did become infected.[566] In UK healthcare workers, the Pfizer/BioNTech vaccine prevented 70% of symptomatic and asymptomatic infections after the first dose, and 86% of infections after the second dose.[297]
- The US CDC reports favorable safety profiles of Pfizer/BioNTech and Moderna vaccines in the first month of use.[257]

Candidates that have received or applied for approval in the US:

- **Pfizer/BioNTech** – mRNA vaccine named BNT162b2 (also called Tozinameran[757] and Comirnaty[201])
  - This vaccine is given as 2 shots, 21 days apart.[576] It must be stored and shipped at -70°C; once thawed, the vaccine vial can be stored for up to 5 days at refrigerated (2–8°C) conditions.[578] Pfizer has performed additional stability studies showing their vaccine can be stored in normal freezers, -25°C to -15°C (-13°F to 5°F) for at least 2 weeks.[577]
  - The vaccine showed 95% efficacy at 7 days after the second vaccine dose (28 days after first dose), which was consistent across age, sex, race, and ethnicity.[585] Efficacy was 94% for those individuals over 65.[585] Initial evidence from Israel suggests high (94%) efficacy in terms of reducing symptomatic illness after real-world administration.[41]
  - Safety was assessed in children (12-15 years old, with plans to expand to those 5-11[357]), racially and ethnically diverse patients (30-42% of trial pool), and individuals 56-85 years old (41-45% of participants).[578] No serious safety concerns were observed, and adverse events included fatigue, headache,[578] and pain at the injection site and muscle pain.[578]
  - Rates of anaphylactic reactions to the Pfizer/BioNTech vaccine in the US are estimated at 4.7 per million doses.[655]
  - Pfizer and BioNTech received Emergency Use Authorization from the US FDA for individuals 16 and older.[219] The WHO issued an Emergency Use Listing for this vaccine, accelerating approval and distribution in many countries.[762]
- **Moderna** – mRNA vaccine named mRNA-1273[497]
  - The vaccine is given as 2 shots, 28 days apart,[497] can be shipped and stored at standard freezer temperatures (-20°C) for 6 months, and is expected to be stable under refrigeration (2-8°C) for 30 days and at room temperature for 12 hours.[496]
  - The vaccine showed 94.1% efficacy, 14 days after the second dose,[43] consistent across age, race, ethnicity, and sex.[43] Vaccine-induced antibodies persisted for at least 119 days.[765] Trials with children (12-17 years) are beginning.[498]
  - Side effects include fatigue (10%), muscle aches (9%), joint paint (5%), and headaches (5%).[497] Pain and redness at the injection site were also noted, particularly after the second dose.[497] The rate of anaphylactic reactions to Moderna's vaccine appears to be approximately 2.5 per million doses.[1]
  - Moderna was granted an EUA from the US FDA for individuals 18 and older.[218] It has also been approved in Canada[99] and recommended for use in those 18 and older in the European Union.[203]

Phase III Trials (testing for efficacy):

- The adenovirus vaccine candidate AZD1222 (from University of Oxford and AstraZeneca) showed 76% efficacy after a single dose, and 82.4% efficacy in individuals given two full doses, though the two-dose efficacy depended on timing (greater efficacy with longer delay between doses).[724] The vaccine is stable at 2-8°C for up to 6 months.[38] This vaccine has been approved for use in the European Union[202] and by the WHO.[763] This vaccine also shows evidence of reducing transmission, and not just the development of symptomatic infection.[724] Trials in children (6-17 years old) are beginning.[637]
- Johnson and Johnson (with Janssen) reported 72% efficacy of its single-dose vaccine in the US, 66% in Latin America, and 57% in South Africa, with 85% efficacy against severe disease globally.[150]
- Novavax reported 89.3% efficacy of their vaccine candidate in the UK (85.6% against the B.1.1.7 variant, 95.6% against 'typical' SARS-CoV-2).[530] Phase IIb trials suggest reduced efficacy against the B.1.351 variant in South Africa.[530]
- The Sputnik V vaccine from Russia's Gamaleya Institute showed 91.6% efficacy in a Phase III trial of 22,000 adults.[454]
- Sinovac's CoronaVac is approximately 50.38% effective, though Phase III trial data have not yet been published.[744]
- Many vaccine candidates are undergoing Phase III trials, including those from CanSino (Ad5-nCoV),[818] Medicargo (with GlaxoSmithKline, called CoVLP),[283] Anhui Zhifei Longcom (with the China Academy of Medical Sciences),[813] CureVac (CVNCoV),[157] Institute of Medical Biology,[641] Clover Biopharmaceuticals,[147] Zydus Cadila,[338] and Kazakhstan's RIBSP.[611]
- India approved Bharat Biotech's vaccine Covaxin, despite no published Phase III safety or efficacy data.[56]
- China's Beijing Institute of Biological Products, in conjunction with Sinopharm, have reported 79% efficacy of their BBIBP vaccine, which has been approved for use by the Chinese government; no published Phase III data exist yet.[745]

What do we need to know?

We need to understand vaccine uptake and efficacy rates, as well as how well vaccines reduce transmission.

- What is the protective efficacy of a single dose of each vaccine in use in the US, and does it vary by age group?
- Does dosing with two different vaccines for first and second doses affect protective efficacy (e.g., Pfizer then Moderna)?[101]
- How do different vaccines protect against SARS-CoV-2 variants?[784]

Non-pharmaceutical Interventions (NPIs) – Are public health control measures effective at reducing spread?

What do we know?

Broad-scale control measures such as stay-at-home orders and widespread face mask use effectively reduce transmission.

- Social distancing and other policies quickly reduced spread throughout China,[379, 383, 386, 458, 476, 731] Europe,[256, 360] and the US.[377] Delaying control measures increases outbreak duration[189] and mortality.[795] Reductions in transmission appear 6-9 days after the implementation of NPIs, and increased transmission is generally visible 14-20 days after NPIs are lifted.[430]
- Tiered restrictions in the UK resulted in 2-44% reductions in transmission, depending on restriction severity.[166] Widespread lockdowns in the UK also reduced the genetic diversity of circulating SARS-CoV-2 lineages.[188]
- US counties[647] and states[326] with mask mandates have lower case growth rates and higher likelihoods of controlling transmission[595] than neighboring counties lacking mask mandates. Modeling suggests that widespread use of facemasks is effective at reducing transmission[521] even when individual mask efficiency is low.[199]
- In the US, shelter-in-place orders (SIPOs) and restaurant and bar closures were associated with large reductions in exponential growth rate of cases.[154] Telework policies may reduce new cases,[230] though NPI adherence depends on socioeconomic factors like ability to telework.[123] Limiting gatherings to fewer than 10 people, closing schools and universities, and closing non-essential businesses also resulted in large reductions in SARS-CoV-2 transmission.[82]
- Mobility[235, 394] and physical contact rates[345] decline after public health control measures are implemented. Mobility reductions in the US have been associated with significant reductions in COVID-19 case growth.[44, 301] Social distancing and reductions in both non-essential visits to stores and overall movement distance led to lower transmission rates.[506] Reductions in mobility are associated with initial reductions in transmissibility at a country level.[529]
- Reducing capacity at crowded indoor locations such as restaurants, gyms, hotels, cafes, and religious organizations may be an effective way to reduce COVID-19 transmission without more substantial lockdowns.[128] Increasing air flow rates in indoor environments, improving mechanical filtration efficiency, and wearing masks may also reduce indoor transmission rates.[365]
- Adolescents and young adults (15-24) may require different messaging to improve adherence to NPIs and public health policies,[290] and self-reported adherence to NPI policies (e.g., mask use) is consistently low in 18- to 29-year-olds.[333] In the US, limiting transmission in younger populations is crucial for reducing hospitalizations and mortality in older cohorts.[547]
- In the US, remote learning at colleges and universities significantly reduced local COVID-19 burden after classes resumed.[413]
- Modeling suggests that 14-day post-exposure quarantines are effective at reducing transmission by ~59%.[594]
- Increasing air exchange rates (ACH) in a room can reduce aerosol concentrations but cannot eliminate infection risk.[541]

Individual behaviors (e.g., face masks, social distancing) have been associated with reduced risk of COVID-19 infection.[567]

- The US CDC has indicated that face masks inhibit transmission by both reducing the number of exhaled particles from infectious individuals, as well as reducing the number of inhaled particles when worn by uninfected individuals.[113] The US CDC recommends universal masking when indoors to inhibit the spread of COVID-19, alongside physical distancing.[319]
- Always wearing masks, maintaining physical distance >1m, and frequently washing hands were all associated with reduced risk of COVID-19 infection in individuals who had direct contact with infected individuals.[187]
- Individuals who scored higher in a simulated social distancing exercise were less likely to contract COVID-19 than those who performed poorly on the exercise, suggesting that individual behaviors are linked with COVID-19 transmission rates.[213]

Particular focus should be placed on minimizing large gatherings where superspreading events are more likely.[768]

- Eliminating superspreading events[24] can result in slower case growth while easing broadly restrictive interventions.[358]
- Retrospective contact tracing may help identify the source of large clusters of cases, and should be implemented due to the overdispersion or heterogeneity in secondary transmission arising from each primary COVID-19 case.[123]

Research is needed to plan the path to SARS-CoV-2 elimination via pharmaceutical and non-pharmaceutical interventions.

- In South Korea, early implementation of rapid contact tracing, testing, and quarantine was able to reduce the transmission rate of COVID-19.[681] Contact tracing and high levels of testing and physical distancing[382] may limit COVID-19 resurgence.[21, 228]
- Premature relaxation of public health control measures may facilitate rapid increases in prevalence at the state level.[249]
- Modeling suggests that periods of social distancing or lock-down may be effective in reducing exposure from asymptomatic cases.[702] Testing is critical to balancing public health and economic costs.[702] Rolling interventions may be necessary.[793]
- Synchronizing public health interventions across US state lines may reduce the total number of required interventions.[625]
- Travel restrictions may be effective in certain conditions, such as when countries have low incidence themselves.[627]
- Highly transmissible SARS-CoV-2 variants (e.g., B.1.1.7) may require additional restrictions to reduce transmission.[723]

Lifting NPIs before widespread vaccine uptake is predicted to increase COVID-19 cases and deaths.[152, 562]

- Modeling suggests that NPIs will need to be in place for 6-12 months after the initiation of vaccination campaigns.[423, 791]

What do we need to know?

We need to understand the magnitude of measures necessary to limit spread of new SARS-CoV-2 variants.

- How effective are school closures when COVID-19 prevalence in the community is high? Low?
- What NPIs are effective at reducing transmission from common SARS-CoV-2 variants?
- How does NPI effectiveness change over time as a result of changes in adherence or behavior?

Environmental Stability – How long does the agent live in the environment?

What do we know?

SARS-CoV-2 can survive on surfaces from hours to days and is stable in air for at least several hours, depending on the presence of UV light, temperature, and humidity.[59] Environmental contamination is not thought to be the principal mode of SARS-CoV-2 transmission in humans.

- There is still limited evidence to support transmission of SARS-CoV-2 through fomites despite positive identification of the viral RNA near people who are infected. As a result, guidance on cleaning and disinfecting surfaces continues to evolve.[419]

Viable SARS-CoV-2 and/or RNA can be recovered from contaminated surfaces; however, survivability varies.

- Both temperature and humidity contribute to SARS-CoV-2 survival on nonporous surfaces, with cooler, less humid environments facilitating survival (stainless steel, ABS plastic, and nitrile rubber; indoors only; simulated saliva matrix).[67] Persistence is reduced with warmer temperatures (37°C), and enhanced at colder temperatures (4°C).[300]
- SARS-CoV-2 was shown to be stable up to 7 days (25-27°C; 35% RH) on smooth surfaces, to include plastic, stainless steel, glass, ceramics, wood, latex gloves, and surgical masks.[448] At 22°C, SARS-CoV-2 was shown to be detectable (via plaque assay) on paper currency for up to 24 hours, on clothing for up to 4 hours, and on skin for up to 96 hours.[300]
- SARS-CoV-2 was found to be stable across pH 3-10 on several surfaces at 22°C.[135] After 3 hours (22°C, 65% RH), no infectious virus was detected on printing and tissue papers; on day 2, none was found on treated wood and cloth; on day 4, none was found on glass or banknote; on day 7, none was found on stainless steel or plastic.[135]
- At standard room temperature and humidity, SARS-CoV-2 becomes undetectable on common library items after 2 to 8 days of quarantine depending on the material (e.g., book cover vs leather) and conditions (e.g., stacked vs unstacked).[8, 339, 646]
- SARS-CoV-2 can persist on plastic and metal surfaces for up to 3 days (21-23°C, 40% RH)[714] and infectious virus can be recovered from a surgical mask after 7 days (22°C, 65% RH)[135] and other PPE for at least 72 hours at 22°C.[293]
- SARS-CoV-2 RNA was detected in symptomatic and asymptomatic cruise ship passenger rooms up to 17 days.[505]
- SARS-CoV-2 RNA is likely to persist long enough in untreated wastewater to permit reliable detection for COVID-19 surveillance,[19] and can warn of SARS-CoV-2 cases ahead of positive PCR tests and hospital admissions.[568]

In the absence of sunlight, SARS-CoV-2 can persist on surfaces for weeks.

- In the absence of sunlight, infectious SARS-CoV-2 can remain on non-porous (e.g., glass, vinyl) surfaces for at least 28 days at 20°C and 50% RH; higher temperatures greatly reduce the environmental stability of SARS-CoV-2.[615] This value is longer than other stability estimates,[136, 615, 714] potentially due to a fluid matrix with more protein to simulate human respiratory fluid and a higher inoculation dose.[615] In simulated saliva on stainless steel surfaces, SARS-CoV-2 shows negligible decay over 60 minutes in darkness, but loses 90% of infectivity every 6.8-12.8 minutes, depending on simulated UVB radiation.[604]
- The Department of Homeland Security (DHS) developed a data-based model for SARS-CoV-2 decay on inert surfaces (stainless steel, ABS plastic and nitrile rubber) at varying temperature and relative humidity, also considering UV light.[181]

SARS-CoV-2 survival in the air is highly dependent on the presence of UV light and temperature.

- DHS has developed a tool for estimating the decay of airborne SARS-CoV-2 in different environmental conditions.[180] Due to the effects of evaporation, modeling suggests that hot, dry conditions increase the aerosol risk of SARS-CoV-2, though cold, humid conditions facilitate transmission by droplet spread.[810]
- Experimental studies using SARS-CoV-2 aerosols (1.78-1.96 µm mass median aerodynamic diameter in artificial saliva matrix) found that simulated sunlight rapidly inactivates the virus, with 90% reductions in infectious concentration after 6 minutes in high-intensity sunlight (similar to mid-June) and 19 minutes in low-intensity sunlight (similar to early March or October).[640] In dark conditions, the half-life of aerosolized SARS-CoV-2 is approximately 86 minutes in simulated saliva matrix.[640] Humidity alone had no significant impact on aerosolized virus survival.[640]
- SARS-CoV-2 was shown to have an aerosol half-life of 2.7 hours (without sunlight, particles <5 µm, tested at 21-23°C and 65% RH),[714] retaining infectivity for up to 16 hours in appropriate conditions (23°C, 53% RH, no sunlight).[224]
- It does not appear that pollen or air particulates are carriers of SARS-CoV-2,[193] despite some country-level associations.[51]

Stability of SARS-CoV-2 RNA in clinical samples depends on temperature and transport medium.

- RNA in clinical samples collected in viral transport medium is stable at 18-25°C or 2-8°C for up to 21 days without impacting real-time RT-PCR results.[663] Separately, storage of RNA in phosphate buffered saline (PBS) at room temperature (18-25°C) resulted in unstable sample concentrations.[571]

There is currently no evidence that SARS-CoV-2 is transmitted to people through food or food packaging.[341, 754]

- SARS-CoV-2 can persist for at least two weeks at refrigerated temperatures (4°C).[136, 601] SARS-CoV-2 maintains infectivity for at least 21 days when inoculated on frozen foods and stored below -20°C.[233] Infectious SARS-CoV-2 has been found on frozen food packaging, but has not been linked to actual infections.[609] Several outbreaks have a hypothesized food origin.[298]

What do we need to know?

We need to quantify the duration of viable SARS-CoV-2 on surfaces, not simply the presence of RNA.

- It is unclear how viability of SARS-CoV-2 is affected across the food supply chain.[796]
- Can SARS-CoV-2-contaminated wastewater cause infections?[440, 596]

Decontamination – What are effective methods to kill the agent in the environment?

What do we know?

Soap and water, as well as common alcohol and chlorine-based cleaners, hand sanitizers, and disinfectants are effective at inactivating SARS-CoV-2 on hands and surfaces.

- A systematic review identified sunlight, UV light, ethanol, hydrogen peroxide, and hypochlorite as methods to reduce surface contamination.[59] However, the levels of decontamination necessary to affect transmission *per se* are still unknown.[59]
- Alcohol-based hand rubs are effective at inactivating SARS-CoV-2.[380]
- Chlorine bleach (1%, 2%), 70% ethanol and 0.05% chlorhexidine are effective against live virus in lab tests.[134]
- EPA has released a list of SARS-CoV-2 disinfectants that have been found effective against SARS-CoV-2 specifically.[207]
- Twice-daily cleaning with sodium dichloroisocyanurate decontaminated surfaces in COVID-19 patient hospital rooms.[544] Regular disinfection of hospital rooms (with benzalkonium wipes) can reduce the presence of SARS-CoV-2 on surfaces, though contamination is widespread without regular cleaning.[370] Chlorhexidine digluconate may be ineffective.[37]
- Oral antiseptic rinses used in pre-procedural rinses for dentistry containing povidone-iodine (PVP-I) are effective decontaminants of SARS-CoV-2, completely inactivating SARS-CoV-2 at concentrations above 0.5% in lab tests (for 15-30 s).[65]
- Efforts are ongoing to create paint-on surfaces[60] or other surface coatings[208] that can rapidly inactivate SARS-CoV-2.
- Iodine-based antiseptics can decontaminate nasal passages,[289] though any influence on transmission is unknown.[244]
- A mouth-spray previously investigated for the cold-causing coronavirus 229E (ColdZyme®) effectively inactivated SARS-CoV-2 *in vitro*; additional tests are necessary to determine any clinical benefit.[288]
- Indoor air filters based on non-thermal plasma or reactive oxygen species may be effective at reducing circulating SARS-CoV-2 concentrations, estimated by reductions in surrogate virus, though additional testing on live SARS-CoV-2 virus is needed.[633]
- Indoor air filtration devices based on hydroxyl radical cascades, which do not emit ozone, are being trialed at 4 UK hospitals due to their efficacy in reducing concentrations of a surrogate virus (M2 phage).[20, 706]
- In tests with a surrogate virus (Phi6 phage), a modified version of the Joint Biological Agent Decontamination System (JBADS) was effective at decontaminating military aircrafts in approximately three hours using high heat and humidity;[670] Phi6, however, may be less stable than SARS-CoV-2 on surfaces, and therefore may not be the best surrogate.[753]
- Aquila Bioscience has developed a spray decontamination technique to pair with its existing alcohol- and chemical-free wipe; these products may be used to capture SARS-CoV-2 on skin, surfaces, and washable masks via high-affinity binding.[79]
- Peracetic acid dry fogging inactivated SARS-CoV-2 on stainless steel coupons, simulating whole-room fumigation.[158]
- Initial research suggests that SARS-CoV-2 can be inactivated within 1 minute on pure copper and copper-coated surfaces.[89]
- Due to the lack of documented transmission via fomites, widespread decontamination of surfaces (e.g., streets, sidewalks) may not be necessary.[517]
- The Air Force Research Laboratory is studying the effects of microwave exposure on aerosolized pathogens.[315]

Several methods exist for decontaminating N95 respirators[536] and other PPE.

- Researchers have identified three methods capable of decontaminating N95 respirators while maintaining physical integrity (fit factor): UV radiation, heating to 70°C, and vaporized hydrogen peroxide (VHP).[232] Ethanol (70%) was associated with loss of physical integrity.[232] Dry heat and UV decontamination can also be used under certain conditions.[231]
- Additional methods showing efficacy against SARS-CoV-2 on respirators include pulsed xenon ultraviolet light,[658] wet heat (using a multicooker),[182] and methylene blue plus light.[414]
- Hydrogen peroxide vapor (VHP) can repeatedly decontaminate N95 respirators.[613] Devices capable of decontaminating 80,000 masks per day have been granted Emergency Use Authorization from the FDA.[215]
- The FDA has issued an Emergency Use Authorization for a system capable of decontaminating ten N95 masks at a time using devices already present in many US hospitals,[83] though fit failure after reuse remains a concern.[435]
- Respirator decontamination methods such as VHP appear to maintain filtration efficiency after repeated decontamination cycles.[570] Several decontamination methods, including VHP, moist heat, and UVC, are capable of decontaminating N95 respirators for 10-20 cycles without loss of fit or filtration efficiency.[10] Stacking respirators may increase decontamination rates without compromising efficiency.[628] Peracetic acid may be effective in combination with VHP.[350]
- The US FDA has issued guidance for bioburden reduction systems using dry heat to decontaminate certain respirators.[707]
- A Canadian technology ("D-Pod") using heat and UVC for PPE is being manufactured for North American distribution.[261]
- A thermal inactivation model for SARS-CoV-2 provides estimates of infectivity reduction based on time and temperature.[794]
- Forced air ozone reactors may be able to decontaminate surgical gowns, though SARS-CoV-2 tests are needed.[143, 446]

What do we need to know?

We need additional SARS-CoV-2 decontamination studies, particularly with regard to indoor aerosol transmission.

- Does contamination with human fluids/waste alter disinfectant efficacy profiles?
- We need to know how to decontaminate whole rooms and large spaces efficiently and effectively.
- What level of decontamination is necessary (e.g., log-reduction) to eliminate transmission risk from contaminated surfaces?
- We need to understand how different testing methods and standards affect decontamination efficacy estimates.

PPE – What PPE is effective, and who should be using it?

What do we know?

Face masks appear effective at reducing infections from SARS-CoV-2. Healthcare workers are at high risk of acquiring COVID-19, even with recommended PPE.

- Contacts with healthcare workers tend to transmit COVID-19 more often than other casual contacts.[736] Hospital-acquired infection rates fell after introduction of comprehensive infection control measures, including expanded testing and use of PPE for all patient contacts.[614] Universal masking policies also reduced the rate of new healthcare worker infections.[735, 819]
- A modeling study suggests that healthcare workers are primarily at risk from droplet and inhalation exposure (compared to contact with fomites), with greater risk while in closer proximity to patients.[353]
- "Healthcare personnel entering the room [of SARS-CoV-2 patients] should use standard precautions, contact precautions, airborne precautions, and use eye protection (e.g., goggles or a face shield)."[111] The WHO considers face shields as inferior to masks and respirators for control of droplet transmission.[759] WHO indicates healthcare workers should wear clean long-sleeve gowns as well as gloves.[756] PPE that covers all skin may reduce exposure to pathogens.[225, 749]
- Respirators (NIOSH-certified N95, EUFFP2 or equivalent) are recommended for those working with potential aerosols.[758] Additional protection (Powered Air Purifying Respirator (PAPR) with hood), should be considered for high-risk procedures.[87]
- KN95 respirators are, under certain conditions, approved for use under FDA Emergency Use Authorization.[216] On May 7, the FDA rescinded a number of KN95 models that no longer meet the EUA criteria and are no longer authorized.[222]
- A study suggests that P100 respirators with removable filter cartridges have similar filtration efficiency compared to N95 respirators and could plausibly be used if N95 respirators were in short supply.[563]
- Particular care should be taken with "duckbill" N95 respirators, which may fail fit tests after repeated doffing.[174] Dome-shaped N95 respirators also failed fit tests after extended use.[174]
- The US FDA cautions healthcare facilities using passive protective barrier enclosures without negative pressure, and has withdrawn a prior Emergency Use Authorization for the devices.[220]
- Experiments with mannequins show that face masks reduce potential spread of SARS-CoV-2 when worn by an infectious individual, but also that face masks worn by non-infected recipients can reduce the number of inhaled particles; the protective effect was maximized when both infected and uninfected individuals (mannequins) wore masks.[709]
- Researchers have developed a lipopeptide fusion inhibitor that prevents SARS-CoV-2 transmission in ferrets given the peptide prophylactically via the intranasal route; human studies have yet to be conducted.[171]

Non-medical masks may be effective at slowing transmission, though data specific to SARS-CoV-2 are sparse.[7, 9]

- Effective February 1, 2021, the CDC requires all passengers on public transit to wear facemasks.[84] The CDC recommends masks without exhalation vents or valves,[106] as masks with valves can allow particles to pass through unfiltered.[718]
- In a study with mannequins, fitting a cloth mask over a medical procedure mask to increase fit blocked over 80% of simulated aerosol particles when the "spreader" was unmasked, and over 95% of particles when both spreaders and recipients wore masks.[85]
- Infected individuals wearing facemasks in the home before the onset of symptoms was associated with a reduction in household transmission.[738]
- A meta-analysis of SARS-CoV-1, MERS, and COVID-19 transmission events found evidence that wearing face masks and eye protection were each associated with lower risk of transmission,[140] with N95 respirators more effective than surgical masks.[140] In a separate meta-analysis, N95 respirators were found to be beneficial for reducing the occurrence of respiratory illness in health care professionals including influenza, though surgical masks were similarly effective for influenza.[539] N95 respirators were associated with up to 80% reductions in SARS-CoV-1 infections.[539]
- Surgical face masks, respirators, and homemade face masks may prevent transmission of coronaviruses from infectious individuals to other individuals.[164, 417, 713] Surgical masks were associated with a significant reduction in the amount of seasonal coronavirus expressed as aerosol particles (<5 µm).[417] Homemade masks reduce overall flow from breathing and coughing (63-86% reduction) but also generate leakage jets facing downward and backward from the wearer's face.[721]
- Some non-standard materials (e.g., cotton, cotton hybrids) may be able to filter out >90% of simulant particles >0.3µm,[374] while other materials (e.g., T-shirt, vacuum cleaner bag, towels) appear to have lower filtration efficacy (~35-62%).[730] Of 42 homemade materials tested, the three with the greatest filtration efficiencies were layered cotton with raised visible fibers.[801] Neck fleeces commonly worn by runners may increase the frequency of small aerosol particles, compared to wearing no mask at all.[229] Cotton T-shirt masks appear ineffective at reducing emitted particles when individuals talk, breathe, sneeze, or cough, with those made of single layers increasing emitted particles during these activities.[36] Smaller aerosol particles (e.g., <0.1µm) are more difficult to filter for most respirators and face masks.[142]
- The US CDC maintains a list of NIOSH-tested facemasks with estimates of minimum and maximum filter efficiency.[112] Mask fit is another critical component of effectiveness,[142] in addition to filter efficiency.

What do we need to know?

We need to continue assessing PPE effectiveness with specific regard to SARS-CoV-2 instead of surrogates.

- When and how do N95 respirators and other face coverings fail?
- How effective are homemade masks at reducing SARS-CoV-2 transmission?
- What is the efficacy of combining multiple facemasks compared with single multilayered masks?[105]

Forensics – Natural vs intentional use? Tests to be used for attribution.

What do we know?

All current evidence supports the natural emergence of SARS-CoV-2 via a bat and possible intermediate mammal species.

- An ongoing investigation coordinated by the WHO has concluded that it is unlikely that the COVID-19 pandemic was the result of a laboratory accident or release.[55]
- Analysis of SARS-CoV-2 and related SARS-like coronaviruses suggests that SARS-CoV-2 jumped directly from bats to humans, without the influence of an intermediate 'mixing' host.[74] Pangolin coronaviruses were shown to be more divergent and split off from bat coronaviruses earlier than SARS-CoV-2.[74] Current sampling of pangolin viruses does not implicate them as an intermediate to human SARS-CoV-2.[74] These data suggest SARS-CoV-2 emerged from circulating bat coronaviruses in SE China/SE Asia and additional zoonotic emergence of novel coronaviruses could occur.
- Based on phylogenetic analysis, SARS-CoV-2 most likely emerged from *Rhinolophus* (horseshoe) bats living in China, Laos, Myanmar, Vietnam, or another Southeast Asian country,[396] though historical recombination with pangolin coronaviruses may explain some features of the SARS-CoV-2 genome.[238]
- Genomic analysis suggests that SARS-CoV-2 is a natural variant and is unlikely to be human-derived or otherwise created by "recombination" with other circulating strains of coronavirus.[30, 817]
- Phylogenetics suggest that SARS-CoV-2 is of bat origin, but is closely related to coronaviruses found in pangolins.[443, 445] The SARS-CoV-2 Spike protein, which mediates entry into host cells and is a major determinant of host range, is very similar to the SARS-CoV-1 Spike protein.[459] The rest of the genome is more closely related to two separate bat coronaviruses[459] and coronaviruses found in pangolins.[445]
- Comparing genomes of multiple coronaviruses using machine-learning has identified key genomic signatures shared among high case fatality rate coronaviruses (SARS-CoV-1, SARS-CoV-2, MERS) and animal counterparts.[291] These data further suggest that SARS-CoV-2 emergence is the result of natural emergence and that there is a potential for future zoonotic transmission of additional pathogenic strains to humans.[291]
- Deletion mutants were identified at low levels in human clinical samples, suggesting that the PRRA furin cleavage site alone is not fully responsible for human infection, but does confer a fitness advantage in the human host.[770] Additional whole-genome sequencing in humans would help to confirm this finding.
- Genomic data support at least two plausible origins of SARS-CoV-2: "(i) natural selection in a non-human animal host prior to zoonotic transfer, and (ii) natural selection in humans following zoonotic transfer."[30] Both scenarios are consistent with the observed genetic changes found in all known SARS-CoV-2 isolates.
- Some SARS-CoV-2 genomic evidence indicates a close relationship with pangolin coronaviruses,[769] and data suggest that pangolins may be a natural host for beta-coronaviruses.[443, 445] Genomic evidence suggests a plausible recombination event between a circulating coronavirus in pangolins and bats could be the source of SARS-CoV-2.[427, 783] Emerging studies are showing that bats are not the only reservoir of SARS-like coronaviruses.[806] Additional research is needed.
- There are multiple studies showing that the SARS-CoV-2 S protein receptor binding domain, the portion of the protein responsible for binding the human receptor ACE2, was acquired through recombination between coronaviruses from pangolins and bats.[30, 427, 444, 806] These studies suggest that pangolins may have played an intermediate role in the adaptation of SARS-CoV-2 to be able to bind to the human ACE2 receptor. Additional research is needed.
- A key difference between SARS-CoV-2 and other beta-coronaviruses is the presence of a polybasic furin cleavage site in the Spike protein (insertion of a PRRA amino acid sequence between S1 and S2).[155]
- A novel bat coronavirus (RmYN02) has been identified in China with an insertion between the S1/S2 cleavage site of the Spike protein. While distinct from the furin cleavage site insertion in SARS-CoV-2, this evidence shows that such insertions can occur naturally.[815]
- Additionally, "[…] SARS-CoV-2 is not derived from any previously used virus backbone," reducing the likelihood of laboratory origination,[30] and "[…] genomic evidence does not support the idea that SARS-CoV-2 is a laboratory construct, [though] it is currently impossible to prove or disprove the other theories of its origin."[30]
- Work with other coronaviruses has indicated that heparan sulfate dependence can be an indicator of prior cell passage, due to a mutation in the previous furin enzyme recognition motif.[170]
- A report claiming a laboratory origin of SARS-CoV-2[789] has been heavily disputed by scientists at Johns Hopkins University.[6]

What do we need to know?

We need to know whether there was an intermediate host species between bats and humans.

- What tests for attribution exist for coronavirus emergence?
- What is the identity of the intermediate species?
- Are there closely related circulating coronaviruses in bats or other animals with the novel PRRA cleavage site found in SARS-CoV-2?

Genomics – How does the disease agent compare to previous strains?

What do we know?

Current evidence suggests that SARS-CoV-2 accumulates mutations at a similar rate as other coronaviruses.

- Preliminary genomic analyses that the first human cases of SARS-CoV-2 emerged between 10/19/2019 – 12/17/2019.[32, 58, 599]
- The estimated mutation rate for SARS-CoV-2 is $6x10^{-4}$ nucleotides per genome per year.[715]

Several viral variants are being investigated for their effects on disease spread, severity, and immune response.[400]

- Enhanced surveillance of viral genomes is needed to better understand circulation of SARS-CoV-2 variants, and such surveillance would aid in the detection of mutations and variants identified as being of enhanced concern.[451, 671]
- Q677H/P mutations have arisen in multiple US lineages, though their effects on transmissibility or severity are unknown.[313]
- **B.1.1.7 (20I/501Y.V1) (VOC202012/01)** - First identified in the UK[600] after increasing prevalence in some areas,[195] this variant has been associated with higher transmission rates[324] and elevated mortality[321] in modeling studies.
- The variant consists of several mutations linked to the viral Spike protein (HV 69-70 deletion, N501Y, N493K).[600]
- There are currently no concerns relating to the efficacy of the Pfizer/BioNTech[508, 784] or Moderna vaccines.[780] The N493K mutation, which is part of the B.1.1.7 variant, shows resistance to neutralization by some antibodies and polyclonal sera from COVID-19 patients.[694] Serum from patients with non-B.1.1.7 variant SARS-CoV-2 can neutralize B.1.1.7 virus.[579]
- The E484K mutation has appeared independently in several individuals with the B.1.1.7 variant, suggesting the future possibility of enhanced immune escape.[282] Continued viral genomic sequencing is needed to determine whether the E484K mutation will persist in the B.1.1.7 variant.[206, 767]
- **B.1.351 (20H/501Y.V2)** - First identified in South Africa in December 2020[689] with notable mutations N501Y, E484K, and K417N.[533] Preliminary, unpublished work suggests the potential for this variant to resist neutralization from SARS-CoV-2 antibodies.[764] Preliminary studies from Moderna,[781] Johnson and Johnson,[198] and Novavax[531] suggest a lower vaccine response to this variant. South Africa has paused the use of vaccines from AstraZeneca due to the potential failure to protect against mild/moderate infections in those with the B.1.351 variant, though it may still protect against severe disease.[507]
- Pfizer and Moderna have reported lower neutralization of the B.1.351 variant by their vaccines in laboratory studies,[252, 449] though additional epidemiological or clinical studies are necessary to assess real-world effects.
- **P.1 (20J/501Y.V3) -** First identified in Brazil,[212]and contains various mutations including K417N, E484K, and N501Y.[212]
- Resurgence of COVID-19 in Manaus, Brazil, which had a large SARS-CoV-2 outbreak in June-October 2020,[95] suggests that differences in viral genetic sequences are sufficient to lead to reinfection.[631]
- Initial analysis of the E484K mutation present in Brazil and South Africa suggests a reduced capacity for antibody binding and neutralization, but more studies are needed on variants containing this mutation to fully understand outcomes.[275, 452]
- **P.2** - First identified in Brazil, shares E484K mutation and other background with P1 but lacks K417N and N501Y mutations; E484K mutation has been suggested in both published[671] and unpublished work[275, 452] to be resistant to neutralization.
- The detection of the P.2 variant in previously infected individuals suggest that it is capable of causing reinfection.[527, 608]
- **COH.20G/501Y** -First identified in Columbus, Ohio, USA.[704] Contains the N501Y mutation, which has arisen independently in multiple countries and is linked to higher transmission rates,[704] though its joint effects with other mutations are still unclear.
- **B.1.429** (CAL.20C) - L452R[534] mutation located on the Spike protein was first reported in Denmark[352] and has increased in prevalence in California.[156] Scientists have identified a possible recombination event between B.1.429 and B.1.1.7, though phenotypic effects are unknown.[274] More studies are needed to understand its transmissibility and infectivity.[381, 807]
- **B.1.525** – Variant with several mutations of concern, including E484K, Q677H, F888L, and a similar suite of mutations as B.1.1.7 variant SARS-CoV-2.[535]

Several human genomic regions, including those determining blood type,[821] affect COVID-19 prevalence and/or severity.[29]

- Blood type may affect COVID-19,[265] with evidence of slightly increased prevalence[27, 52, 268] and moderately increased severity in those with type A blood[316, 442] (though evidence is mixed).[397] In US hospitals, COVID-19 prevalence was slightly higher in individuals with non-O-type blood; blood type affected both risk of mechanical ventilation (lower in type A, higher in B and AB compared to O) and death (higher in AB, lower in A and B compared to O), and Rh negative status was protective for all three measures.[821] Non-O-type blood has been associated with clotting issues.[179]
- Other human genomic regions associated with severe disease include locus 3p21.31,[265, 549] those with deletions or mutations in their NKG2C receptor,[719] and those with defective androgen signaling (long polyQ allelic repeats).[48]

There is some concern regarding SARS-CoV-2 strains involved in continued human and mink transmission.

- The detection of mink-adapted SARS-CoV-2 in humans resulted in the mass culling of all mink in Denmark;[610] mutations in the Spike protein initially showed a decreased susceptibility to neutralizing antibodies.[340]
- The main SARS-CoV-2 variant associated with mink outbreaks in the Netherlands involves the Y453F mutation, which has also been identified in humans outside of Europe; this and other evidence[94] suggests the strain originated in humans.[153]

What do we need to know?

We need to identify differences in transmissibility or severity caused by different SARS-CoV-2 mutations and variants.

- How do viral mutations affect the long-term efficacy of specific vaccines or therapeutics?
- Which viral variants affect transmission rates or disease severity?
- How do variants affect the likelihood of reinfection or coinfection?

Forecasting – What forecasting models and methods exist?

What do we know?

Several platforms provide digital dashboards summarizing the current status of the pandemic in US states and counties.

- The US CDC maintains a dashboard of state-level COVID-19 vaccination data for first and second doses.[108]
- Hospital IQ has a dashboard that forecasts hospital and ICU admissions for each county in the US.[342]
- COVID Act Now: State and county-level dashboard focused on re-opening strategies, showing trends in four metrics related to COVID-19 risk (change in cases, total testing capacity, fraction of positive tests, and availability of ICU beds). Fundamentally uses an SEIR model fit to observed data.[532]
- ESRI estimates the number of active COVID-19 cases in each US county, but validation is needed.[537]
- The National Association of County and City Health Officials (NACCHO) provides a dashboard with estimates of county-specific test positivity rates as well as mortality incidence for different racial groups.[513]
- The COVID Tracking Project reports the number of active COVID-19 hospitalizations in the US and each US state.[3]
- Maps and dashboards depicting COVID-19 infection rates do not necessarily increase likelihood of adhering to non-pharmaceutical interventions; additional information is needed to influence perceptions of individual risk.[695]

The US CDC provides ensemble forecasts of cases and deaths based on the arithmetic mean of many participating groups.[107]

- Columbia University Model: Spatially explicit SEIR model incorporating contact rate reductions due to social distancing. Estimates total cases and risk of healthcare overrun.[626]
- Institute of Health Metrics and Evaluation (IHME): Mechanistic SEIR model combined with curve-fitting techniques to forecast cases, hospital resource use, and deaths at the state and country level.[336] Also provides global forecasts.[337]
- Los Alamos National Laboratory: Forecasts of state-level cases and deaths based on statistical growth model fit to reported data. Implicitly accounts for effects of social distancing and other control measures.[389]
- Google/Harvard University: Time-series machine learning model that makes assumptions about which non-pharmaceutical interventions will be in place in the future.[269]
- Northeastern University: Spatially explicit, agent-based epidemic model used to forecast fatalities, hospital resource use, and the cumulative attack rate (proportion of the population infected) for unmitigated and mitigated scenarios.[528]
- Notre Dame University: Agent-based model forecasting cases and deaths for Midwest states. Includes effectiveness of control measures like social distancing.[572]
- University of California, Los Angeles: Mechanistic SIR model with statistical optimization to find best-fitting parameter values. Estimates confirmed and active cases, fatalities, and transmission rates at the national and state levels.[708]

Additional forecasting efforts are designed to assess the effects of interventions such as social distancing and vaccination.

- Massachusetts Institute of Technology: Mechanistic SEIR model that forecasts cases, hospitalizations, and deaths. Also includes estimates of intervention measures, allows users to project based on different intervention scenarios.[492]
- CovidSim: SEIR model allow users to simulate effects of future intervention policies at state and national levels (US only).[133]
- Covasim: Agent-based model for testing effects of intervention measures, also available as Python library.[366]
- Shen et al. estimate US COVID-19 cases under different scenarios of vaccine efficacy, studying the continued need for non-pharmaceutical interventions such as face masks and physical distancing.[650]
- In a modeling study, vaccination strategies prioritizing adults >60 years old minimized mortality, while those prioritizing adults 20-49 years old minimized disease incidence.[91]
- The WHO COVID-19 modeling parameter working group has released updated parameter ranges for several key COVID-19 parameters, including the reproduction number (R_0), serial interval, generation time, and fatality rate.[66]
- University of Georgia: Statistical models used to estimate the current number of symptomatic and incubating individuals, beyond what is reported (e.g., "nowcasts"). Available at the state and national level for the US.[121]
- Researchers use a rolling window analysis incorporating uncertainty in the generation time distribution to estimate time-varying transmission rates in US states (the effective reproduction number, R_{eff} or R_t).[12]
- Georgia Tech Applied Bioinformatics Laboratory: Tool providing probability of at least one infected individual attending an event, accounting for event size and county/state COVID-19 prevalence.[127]
- MITRE: Dashboards for COVID-19 forecasts and decision support tools, including regional comparisons and intervention planning. Uses combinations of SEIR models and curve-fitting approaches.[494]

What do we need to know?

We need to know how different vaccine uptake rates will affect the epidemic in the US and neighboring countries.

- We need to know how vaccine efficacy, uptake, and deployment will alter COVID-19 progression.
- How will spillover and movement between countries affect local COVID-19 resurgence after initial vaccine distribution?
- We need real-time, publicly available dashboards to estimate vaccine uptake and adherence rates across the US.
- Does modeling support giving initial vaccine doses to as many people as possible despite reduced efficacy?[584]
- We need to know which forecast methods or ensembles are explicitly considering vaccination uptake in their projections.
- What are likely scenarios for the post-vaccination phase of COVID-19? Endemicity? Seasonal peaks in children?[402]

Table 1. Definitions of commonly used acronyms

Acronym/Term	Definition	Description
ACE2	Angiotensin-converting enzyme 2	Acts as a receptor for SARS-CoV and SARS-CoV-2, allowing entry into human cells
Airborne transmission	Aerosolization of infectious particles	Aerosolized particles can spread for long distances (e.g., between hospital rooms via HVAC systems). Particles generally <5 µm.
ARDS	Acute respiratory distress syndrome	Leakage of fluid into the lungs which inhibits respiration and leads to death
Attack rate	Proportion of "at-risk" individuals who develop infection	Defined in terms of "at-risk" population such as schools or households, defines the proportion of individuals in those populations who become infected after contact with an infectious individual
CCV	Canine coronavirus	Canine coronavirus
CFR	Case Fatality Rate	Number of deaths divided by confirmed patients
CoV	Coronavirus	Virus typified by crown-like structures when viewed under electron microscope
COVID-19	Coronavirus disease 19	Official name for the disease caused by the SARS-CoV-2 virus.
Droplet transmission	Sneezing, coughing	Transmission via droplets requires relatively close contact (e.g., within 6 feet)
ELISA	Enzyme-linked immunosorbent assay	Method for serological testing of antibodies
Fomite	Inanimate vector of disease	Surfaces such as hospital beds, doorknobs, healthcare worker gowns, faucets, etc.
HCW	Healthcare worker	Doctors, nurses, technicians dealing with patients or samples
Incubation period	Time between infection and symptom onset	Time between infection and onset of symptoms typically establishes guidelines for isolating patients before transmission is possible
Infectious period	Length of time an individual can transmit infection to others	Reducing the infectious period is a key method of reducing overall transmission; hospitalization, isolation, and quarantine are all effective methods
Intranasal	Agent deposited into external nares of subject	Simulates inhalation exposure by depositing liquid solution of pathogen/virus into the nose of a test animal, where it is then taken up by the respiratory system.
MERS	Middle East Respiratory Syndrome	Coronavirus with over 2,000 cases in regional outbreak since 2012
MHV	Mouse hepatitis virus	Coronavirus surrogate
Nosocomial	Healthcare- or hospital-associated infections	Characteristic of SARS and MERS outbreaks, lead to refinement of infection control procedures
NPI	Non-pharmaceutical intervention	Public health control measures designed to reduce transmission, such as social distancing, movement restrictions, and face mask requirements.
PCR	Polymerase chain reaction	PCR (or real-time [RT] or quantitative [Q] PCR) is a method of increasing the amount of genetic material in a sample, which is then used for diagnostic testing to confirm the presence of SARS-CoV-2.
PFU	Plaque forming unit	Measurement of the number of infectious virus particles as determined by plaque forming assay. A measurement of sample infectivity.

Acronym/Term	Definition	Description
PPE	Personal protective equipment	Gowns, masks, gloves, and any other measures used to prevent spread between individuals
RBD	Receptor binding domain	Protein domain used by virus to gain entry into host cells by recognizing specific host cell receptors (e.g., ACE2).
R_0	Basic reproduction number	A measure of transmissibility. Specifically, the average number of new infections caused by a typical infectious individual in a wholly susceptible population.
SARS	Severe Acute Respiratory Syndrome	Coronavirus with over 8,000 cases in global 2002-2003 outbreak
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2	Official name for the virus previously known as 2019-nCoV.
SEIR	Susceptible (S), exposed (E), infected (I), and resistant (R)	A type of modeling that incorporates the flow of people between the following states: susceptible (S), exposed (E), infected (I), and resistant (R), and is being used for SARS-CoV-2 forecasting
Serial interval	Length of time between symptom onset of successive cases in a transmission chain	The serial interval can be used to estimate R_0, and is useful for estimating the rate of outbreak spread
SIR	Susceptible (S), infected (I), and resistant (R)	A type of modeling that incorporates the flow of people between the following states: susceptible (S), infected (I), and resistant (R), and is being used for SARS-CoV-2 forecasting
$TCID_{50}$	50% Tissue Culture Infectious Dose	The number of infectious units which will infect 50% of tissue culture monolayers. A measurement of sample infectivity.
Transgenic	Genetically modified	In this case, animal models modified to be more susceptible to MERS and/or SARS by adding proteins or receptors necessary for infection
Vertical transmission	Transmission from mother to fetus	Generally understood as intrauterine transmission via blood or placenta. Not the same as transmission during or after birth.

Literature Cited:

1. Allergic Reactions Including Anaphylaxis After Receipt of the First Dose of Moderna COVID-19 Vaccine — United States, December 21, 2020–January 10, 2021. *Morbidity and Mortality Weekly Report* **2021,** *ePub 22 January 2021*. https://www.cdc.gov/mmwr/volumes/70/wr/mm7004e1.htm
2. Coronavirus diagnosed at mink farms in North Brabant. *NOS* 2020. https://nos.nl/artikel/2331784-coronavirus-vastgesteld-bij-nertsenfokkerijen-in-noord-brabant.html
3. COVID Tracking Project. https://covidtracking.com/data.
4. Effect of Hydroxychloroquine in Hospitalized Patients with Covid-19. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2022926
5. First case of SARS-CoV-2 in mink confirmed in Oregon. Oregon Department of Agriculture: 2020. https://odanews.wpengine.com/first-case-of-sars-cov-2-in-mink-confirmed-in-oregon/
6. *In Response: Yan et al. Preprint Examinations of the Origin of SARS-CoV-2*; Johns Hopkins Bloomberg School of Public Health, Center for Health Security: 2020. https://www.centerforhealthsecurity.org/our-work/pubs_archive/pubs-pdfs/2020/200921-in-response-yan.pdf
7. Masks for Prevention of Respiratory Virus Infections, Including SARS-CoV-2, in Health Care and Community Settings. *Annals of Internal Medicine 0* (0), null. https://www.acpjournals.org/doi/abs/10.7326/M20-3213
8. Research Shows Virus Undetectable on Five Highly Circulated Library Materials After Three Days. Institute for Library and Museum Services: 2020. https://www.imls.gov/news/research-shows-virus-undetectable-five-highly-circulated-library-materials-after-three-days
9. Update Alert: Masks for Prevention of Respiratory Virus Infections, Including SARS-CoV-2, in Health Care and Community Settings. *Annals of Internal Medicine 0* (0), null. https://www.acpjournals.org/doi/abs/10.7326/L20-0948
10. 3M, *Decontamination of 3M Filtering Facepiece Respirators, such as N95 Respirators, in the United States - Considerations*; 3M: 2020. https://multimedia.3m.com/mws/media/1824869O/decontamination-methods-for-3m-filtering-facepiece-respirators-technical-bulletin.pdf
11. AAAS, You may be able to spread coronavirus just by breathing, new report finds. *Science* 2 April, 2020. https://www.sciencemag.org/news/2020/04/you-may-be-able-spread-coronavirus-just-breathing-new-report-finds
12. Abbott, S.; Hellewell, J.; Thompson, R.; Sherratt, K.; Gibbs, H.; Bosse, N.; Munday, J.; Meakin, S.; Doughty, E.; Chun, J.; Chan, Y.; Finger, F.; Campbell, P.; Endo, A.; Pearson, C.; Gimma, A.; Russell, T.; null, n.; Flasche, S.; Kucharski, A.; Eggo, R.; Funk, S., Estimating the time-varying reproduction number of SARS-CoV-2 using national and subnational case counts [version 1; peer review: awaiting peer review]. *Wellcome Open Research* **2020,** *5* (112). https://wellcomeopenresearch.org/articles/5-112/v1
13. Abella, B. S.; Jolkovsky, E. L.; Biney, B. T.; Uspal, J. E.; Hyman, M. C.; Frank, I.; Hensley, S. E.; Gill, S.; Vogl, D. T.; Maillard, I.; Babushok, D. V.; Huang, A. C.; Nasta, S. D.; Walsh, J. C.; Wiletyo, E. P.; Gimotty, P. A.; Milone, M. C.; Amaravadi, R. K., Efficacy and Safety of Hydroxychloroquine vs Placebo for Pre-exposure SARS-CoV-2 Prophylaxis Among Health Care Workers: A Randomized Clinical Trial. *JAMA Intern Med* **2020**.
14. Ackermann, M.; Verleden, S. E.; Kuehnel, M.; Haverich, A.; Welte, T.; Laenger, F.; Vanstapel, A.; Werlein, C.; Stark, H.; Tzankov, A.; Li, W. W.; Li, V. W.; Mentzer, S. J.; Jonigk, D., Pulmonary Vascular Endothelialitis, Thrombosis, and Angiogenesis in Covid-19. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2015432
15. Adam, D.; Wu, P.; Wong, J.; Lau, E.; Tsang, T.; Cauchemez, S.; Leung, G.; Cowling, B., Clustering and superspreading potential of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections in Hong Kong. **2020**.

16. Adam, D. C.; Wu, P.; Wong, J. Y.; Lau, E. H. Y.; Tsang, T. K.; Cauchemez, S.; Leung, G. M.; Cowling, B. J., Clustering and superspreading potential of SARS-CoV-2 infections in Hong Kong. *Nature Medicine* **2020**. https://doi.org/10.1038/s41591-020-1092-0
17. Adams, M.; Katz, D.; Grandpre, J., Updated Estimates of Chronic Conditions Affecting Risk for Complications from Coronavirus Disease, United States. *Emerging Infectious Disease journal* **2020,** *26* (9). https://wwwnc.cdc.gov/eid/article/26/9/20-2117_article
18. Agrawal, A. S.; Garron, T.; Tao, X.; Peng, B. H.; Wakamiya, M.; Chan, T. S.; Couch, R. B.; Tseng, C. T., Generation of a transgenic mouse model of Middle East respiratory syndrome coronavirus infection and disease. *J Virol* **2015,** *89* (7), 3659-70. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4403411/pdf/zjv3659.pdf
19. Ahmed, W.; Bertsch, P. M.; Bibby, K.; Haramoto, E.; Hewitt, J.; Huygens, F.; Gyawali, P.; Korajkic, A.; Riddell, S.; Sherchan, S. P.; Simpson, S. L.; Sirikanchana, K.; Symonds, E. M.; Verhagen, R.; Vasan, S. S.; Kitajima, M.; Bivins, A., Decay of SARS-CoV-2 and surrogate murine hepatitis virus RNA in untreated wastewater to inform application in wastewater-based epidemiology. *Environmental Research* **2020**, 110092. http://www.sciencedirect.com/science/article/pii/S0013935120309890
20. Airora, The development, testing and verification of Airora's patented biocidal technology. https://www.airora.com/verification.html (accessed 19 Oct 2020).
21. Aleta, A.; Martin-Corral, D.; Pastore y Piontti, A.; Ajelli, M.; Litivinova, M.; Chinazzi, M.; Dean, N.; Halloran, M. E.; Longini, I.; Merler, S.; Pentland, A.; Vespignani, A.; Moro, E.; Moreno, Y., Modeling the impact of social distancing, testing, contact tracing and household quarantine on second-wave scenarios of the COVID-19 epidemic. *Preprint* **2020**. https://www.mobs-lab.org/uploads/6/7/8/7/6787877/tracing_main_may4.pdf
22. Ali, S. T.; Wang, L.; Lau, E. H. Y.; Xu, X.-K.; Du, Z.; Wu, Y.; Leung, G. M.; Cowling, B. J., Serial interval of SARS-CoV-2 was shortened over time by nonpharmaceutical interventions. *Science* **2020**, eabc9004. https://science.sciencemag.org/content/sci/early/2020/07/20/science.abc9004.full.pdf
23. Alsharidah, S.; Ayed, M.; Ameen, R. M.; Alhuraish, F.; Rouheldeen, N. A.; Alshammari, F. R.; Embaireeg, A.; Almelahi, M.; Adel, M.; Dawoud, M. E.; Aljasmi, M. A.; Alshammari, N.; Alsaeedi, A.; Al-Adsani, W.; Arian, H.; Awad, H.; Alenezi, H. A.; Alzafiri, A.; Gouda, E. F.; Almehanna, M.; Alqahtani, S.; Alshammari, A.; Askar, M. Z., COVID-19 Convalescent Plasma Treatment of Moderate and Severe Cases of SARS-CoV-2 Infection: A Multicenter Interventional Study. *Int J Infect Dis* **2020**.
24. Althouse, B. M.; Wenger, E. A.; Miller, J. C.; Scarpino, S. V.; Allard, A.; Hébert-Dufresne, L.; Hu, H., Superspreading events in the transmission dynamics of SARS-CoV-2: Opportunities for interventions and control. *PLOS Biology* **2020,** *18* (11), e3000897. https://doi.org/10.1371/journal.pbio.3000897
25. Alves, A. M.; Yvamoto, E. Y.; Marzinotto, M. A. N.; Teixeira, A. C. d. S.; Carrilho, F. J., SARS-CoV-2 leading to acute pancreatitis: an unusual presentation. *The Brazilian Journal of Infectious Diseases* **2020**. http://www.sciencedirect.com/science/article/pii/S1413867020301392
26. Amit, S.; Regev-Yochay, G.; Afek, A.; Kreiss, Y.; Leshem, E., Early rate reductions of SARS-CoV-2 infection and COVID-19 in BNT162b2 vaccine recipients. *The Lancet* **2021**. https://doi.org/10.1016/S0140-6736(21)00448-7
27. Amoroso, A.; Magistroni, P.; Vespasiano, F.; Bella, A.; Bellino, S.; Puoti, F.; Alizzi, S.; Vaisitti, T.; Boros, S.; Grossi, P. A.; Trapani, S.; Lombardini, L.; Pezzotti, P.; Deaglio, S.; Brusaferro, S.; Cardillo, M., HLA and AB0 Polymorphisms May Influence SARS-CoV-2 Infection and COVID-19 Severity. *Transplantation* **2020**.
28. Anand, S.; Montez-Rath, M.; Han, J.; Bozeman, J.; Kerschmann, R.; Beyer, P.; Parsonnet, J.; Chertow, G. M., Prevalence of SARS-CoV-2 antibodies in a large nationwide sample of patients on dialysis in the USA: a cross-sectional study. *The Lancet* **2020**. https://doi.org/10.1016/S0140-6736(20)32009-2
29. Anastassopoulou, C.; Gkizarioti, Z.; Patrinos, G. P.; Tsakris, A., Human genetic factors associated with susceptibility to SARS-CoV-2 infection and COVID-19 disease severity. *Hum Genomics* **2020,** *14* (1), 40.

30. Andersen, K. G.; Rambaut, A.; Lipkin, W. I.; Holmes, E. C.; Garry, R. F., The proximal origin of SARS-CoV-2. *Nature Medicine* **2020**. https://doi.org/10.1038/s41591-020-0820-9
31. Anderson, E. L.; Turnham, P.; Griffin, J. R.; Clarke, C. C., Consideration of the Aerosol Transmission for COVID-19 and Public Health. *Risk Analysis* **2020,** *40* (5), 902-907. https://onlinelibrary.wiley.com/doi/abs/10.1111/risa.13500
32. Anderson, K., Estimates of the clock and TMRCA for 2019-nCoV based on 27 genomes. http://virological.org/t/clock-and-tmrca-based-on-27-genomes/347 (accessed 01/26/2020).
33. Arentz, M.; Yim, E.; Klaff, L.; Lokhandwala, S.; Riedo, F. X.; Chong, M.; Lee, M., Characteristics and Outcomes of 21 Critically Ill Patients With COVID-19 in Washington State. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.4326
34. Argenziano, M. G.; Bruce, S. L.; Slater, C. L.; Tiao, J. R.; Baldwin, M. R.; Barr, R. G.; Chang, B. P.; Chau, K. H.; Choi, J. J.; Gavin, N.; Goyal, P.; Mills, A. M.; Patel, A. A.; Romney, M.-L. S.; Safford, M. M.; Schluger, N. W.; Sengupta, S.; Sobieszczyk, M. E.; Zucker, J. E.; Asadourian, P. A.; Bell, F. M.; Boyd, R.; Cohen, M. F.; Colquhoun, M. I.; Colville, L. A.; de Jonge, J. H.; Dershowitz, L. B.; Dey, S. A.; Eiseman, K. A.; Girvin, Z. P.; Goni, D. T.; Harb, A. A.; Herzik, N.; Householder, S.; Karaaslan, L. E.; Lee, H.; Lieberman, E.; Ling, A.; Lu, R.; Shou, A. Y.; Sisti, A. C.; Snow, Z. E.; Sperring, C. P.; Xiong, Y.; Zhou, H. W.; Natarajan, K.; Hripcsak, G.; Chen, R., Characterization and Clinical Course of 1000 Patients with COVID-19 in New York: retrospective case series. *medRxiv* **2020**, 2020.04.20.20072116. https://www.medrxiv.org/content/medrxiv/early/2020/04/22/2020.04.20.20072116.full.pdf
35. Arons, M. M.; Hatfield, K. M.; Reddy, S. C.; Kimball, A.; James, A.; Jacobs, J. R.; Taylor, J.; Spicer, K.; Bardossy, A. C.; Oakley, L. P.; Tanwar, S.; Dyal, J. W.; Harney, J.; Chisty, Z.; Bell, J. M.; Methner, M.; Paul, P.; Carlson, C. M.; McLaughlin, H. P.; Thornburg, N.; Tong, S.; Tamin, A.; Tao, Y.; Uehara, A.; Harcourt, J.; Clark, S.; Brostrom-Smith, C.; Page, L. C.; Kay, M.; Lewis, J.; Montgomery, P.; Stone, N. D.; Clark, T. A.; Honein, M. A.; Duchin, J. S.; Jernigan, J. A., Presymptomatic SARS-CoV-2 Infections and Transmission in a Skilled Nursing Facility. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2008457
36. Asadi, S.; Cappa, C. D.; Barreda, S.; Wexler, A. S.; Bouvier, N. M.; Ristenpart, W. D., Efficacy of masks and face coverings in controlling outward aerosol particle emission from expiratory activities. *Scientific Reports* **2020,** *10* (1), 15665. https://doi.org/10.1038/s41598-020-72798-7
37. Assis, M. S.; Araújo, R.; Lopes, A. M. M., Safety alert for hospital environments and health professional: chlorhexidine is ineffective for coronavirus. *Rev Assoc Med Bras (1992)* **2020,** *66Suppl 2* (Suppl 2), 124-129.
38. AstraZeneca, AZD1222 vaccine met primary efficacy endpoint in preventing COVID-19. https://www.astrazeneca.com/media-centre/press-releases/2020/azd1222hlr.html.
39. Avanzato, V. A.; Matson, M. J.; Seifert, S. N.; Pryce, R.; Williamson, B. N.; Anzick, S. L.; Barbian, K.; Judson, S. D.; Fischer, E. R.; Martens, C.; Bowden, T. A.; de Wit, E.; Riedo, F. X.; Munster, V. J., Case Study: Prolonged infectious SARS-CoV-2 shedding from an asymptomatic immunocompromised cancer patient. *Cell* **2020**. https://doi.org/10.1016/j.cell.2020.10.049
40. Ayoubkhani, D.; Khunti, K.; Nafilyan, V.; Maddox, T.; Humberstone, B.; Diamond, S. I.; Banerjee, A., Epidemiology of post-COVID syndrome following hospitalisation with coronavirus: a retrospective cohort study. *medRxiv* **2021**, 2021.01.15.21249885. https://www.medrxiv.org/content/medrxiv/early/2021/01/15/2021.01.15.21249885.full.pdf
41. Azad, A., Pfizer-BioNTech vaccine sharply reduces symptomatic Covid-19 in the real world, Israeli researchers say. https://www.cnn.com/2021/02/15/health/pfizer-biontech-covid-vaccine-reduces-infections-israel-study-intl/index.html.
42. Aziz, M.; Fatima, R.; Assaly, R., Elevated Interleukin-6 and Severe COVID-19: A Meta-Analysis. *J Med Virol* **2020**.

43. Baden, L. R.; El Sahly, H. M.; Essink, B.; Kotloff, K.; Frey, S.; Novak, R.; Diemert, D.; Spector, S. A.; Rouphael, N.; Creech, C. B.; McGettigan, J.; Khetan, S.; Segall, N.; Solis, J.; Brosz, A.; Fierro, C.; Schwartz, H.; Neuzil, K.; Corey, L.; Gilbert, P.; Janes, H.; Follmann, D.; Marovich, M.; Mascola, J.; Polakowski, L.; Ledgerwood, J.; Graham, B. S.; Bennett, H.; Pajon, R.; Knightly, C.; Leav, B.; Deng, W.; Zhou, H.; Han, S.; Ivarsson, M.; Miller, J.; Zaks, T., Efficacy and Safety of the mRNA-1273 SARS-CoV-2 Vaccine. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2035389
44. Badr, H. S.; Du, H.; Marshall, M.; Dong, E.; Squire, M. M.; Gardner, L. M., Association between mobility patterns and COVID-19 transmission in the USA: a mathematical modelling study. *The Lancet Infectious Diseases* **2020**. https://doi.org/10.1016/S1473-3099(20)30553-3
45. Bae, S. H.; Shin, H.; Koo, H.-Y.; Lee, S. W.; Yang, J. M.; Yon, D. K., Asymptomatic Transmission of SARS-CoV-2 on Evacuation Flight. *Emerging Infectious Disease journal* **2020,** *26* (11). https://wwwnc.cdc.gov/eid/article/26/11/20-3353_article
46. Bai, Y.; Yao, L.; Wei, T.; Tian, F.; Jin, D.-Y.; Chen, L.; Wang, M., Presumed Asymptomatic Carrier Transmission of COVID-19. *JAMA*.
47. Bailey, L. C.; Razzaghi, H.; Burrows, E. K.; Bunnell, H. T.; Camacho, P. E. F.; Christakis, D. A.; Eckrich, D.; Kitzmiller, M.; Lin, S. M.; Magnusen, B. C.; Newland, J.; Pajor, N. M.; Ranade, D.; Rao, S.; Sofela, O.; Zahner, J.; Bruno, C.; Forrest, C. B., Assessment of 135 794 Pediatric Patients Tested for Severe Acute Respiratory Syndrome Coronavirus 2 Across the United States. *JAMA Pediatrics* **2020**. https://doi.org/10.1001/jamapediatrics.2020.5052
48. Baldassarri, M.; Picchiotti, N.; Fava, F.; Fallerini, C.; Benetti, E.; Daga, S.; Valentino, F.; Doddato, G.; Furini, S.; Giliberti, A.; Tita, R.; Amitrano, S.; Bruttini, M.; Croci, S.; Meloni, I.; Pinto, A. M.; Gabbi, C.; Sciarra, F.; Venneri, M. A.; Gori, M.; Sanarico, M.; Crawley, F. P.; Pagotto, U.; Fanelli, F.; Mezzullo, M.; Dominguez-Garrido, E.; Planas-Serra, L.; Schluter, A.; Colobran, R.; Soler-Palacin, P.; Lapunzina, P.; Tenorio, J.; Pujol, A.; Castagna, M. G.; Marcelli, M.; Isidori, A. M.; Renieri, A.; Frullanti, E.; Mari, F., Shorter androgen receptor polyQ alleles protect against life-threatening COVID-19 disease in males. *medRxiv* **2020**, 2020.11.04.20225680. http://medrxiv.org/content/early/2020/11/05/2020.11.04.20225680.abstract
49. Bao, L.; Gao, H.; Deng, W.; Lv, Q.; Yu, H.; Liu, M.; Yu, P.; Liu, J.; Qu, Y.; Gong, S.; Lin, K.; Qi, F.; Xu, Y.; Li, F.; Xiao, C.; Xue, J.; Song, Z.; Xiang, Z.; Wang, G.; Wang, S.; Liu, X.; Zhao, W.; Han, Y.; Wei, Q.; Qin, C., Transmission of SARS-CoV-2 via close contact and respiratory droplets among hACE2 mice. *The Journal of Infectious Diseases* **2020**. https://doi.org/10.1093/infdis/jiaa281
50. Bao, L.; Song, Z.; Xue, J.; Gao, H.; Liu, J.; Wang, J.; Guo, Q.; Zhao, B.; Qu, Y.; Qi, F.; Gong, S.; Liu, M.; Qi, L.; Li, D.; Han, Y.; Zhao, W.; Deng, S.; Liu, Y.; Xiang, Z.; Yang, B.; Deng, W.; Yu, H.; Cong, Z.; Wei, Q.; Xu, J.; Gao, G. F.; Qin, C., Susceptibility and Attenuated Transmissibility of SARS-CoV-2 in Domestic Cats. *The Journal of Infectious Diseases* **2021**. https://doi.org/10.1093/infdis/jiab104
51. Barakat, T.; Muylkens, B.; Su, B.-L., Is Particulate Matter of Air Pollution a Vector of Covid-19 Pandemic? *Matter* **2020,** *3* (4), 977-980. http://www.sciencedirect.com/science/article/pii/S2590238520305129
52. Barnkob, M. B.; Pottegård, A.; Støvring, H.; Haunstrup, T. M.; Homburg, K.; Larsen, R.; Hansen, M. B.; Titlestad, K.; Aagaard, B.; Møller, B. K.; Barington, T., Reduced prevalence of SARS-CoV-2 infection in ABO blood group O. *Blood Advances* **2020,** *4* (20), 4990-4993. https://doi.org/10.1182/bloodadvances.2020002657
53. Bartlett, S. L.; Diel, D. G.; Wang, L.; Zec, S.; Laverack, M.; Martins, M.; Caserta, L. C.; Killian, M. L.; Terio, K.; Olmstead, C.; Delaney, M. A.; Stokol, T.; Ivančić, M.; Jenkins-Moore, M.; Ingerman, K.; Teegan, T.; McCann, C.; Thomas, P.; McAloose, D.; Sykes, J. M.; Calle, P. P., SARS-CoV-2 Infection And Longitudinal Fecal Screening In Malayan Tigers (Panthera tigris jacksoni), Amur Tigers (Panthera tigris altaica), And African Lions (Panthera leo krugeri) At The Bronx

Zoo, New York, USA. *bioRxiv* **2020**, 2020.08.14.250928. https://www.biorxiv.org/content/biorxiv/early/2020/08/14/2020.08.14.250928.full.pdf
54. Bazant, M. Z.; Bush, J. W. M., Beyond Six Feet: A Guideline to Limit Indoor Airborne Transmission of COVID-19. *medRxiv* **2020**, 2020.08.26.20182824. https://www.medrxiv.org/content/medrxiv/early/2020/11/03/2020.08.26.20182824.full.pdf
55. BBC, Covid: WHO team says 'extremely unlikely' virus leaked from lab. *British Broadcasting Channel* 2021. https://www.bbc.com/news/world-asia-china-55996728
56. BBCNews, Coronavirus: India approves vaccines from Bharat Biotech and Oxford/AstraZeneca. https://www.bbc.com/news/world-asia-india-55520658.
57. Beale, S.; Lewer, D.; Aldridge, R.; Johnson, A.; Zambon, M.; Hayward, A.; Fragaszy, E., Household transmission of seasonal coronavirus infections: Results from the Flu Watch cohort study [version 1; peer review: 1 approved, 2 approved with reservations]. *Wellcome Open Research* **2020,** *5* (145). https://wellcomeopenresearch.org/articles/5-145/v1
58. Bedford, T.; Neher, R., Genomic epidemiology of novel coronavirus (nCoV) using data from GISAID. https://nextstrain.org/ncov.
59. Bedrosian, N.; Mitchell, E.; Rohm, E.; Rothe, M.; Kelly, C.; String, G.; Lantagne, D., A Systematic Review of Surface Contamination, Stability, and Disinfection Data on SARS-CoV-2 (Through July 10, 2020). *Environ Sci Technol* **2020**.
60. Behzadinasab, S.; Chin, A.; Hosseini, M.; Poon, L. L. M.; Ducker, W. A., A Surface Coating that Rapidly Inactivates SARS-CoV-2. *ACS Applied Materials & Interfaces* **2020**. https://doi.org/10.1021/acsami.0c11425
61. Beigel, J. H.; Tomashek, K. M.; Dodd, L. E.; Mehta, A. K.; Zingman, B. S.; Kalil, A. C.; Hohmann, E.; Chu, H. Y.; Luetkemeyer, A.; Kline, S.; Lopez de Castilla, D.; Finberg, R. W.; Dierberg, K.; Tapson, V.; Hsieh, L.; Patterson, T. F.; Paredes, R.; Sweeney, D. A.; Short, W. R.; Touloumi, G.; Lye, D. C.; Ohmagari, N.; Oh, M.-d.; Ruiz-Palacios, G. M.; Benfield, T.; Fätkenheuer, G.; Kortepeter, M. G.; Atmar, R. L.; Creech, C. B.; Lundgren, J.; Babiker, A. G.; Pett, S.; Neaton, J. D.; Burgess, T. H.; Bonnett, T.; Green, M.; Makowski, M.; Osinusi, A.; Nayak, S.; Lane, H. C., Remdesivir for the Treatment of Covid-19 — Final Report. *New England Journal of Medicine* **2020**. https://doi.org/10.1056/NEJMoa2007764
62. Bhimraj, A.; Morgan, R. L.; Shumaker, A. H.; Lavergne, V.; Baden, L.; Cheng, V. C.-C.; Edwards, K. M.; Gandhi, R.; Gallagher, J.; Muller, W. J.; O'Horo, J. C.; Shoham, S.; Murad, M. H.; Mustafa, R. A.; Sultan, S.; Falck-Ytter, Y., Infectious Diseases Society of America Guidelines on the Treatment and Management of Patients with COVID-19 *IDSA* **2021**. https://www.idsociety.org/globalassets/idsa/practice-guidelines/covid-19/treatment/idsa-covid-19-gl-tx-and-mgmt-v3.6.0.pdf
63. Bhimraj, A.; Morgan, R. L.; Shumaker, A. H.; Lavergne, V.; Baden, L.; Cheng, V. C.-C.; Edwards, K. M.; Gandhi, R.; Gallagher, J.; Muller, W. J.; O'Horo, J. C.; Shoham, S.; Murad, M. H.; Mustafa, R. A.; Sultan, S.; Falck-Ytter, Y., *Infectious Diseases Society of America Guidelines on the Treatment and Management of Patients with COVID-19*; 2021. https://www.idsociety.org/globalassets/idsa/practice-guidelines/covid-19/treatment/idsa-covid-19-gl-tx-and-mgmt-v3.8.0.pdf
64. Bi, Q.; Lessler, J.; Eckerle, I.; Lauer, S. A.; Kaiser, L.; Vuilleumier, N.; Cummings, D. A.; Flahault, A.; Petrovic, D.; Guessous, I.; Stringhini, S.; Azman, A. S., Household Transmission of SARS-COV-2: Insights from a Population-based Serological Survey. *medRxiv* **2020**, 2020.11.04.20225573. https://www.medrxiv.org/content/medrxiv/early/2020/11/04/2020.11.04.20225573.full.pdf
65. Bidra, A. S.; Pelletier, J. S.; Westover, J. B.; Frank, S.; Brown, S. M.; Tessema, B., Rapid In-Vitro Inactivation of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Using Povidone-Iodine Oral Antiseptic Rinse. *Journal of Prosthodontics* **2020,** *n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1111/jopr.13209
66. Biggerstaff, M.; Cowling, B.; Cucunubá, Z.; Dinh, L.; Ferguson, N.; Gao, H.; Hill, V.; Imai, N.; Johansson, M.; Kada, S.; Morgan, O.; Pastore y Piontti, A.; Polonsky, J.; Prasad, P. V.; Quandelacy, T.; Rambaut, A.;

Tappero, J.; Vandemaele, K.; Vespignani, A.; Warmbrod, K. L.; Wong, J., Early Insights from Statistical and Mathematical Modeling of Key Epidemiologic Parameters of COVID-19. *Emerging Infectious Disease journal* **2020,** *26* (11). https://wwwnc.cdc.gov/eid/article/26/11/20-1074_article
67. Biryukov, J.; Boydston, J. A.; Dunning, R. A.; Yeager, J. J.; Wood, S.; Reese, A. L.; Ferris, A.; Miller, D.; Weaver, W.; Zeitouni, N. E.; Phillips, A.; Freeburger, D.; Hooper, I.; Ratnesar-Shumate, S.; Yolitz, J.; Krause, M.; Williams, G.; Dawson, D. G.; Herzog, A.; Dabisch, P.; Wahl, V.; Hevey, M. C.; Altamura, L. A., Increasing Temperature and Relative Humidity Accelerates Inactivation of SARS-CoV-2 on Surfaces. *mSphere* **2020,** *5* (4), e00441-20. https://msphere.asm.org/content/msph/5/4/e00441-20.full.pdf
68. Blair, R. V.; Vaccari, M.; Doyle-Meyers, L. A.; Roy, C. J.; Russell-Lodrigue, K.; Fahlberg, M.; Monjure, C. J.; Beddingfield, B.; Plante, K. S.; Plante, J. A.; Weaver, S. C.; Qin, X.; Midkiff, C. C.; Lehmicke, G.; Golden, N.; Threeton, B.; Penney, T.; Allers, C.; Barnes, M. B.; Pattison, M.; Datta, P. K.; Maness, N. J.; Birnbaum, A.; Bohm, R. P.; Rappaport, J., ARDS and Cytokine Storm in SARS-CoV-2 Infected Caribbean Vervets. *bioRxiv* **2020**, 2020.06.18.157933.
http://biorxiv.org/content/early/2020/06/19/2020.06.18.157933.abstract
69. **BMJ**, Coronavirus Disease 2019: Treatment algorithm. https://bestpractice.bmj.com/topics/en-gb/3000201/treatment-algorithm#patientGroup-0-0.
70. BMJ, A living WHO guideline on drugs for covid-19. https://www.bmj.com/content/370/bmj.m3379.
71. Böhmer, M. M.; Buchholz, U.; Corman, V. M.; Hoch, M.; Katz, K.; Marosevic, D. V.; Böhm, S.; Woudenberg, T.; Ackermann, N.; Konrad, R.; Eberle, U.; Treis, B.; Dangel, A.; Bengs, K.; Fingerle, V.; Berger, A.; Hörmansdorfer, S.; Ippisch, S.; Wicklein, B.; Grahl, A.; Pörtner, K.; Muller, N.; Zeitlmann, N.; Boender, T. S.; Cai, W.; Reich, A.; An der Heiden, M.; Rexroth, U.; Hamouda, O.; Schneider, J.; Veith, T.; Mühlemann, B.; Wölfel, R.; Antwerpen, M.; Walter, M.; Protzer, U.; Liebl, B.; Haas, W.; Sing, A.; Drosten, C.; Zapf, A., Investigation of a COVID-19 outbreak in Germany resulting from a single travel-associated primary case: a case series. *The Lancet. Infectious diseases* **2020**, S1473-3099(20)30314-5.
https://pubmed.ncbi.nlm.nih.gov/32422201
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7228725/
72. Bond, T. C.; Bosco-Lauth, A.; Farmer, D. K.; Francisco, P. W.; Pierce, J. R.; Fedak, K. M.; Ham, J. M.; Jathar, S. H.; VandeWoude, S., Quantifying Proximity, Confinement, and Interventions in Disease Outbreaks: A Decision Support Framework for Air-Transported Pathogens. *Environmental Science & Technology* **2021**. https://doi.org/10.1021/acs.est.0c07721
73. Bongiovanni, D.; Klug, M.; Lazareva, O.; Weidlich, S.; Biasi, M.; Ursu, S.; Warth, S.; Buske, C.; Lukas, M.; Spinner, C. D.; Scheidt, M. v.; Condorelli, G.; Baumbach, J.; Laugwitz, K.-L.; List, M.; Bernlochner, I., SARS-CoV-2 infection is associated with a pro-thrombotic platelet phenotype. *Cell Death & Disease* **2021,** *12* (1), 50. https://doi.org/10.1038/s41419-020-03333-9
74. Boni, M. F.; Lemey, P.; Jiang, X.; Lam, T. T.-Y.; Perry, B. W.; Castoe, T. A.; Rambaut, A.; Robertson, D. L., Evolutionary origins of the SARS-CoV-2 sarbecovirus lineage responsible for the COVID-19 pandemic. *Nature Microbiology* **2020**. https://doi.org/10.1038/s41564-020-0771-4
75. Bosco-Lauth, A. M.; Hartwig, A. E.; Porter, S. M.; Gordy, P. W.; Nehring, M.; Byas, A. D.; VandeWoude, S.; Ragan, I. K.; Maison, R. M.; Bowen, R. A., Pathogenesis, transmission and response to re-exposure of SARS-CoV-2 in domestic cats. *bioRxiv* **2020**, 2020.05.28.120998.
http://biorxiv.org/content/early/2020/05/29/2020.05.28.120998.abstract
76. Boukli, N.; Le Mene, M.; Schnuriger, A.; Cuervo, N. S.; Laroche, C.; Morand-Joubert, L.; Gozlan, J., High incidence of false positive results in patients with other acute infections, using the LIAISON® SARS-CoV-2 commercial chemiluminescent micro-particle immunoassay for detection of IgG anti SARS-CoV-2 antibodies. *Journal of Clinical Microbiology* **2020**, JCM.01352-20.
https://jcm.asm.org/content/jcm/early/2020/08/25/JCM.01352-20.full.pdf
77. Boulware, D. R.; Pullen, M. F.; Bangdiwala, A. S.; Pastick, K. A.; Lofgren, S. M.; Okafor, E. C.; Skipper, C. P.; Nascene, A. A.; Nicol, M. R.; Abassi, M.; Engen, N. W.; Cheng, M. P.; LaBar, D.; Lother, S. A.;

MacKenzie, L. J.; Drobot, G.; Marten, N.; Zarychanski, R.; Kelly, L. E.; Schwartz, I. S.; McDonald, E. G.; Rajasingham, R.; Lee, T. C.; Hullsiek, K. H., A Randomized Trial of Hydroxychloroquine as Postexposure Prophylaxis for Covid-19. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2016638

78. Bradburne, A. F.; Bynoe, M. L.; Tyrrell, D. A., Effects of a "new" human respiratory virus in volunteers. *British medical journal* **1967,** *3* (5568), 767-769. https://pubmed.ncbi.nlm.nih.gov/6043624 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1843247/

79. Brady, T., Irish company develops groundbreaking Covid spray that will provide near complete protection. https://www.independent.ie/irish-news/health/irish-company-develops-groundbreaking-covid-spray-that-will-provide-near-complete-protection-39717080.html (accessed 09 Nov 2020).

80. Bramante, C. T.; Ingraham, N. E.; Murray, T. A.; Marmor, S.; Hovertsen, S.; Gronski, J.; McNeil, C.; Feng, R.; Guzman, G.; Abdelwahab, N.; King, S.; Tamariz, L.; Meehan, T.; Pendleton, K. M.; Benson, B.; Vojta, D.; Tignanelli, C. J., Metformin and risk of mortality in patients hospitalised with COVID-19: a retrospective cohort analysis. *The Lancet Healthy Longevity*. https://doi.org/10.1016/S2666-7568(20)30033-7

81. Braun, J.; Loyal, L.; Frentsch, M.; Wendisch, D.; Georg, P.; Kurth, F.; Hippenstiel, S.; Dingeldey, M.; Kruse, B.; Fauchere, F.; Baysal, E.; Mangold, M.; Henze, L.; Lauster, R.; Mall, M.; Beyer, K.; Roehmel, J.; Schmitz, J.; Miltenyi, S.; Mueller, M. A.; Witzenrath, M.; Suttorp, N.; Kern, F.; Reimer, U.; Wenschuh, H.; Drosten, C.; Corman, V. M.; Giesecke-Thiel, C.; Sander, L.-E.; Thiel, A., Presence of SARS-CoV-2 reactive T cells in COVID-19 patients and healthy donors. *medRxiv* **2020**, 2020.04.17.20061440. https://www.medrxiv.org/content/medrxiv/early/2020/04/22/2020.04.17.20061440.full.pdf

82. Brauner, J. M.; Mindermann, S.; Sharma, M.; Johnston, D.; Salvatier, J.; Gavenčiak, T.; Stephenson, A. B.; Leech, G.; Altman, G.; Mikulik, V.; Norman, A. J.; Monrad, J. T.; Besiroglu, T.; Ge, H.; Hartwick, M. A.; Teh, Y. W.; Chindelevitch, L.; Gal, Y.; Kulveit, J., Inferring the effectiveness of government interventions against COVID-19. *Science* **2021,** *371* (6531), eabd9338. https://science.sciencemag.org/content/sci/371/6531/eabd9338.full.pdf

83. Brennan, Z., FDA issues 2nd EUA for decontamination system for N95 masks. *Regulatory Focus* 2020. https://www.raps.org/news-and-articles/news-articles/2020/4/fda-issues-2nd-eua-for-decontamination-system-for

84. Breslow, J., CDC Issues Sweeping New Mask Mandate For U.S. Travelers, Extends Eviction Moratorium. *NPR* 2021. https://www.npr.org/sections/coronavirus-live-updates/2021/01/30/962390180/cdc-issues-sweeping-new-mask-mandate-for-u-s-travelers-extends-eviction-moratori

85. Brooks, J. T.; Beezhold, D. H.; Noti, J. D.; al., e., Maximizing Fit for Cloth and Medical Procedure Masks to Improve Performance and Reduce SARS-CoV-2 Transmission and Exposure, 2021. *MMWR. Morbidity and Mortality Weekly Report* **2021,** *70*.

86. Brosseau, L. M., COMMENTARY: COVID-19 transmission messages should hinge on science. http://www.cidrap.umn.edu/news-perspective/2020/03/commentary-covid-19-transmission-messages-should-hinge-science.

87. Brosseau, L. M.; Jones, R., Commentary: Protecting health workers from airborne MERS-CoV - learning from SARS. http://www.cidrap.umn.edu/news-perspective/2014/05/commentary-protecting-health-workers-airborne-mers-cov-learning-sars.

88. Bryan, A.; Fink, S. L.; Gattuso, M. A.; Pepper, G.; Chaudhary, A.; Wener, M. H.; Morishima, C.; Jerome, K. R.; Mathias, P. C.; Greninger, A. L., SARS-CoV-2 Viral Load on Admission Is Associated With 30-Day Mortality. *Open Forum Infectious Diseases* **2020,** *7* (12). https://doi.org/10.1093/ofid/ofaa535

89. Bryant, C.; Wilks, S. A.; Keevil, C. W., Rapid inactivation of SARS-CoV-2 on copper touch surfaces determined using a cell culture infectivity assay. *bioRxiv* **2021**, 2021.01.02.424974. https://www.biorxiv.org/content/biorxiv/early/2021/01/02/2021.01.02.424974.full.pdf

90. Bryner, J., First US infant death linked to COVID-19 reported in Illinois. *LiveScience* 2020. https://www.livescience.com/us-infant-dies-coronavirus.html
91. Bubar, K. M.; Reinholt, K.; Kissler, S. M.; Lipsitch, M.; Cobey, S.; Grad, Y. H.; Larremore, D. B., Model-informed COVID-19 vaccine prioritization strategies by age and serostatus. *Science* **2021**, eabe6959. https://science.sciencemag.org/content/sci/early/2021/01/21/science.abe6959.full.pdf
92. Buitrago-Garcia, D.; Egli-Gany, D.; Counotte, M. J.; Hossmann, S.; Imeri, H.; Ipekci, A. M.; Salanti, G.; Low, N., Occurrence and transmission potential of asymptomatic and presymptomatic SARS-CoV-2 infections: A living systematic review and meta-analysis. *PLOS Medicine* **2020,** *17* (9), e1003346. https://doi.org/10.1371/journal.pmed.1003346
93. Bulfone, T. C.; Malekinejad, M.; Rutherford, G. W.; Razani, N., Outdoor Transmission of SARS-CoV-2 and Other Respiratory Viruses, a Systematic Review. *The Journal of Infectious Diseases* **2020**. https://doi.org/10.1093/infdis/jiaa742
94. Burkholz, S.; Pokhrel, S.; Kraemer, B. R.; Mochly-Rosen, D.; Carback, R. T.; Hodge, T.; Harris, P.; Ciotlos, S.; Wang, L.; Herst, C. V.; Rubsamen, R., Paired SARS CoV-2 Spike Protein Mutations Observed During Ongoing SARS-CoV-2 Viral Transfer from Humans to Minks and Back to Humans. *bioRxiv* **2020**, 2020.12.22.424003. http://biorxiv.org/content/early/2020/12/29/2020.12.22.424003.abstract
95. Buss, L. F.; Prete, C. A.; Abrahim, C. M. M.; Mendrone, A.; Salomon, T.; de Almeida-Neto, C.; França, R. F. O.; Belotti, M. C.; Carvalho, M. P. S. S.; Costa, A. G.; Crispim, M. A. E.; Ferreira, S. C.; Fraiji, N. A.; Gurzenda, S.; Whittaker, C.; Kamaura, L. T.; Takecian, P. L.; da Silva Peixoto, P.; Oikawa, M. K.; Nishiya, A. S.; Rocha, V.; Salles, N. A.; de Souza Santos, A. A.; da Silva, M. A.; Custer, B.; Parag, K. V.; Barral-Netto, M.; Kraemer, M. U. G.; Pereira, R. H. M.; Pybus, O. G.; Busch, M. P.; Castro, M. C.; Dye, C.; Nascimento, V. H.; Faria, N. R.; Sabino, E. C., Three-quarters attack rate of SARS-CoV-2 in the Brazilian Amazon during a largely unmitigated epidemic. *Science* **2020**, eabe9728. https://science.sciencemag.org/content/sci/early/2020/12/07/science.abe9728.full.pdf
96. Bussani, R.; Schneider, E.; Zentilin, L.; Collesi, C.; Ali, H.; Braga, L.; Volpe, M. C.; Colliva, A.; Zanconati, F.; Berlot, G.; Silvestri, F.; Zacchigna, S.; Giacca, M., Persistence of viral RNA, pneumocyte syncytia and thrombosis are hallmarks of advanced COVID-19 pathology. *EBioMedicine* **2020**. https://doi.org/10.1016/j.ebiom.2020.103104
97. Callow, K.; Parry, H.; Sergeant, M.; Tyrrell, D., The time course of the immune response to experimental coronavirus infection of man. *Epidemiology & Infection* **1990,** *105* (2), 435-446.
98. Callow, K. A.; Parry, H. F.; Sergeant, M.; Tyrrell, D. A., The time course of the immune response to experimental coronavirus infection of man. *Epidemiology and infection* **1990,** *105* (2), 435-446. https://pubmed.ncbi.nlm.nih.gov/2170159
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2271881/
99. Canada, H., Health Canada authorizes Moderna COVID-19 vaccine. https://www.canada.ca/en/health-canada/news/2020/12/health-canada-authorizes-moderna-covid-19-vaccine.html.
100. Cao, B.; Wang, Y.; Wen, D.; Liu, W.; Wang, J.; Fan, G.; Ruan, L.; Song, B.; Cai, Y.; Wei, M.; Li, X.; Xia, J.; Chen, N.; Xiang, J.; Yu, T.; Bai, T.; Xie, X.; Zhang, L.; Li, C.; Yuan, Y.; Chen, H.; Li, H.; Huang, H.; Tu, S.; Gong, F.; Liu, Y.; Wei, Y.; Dong, C.; Zhou, F.; Gu, X.; Xu, J.; Liu, Z.; Zhang, Y.; Li, H.; Shang, L.; Wang, K.; Li, K.; Zhou, X.; Dong, X.; Qu, Z.; Lu, S.; Hu, X.; Ruan, S.; Luo, S.; Wu, J.; Peng, L.; Cheng, F.; Pan, L.; Zou, J.; Jia, C.; Wang, J.; Liu, X.; Wang, S.; Wu, X.; Ge, Q.; He, J.; Zhan, H.; Qiu, F.; Guo, L.; Huang, C.; Jaki, T.; Hayden, F. G.; Horby, P. W.; Zhang, D.; Wang, C., A Trial of Lopinavir–Ritonavir in Adults Hospitalized with Severe Covid-19. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2001282
101. Care, D. o. H. a. S., World-first COVID-19 alternating dose vaccine study launches in UK. https://www.gov.uk/government/news/world-first-covid-19-alternating-dose-vaccine-study-launches-in-uk.

102. Carfì, A.; Bernabei, R.; Landi, F.; Group, f. t. G. A. C.-P.-A. C. S., Persistent Symptoms in Patients After Acute COVID-19. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.12603
103. Caronna, E.; Ballvé, A.; Llauradó, A.; Gallardo, V. J.; María Ariton, D.; Lallana, S.; Maza, S. L.; Gadea, M. O.; Quibus, L.; Restrepo, J. L.; Rodrigo-Gisbert, M.; Vilaseca, A.; Gonzalez, M. H.; Gallo, M. M.; Alpuente, A.; Torres-Ferrus, M.; Borrell, R. P.; Alvarez-Sabin, J.; Pozo-Rosich, P., Headache: A striking prodromal and persistent symptom, predictive of COVID-19 clinical evolution. *Cephalalgia* **2020,** *40* (13), 1410-1421. https://doi.org/10.1177/0333102420965157
104. Cavalcanti, A. B.; Zampieri, F. G.; Rosa, R. G.; Azevedo, L. C. P.; Veiga, V. C.; Avezum, A.; Damiani, L. P.; Marcadenti, A.; Kawano-Dourado, L.; Lisboa, T.; Junqueira, D. L. M.; de Barros e Silva, P. G. M.; Tramujas, L.; Abreu-Silva, E. O.; Laranjeira, L. N.; Soares, A. T.; Echenique, L. S.; Pereira, A. J.; Freitas, F. G. R.; Gebara, O. C. E.; Dantas, V. C. S.; Furtado, R. H. M.; Milan, E. P.; Golin, N. A.; Cardoso, F. F.; Maia, I. S.; Hoffmann Filho, C. R.; Kormann, A. P. M.; Amazonas, R. B.; Bocchi de Oliveira, M. F.; Serpa-Neto, A.; Falavigna, M.; Lopes, R. D.; Machado, F. R.; Berwanger, O., Hydroxychloroquine with or without Azithromycin in Mild-to-Moderate Covid-19. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2019014
105. CBS, 2021. https://www.cbsnews.com/news/covid-19-double-masks-adds-to-obstacle-course-particles-research-shows/
106. CDC, About Masks. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-face-coverings.html.
107. CDC, COVID-19 Forecasts. https://www.cdc.gov/coronavirus/2019-ncov/covid-data/forecasting-us.html.
108. CDC, COVID-19 Vaccinations in the United States. https://covid.cdc.gov/covid-data-tracker/#vaccinations.
109. CDC, COVID-19 Vaccine: Helps protect you from getting COVID-19. https://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html.
110. CDC, Interim Clinical Considerations for Use of mRNA COVID-19 Vaccines Currently Authorized in the United States. https://www.cdc.gov/vaccines/covid-19/info-by-product/clinical-considerations.html.
111. CDC, Interim healthcare infection prevention and control recommendations for patients under investigation for 2019 novel coronavirus. https://www.cdc.gov/coronavirus/2019-ncov/infection-control.html.
112. CDC, NPPTL Respirator Assessments to Support the COVID-19 Response. https://www.cdc.gov/niosh/npptl/respirators/testing/NonNIOSHresults.html.
113. CDC, Scientific Brief: Community Use of Cloth Masks to Control the Spread of SARS-CoV-2. https://www.cdc.gov/coronavirus/2019-ncov/more/masking-science-sars-cov2.html.
114. CDC, Scientific Brief: SARS-CoV-2 and Potential Airborne Transmission. https://www.cdc.gov/coronavirus/2019-ncov/more/scientific-brief-sars-cov-2.html.
115. CDC, Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) — United States, February 12–March 16, 2020. . *MMWR* **2020**. https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e2.htm?s_cid=mm6912e2_w#suggestedcitation
116. CDC, Situation summary. https://www.cdc.gov/coronavirus/2019-nCoV/summary.html.
117. CDC, Symptoms of Coronavirus. https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html.
118. CDC, Transitioning from CDC's Indicators for Dynamic School Decision-Making (released September 15, 2020) to CDC's Operational Strategy for K-12 Schools through Phased Mitigation (released February 12, 2021) to Reduce COVID-19. https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/indicators.html.
119. CDC, Transmission of SARS-CoV-2 in K-12 schools. https://www.cdc.gov/coronavirus/2019-ncov/more/science-and-research/transmission_k_12_schools.html.

120. CDC, C., China's CDC detects a large number of new coronaviruses in the South China seafood market in Wuhan http://www.chinacdc.cn/yw_9324/202001/t20200127_211469.html (accessed 01/27/2020).
121. CEID, Nowcasts for the US, states, and territories. http://2019-coronavirus-tracker.com/nowcast.html.
122. Centers for Disease Control and Prevention (CDC), Overview of Testing for SARS-CoV-2 (COVID-19). https://www.cdc.gov/coronavirus/2019-ncov/hcp/testing-overview.html (accessed 22 September 2020).
123. Cevik, M.; Marcus, J.; Buckee, C.; Smith, T., SARS-CoV-2 transmission dynamics should inform policy. *Available at SSRN 3692807* **2020**.
124. Cevik, M.; Tate, M.; Lloyd, O.; Maraolo, A. E.; Schafers, J.; Ho, A., SARS-CoV-2, SARS-CoV, and MERS-CoV viral load dynamics, duration of viral shedding, and infectiousness: a systematic review and meta-analysis. *The Lancet Microbe* **2020**. https://doi.org/10.1016/S2666-5247(20)30172-5
125. Chan, J. F.-W.; Yuan, S.; Kok, K.-H.; To, K. K.-W.; Chu, H.; Yang, J.; Xing, F.; Liu, J.; Yip, C. C.-Y.; Poon, R. W.-S.; Tsoi, H.-W.; Lo, S. K.-F.; Chan, K.-H.; Poon, V. K.-M.; Chan, W.-M.; Ip, J. D.; Cai, J.-P.; Cheng, V. C.-C.; Chen, H.; Hui, C. K.-M.; Yuen, K.-Y., A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *The Lancet* **2020**. https://www.sciencedirect.com/science/article/pii/S0140673620301549
126. Chan, J. F.; Zhang, A. J.; Yuan, S.; Poon, V. K.; Chan, C. C.; Lee, A. C.; Chan, W. M.; Fan, Z.; Tsoi, H. W.; Wen, L.; Liang, R.; Cao, J.; Chen, Y.; Tang, K.; Luo, C.; Cai, J. P.; Kok, K. H.; Chu, H.; Chan, K. H.; Sridhar, S.; Chen, Z.; Chen, H.; To, K. K.; Yuen, K. Y., Simulation of the clinical and pathological manifestations of Coronavirus Disease 2019 (COVID-19) in golden Syrian hamster model: implications for disease pathogenesis and transmissibility. *Clin Infect Dis* **2020**. https://www.ncbi.nlm.nih.gov/pubmed/32215622
127. Chande, A. T.; Gussler, W.; Harris, M.; Lee, S.; Rishishwar, L.; Jordan, I. K.; Andris, C. M.; Weitz, J. S., Interactive COVID-19 Event Risk Assessment Planning Tool. http://covid19risk.biosci.gatech.edu/.
128. Chang, S.; Pierson, E.; Koh, P. W.; Gerardin, J.; Redbird, B.; Grusky, D.; Leskovec, J., Mobility network models of COVID-19 explain inequities and inform reopening. *Nature* **2020**. https://doi.org/10.1038/s41586-020-2923-3
129. Changzheng, L. J. L., Experts in the medical treatment team: Wuhan's unexplained viral pneumonia patients can be controlled more. https://www.cn-healthcare.com/article/20200110/content-528579.html.
130. Chen, C.; Cao, M.; Peng, L.; Guo, X.; Yang, F.; Wu, W.; Chen, L.; Yang, Y.; Liu, Y.; Wang, F., Coronavirus Disease-19 Among Children Outside Wuhan, China. *SSRN* **2020**. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3546071
131. Chen, Q.; Song, Y.; Wang, L.; Zhang, Y.; Han, L.; Liu, J.; Yang, M.; Ma, J.; Wang, T., Corticosteroids treatment in severe patients with COVID-19: a propensity score matching study. *Expert Rev Respir Med* **2020**.
132. Cheng, H.-Y.; Jian, S.-W.; Liu, D.-P.; Ng, T.-C.; Huang, W.-T.; Lin, H.-H.; Team, f. t. T. C.-O. I., Contact Tracing Assessment of COVID-19 Transmission Dynamics in Taiwan and Risk at Different Exposure Periods Before and After Symptom Onset. *JAMA Internal Medicine* **2020**. https://doi.org/10.1001/jamainternmed.2020.2020
133. Chhatwal, J.; Ayer, T.; Linas, B. P. D., O. O.; Mueller, P.; Adee, M.; Ladd, M. A.; Xiao, J. Y. X., COVID-19. https://www.covid19sim.org/.
134. Chin, A.; Chu, J.; Perera, M.; Hui, K.; Yen, H.-L.; Chan, M.; Peiris, M.; Poon, L., Stability of SARS-CoV-2 in different environmental conditions. *medRxiv* **2020**, 2020.03.15.20036673. https://www.medrxiv.org/content/medrxiv/early/2020/03/27/2020.03.15.20036673.full.pdf

135. Chin, A. W. H.; Chu, J. T. S.; Perera, M. R. A.; Hui, K. P. Y.; Yen, H.-L.; Chan, M. C. W.; Peiris, M.; Poon, L. L. M., Stability of SARS-CoV-2 in different environmental conditions. *The Lancet Microbe* **2020,** *1* (1), e10. https://doi.org/10.1016/S2666-5247(20)30003-3
136. Chin, A. W. H.; Chu, J. T. S.; Perera, M. R. A.; Hui, K. P. Y.; Yen, H.-L.; Chan, M. C. W.; Peiris, M.; Poon, L. L. M., Stability of SARS-CoV-2 in different environmental conditions. *The Lancet Microbe*. https://doi.org/10.1016/S2666-5247(20)30003-3
137. Choe, P. G.; Kang, C. K.; Suh, H. J.; Jung, J.; Kang, E.; Lee, S. Y.; Song, K.-H.; Kim, H. B.; Kim, N. J.; Park, W. B.; Kim, E. S.; Oh, M.-d., Antibody Responses to SARS-CoV-2 at 8 Weeks Postinfection in Asymptomatic Patients. *Emerging Infectious Disease journal* **2020,** *26* (10), 2484. https://wwwnc.cdc.gov/eid/article/26/10/20-2211_article
138. Choi, E.; Chu, D. K. W.; Cheng, P. K. C.; Tsang, D. N. C.; Peiris, M.; Bausch, D.; Poon, L. L. M.; Watson-Jones, D., In-Flight Transmission of Severe Acute Respiratory Syndrome Coronavirus 2. *Emerging Infectious Disease journal* **2020,** *26* (11). https://wwwnc.cdc.gov/eid/article/26/11/20-3254_article
139. Christensen, B.; Favaloro, E. J.; Lippi, G.; Van Cott, E. M., Hematology Laboratory Abnormalities in Patients with Coronavirus Disease 2019 (COVID-19). *Semin Thromb Hemost* **2020,** (EFirst).
140. Chu, D. K.; Akl, E. A.; Duda, S.; Solo, K.; Yaacoub, S.; Schünemann, H. J.; Chu, D. K.; Akl, E. A.; El-harakeh, A.; Bognanni, A.; Lotfi, T.; Loeb, M.; Hajizadeh, A.; Bak, A.; Izcovich, A.; Cuello-Garcia, C. A.; Chen, C.; Harris, D. J.; Borowiack, E.; Chamseddine, F.; Schünemann, F.; Morgano, G. P.; Muti Schünemann, G. E. U.; Chen, G.; Zhao, H.; Neumann, I.; Chan, J.; Khabsa, J.; Hneiny, L.; Harrison, L.; Smith, M.; Rizk, N.; Giorgi Rossi, P.; AbiHanna, P.; El-khoury, R.; Stalteri, R.; Baldeh, T.; Piggott, T.; Zhang, Y.; Saad, Z.; Khamis, A.; Reinap, M.; Duda, S.; Solo, K.; Yaacoub, S.; Schünemann, H. J., Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *The Lancet* **2020**. https://doi.org/10.1016/S0140-6736(20)31142-9
141. Chua, G. T.; Wong, J. S. C.; To, K. K. W.; Ho, P. P. K.; Lam, I. C. S.; Duque, J. S. R.; Chan, W. H.; Yau, F. Y. S.; Yip, C. C. Y.; Ng, A. C. K.; Wong, W. H. S.; Kwong, J. H. Y.; Leung, K. F. S.; Wan, P. T.; Lam, K.; Wong, I. C. K.; Kwok, J.; Ho, M. H. K.; Chan, G. C. F.; Lau, Y. L.; Ip, P.; Kwan, M. Y. W., Saliva Viral Load Better Correlates with Clinical and Immunological Profiles in Children with Coronavirus Disease 2019. *Emerging Microbes & Infections* **2021**, 1-25. https://doi.org/10.1080/22221751.2021.1878937
142. Clapp, P. W.; Sickbert-Bennett, E. E.; Samet, J. M.; Berntsen, J.; Zeman, K. L.; Anderson, D. J.; Weber, D. J.; Bennett, W. D.; Control, U. C. f. D.; Program, P. E., Evaluation of Cloth Masks and Modified Procedure Masks as Personal Protective Equipment for the Public During the COVID-19 Pandemic. *JAMA Internal Medicine* **2020**. https://doi.org/10.1001/jamainternmed.2020.8168
143. Clean Flow, Clean Flow Healthcare Mini. https://cleanworkscorp.com/wp-content/uploads/2020/04/Clean_Works_Heathcare_Mini.pdf (accessed 09 Nov 2020).
144. Clift, A. K.; Coupland, C. A. C.; Keogh, R. H.; Hemingway, H., COVID-19 Mortality Risk in Down Syndrome: Results From a Cohort Study Of 8 Million Adults. *Annals of Internal Medicine* **2020,** *0* (0), null. https://www.acpjournals.org/doi/abs/10.7326/M20-4986
145. ClinicalTrials.gov, A Longitudinal Study of COVID-19 Sequelae and Immunity. https://clinicaltrials.gov/ct2/show/NCT04411147 (accessed 15 Feb 2021).
146. ClinicalTrials.gov, LYT-100 in Post-acute COVID-19 Respiratory Disease. https://www.clinicaltrials.gov/ct2/show/NCT04652518 (accessed 15 Feb 2021).
147. Clover, A Controlled Phase 2/3 Study of Adjuvanted Recombinant SARS-CoV-2 Trimeric S-protein Vaccine (SCB-2019) for the Prevention of COVID-19 (SCB-2019). https://clinicaltrials.gov/ct2/show/NCT04672395.
148. Cockrell, A. S.; Yount, B. L.; Scobey, T.; Jensen, K.; Douglas, M.; Beall, A.; Tang, X.-C.; Marasco, W. A.; Heise, M. T.; Baric, R. S., A mouse model for MERS coronavirus-induced acute respiratory distress syndrome. *Nature microbiology* **2016,** *2* (2), 1-11.

149. Cohen, J., Mining coronavirus genomes for clues to the outbreak's origins. *Science* 2020. https://www.sciencemag.org/news/2020/01/mining-coronavirus-genomes-clues-outbreak-s-origins
150. Cohen, J., One-dose COVID-19 vaccine offers solid protection against severe disease. https://www.sciencemag.org/news/2021/01/one-dose-covid-19-vaccine-offers-solid-protection-against-severe-disease.
151. Cohen, J., Wuhan seafood market may not be source of novel virus spreading globally. https://www.sciencemag.org/news/2020/01/wuhan-seafood-market-may-not-be-source-novel-virus-spreading-globally (accessed 01/27/2020).
152. Conlen, M.; Lu, D.; Glanz, J., Why vaccines alone will not end the pandemic. *New York Times* 2021. https://www.nytimes.com/interactive/2021/01/24/us/covid-vaccine-rollout.html
153. Control, E. C. f. D. P. a., Rapid Risk Assessment: Detection of new SARS-CoV-2 variants related to mink. *European Centre for Disease Prevention and Control* **2020**. https://www.ecdc.europa.eu/en/publications-data/detection-new-sars-cov-2-variants-mink?ftag=MSF0951a18
154. Courtemanche, C.; Garuccio, J.; Le, A.; Pinkston, J.; Yelowitz, A., Strong Social Distancing Measures In The United States Reduced The COVID-19 Growth Rate. *Health Affairs* **2020**, 10.1377/hlthaff.2020.00608. https://doi.org/10.1377/hlthaff.2020.00608
155. Coutard, B.; Valle, C.; de Lamballerie, X.; Canard, B.; Seidah, N.; Decroly, E., The spike glycoprotein of the new coronavirus 2019-nCoV contains a furin-like cleavage site absent in CoV of the same clade. *Antiviral research* **2020,** *176*, 104742.
156. CPH, COVID-19 Variant First Found in Other Countries and States Now Seen More Frequently in California. California Department of Public Health: 2021. https://www.cdph.ca.gov/Programs/OPA/Pages/NR21-020.aspx
157. CureVac, A Study to Determine the Safety and Efficacy of SARS-CoV-2 mRNA Vaccine CVnCoV in Adults. https://clinicaltrials.gov/ct2/show/NCT04652102.
158. Cutts, T.; Kasloff, S.; Safronetz, D.; Krishnan, J., Decontamination of Common Healthcare Facility Surfaces Contaminated with SARS-CoV-2 using Peracetic Acid Dry Fogging. *bioRxiv* **2020**, 2020.12.04.412585. https://www.biorxiv.org/content/biorxiv/early/2020/12/07/2020.12.04.412585.full.pdf
159. da Rosa Mesquita, R.; Francelino Silva Junior, L. C.; Santos Santana, F. M.; Farias de Oliveira, T.; Campos Alcântara, R.; Monteiro Arnozo, G.; Rodrigues da Silva Filho, E.; Galdino dos Santos, A. G.; Oliveira da Cunha, E. J.; Salgueiro de Aquino, S. H.; Freire de Souza, C. D., Clinical manifestations of COVID-19 in the general population: systematic review. *Wiener klinische Wochenschrift* **2020**. https://doi.org/10.1007/s00508-020-01760-4
160. da Silva Francisco, R.; Benites, L. F.; Lamarca, A. P.; de Almeida, L. G. P.; Hansen, A. W.; Gularte, J. S.; Demoliner, M.; Gerber, A. L.; de C Guimarães, A. P.; Antunes, A. K. E.; Heldt, F. H.; Mallmann, L.; Hermann, B.; Ziulkoski, A. L.; Goes, V.; Schallenberger, K.; Fillipi, M.; Pereira, F.; Weber, M. N.; de Almeida, P. R.; Fleck, J. D.; Vasconcelos, A. T. R.; Spilki, F. R., Pervasive transmission of E484K and emergence of VUI-NP13L with evidence of SARS-CoV-2 co-infection events by two different lineages in Rio Grande do Sul, Brazil. *medRxiv* **2021**, 2021.01.21.21249764. https://www.medrxiv.org/content/medrxiv/early/2021/01/26/2021.01.21.21249764.full.pdf
161. Dan, J. M.; Mateus, J.; Kato, Y.; Hastie, K. M.; Yu, E. D.; Faliti, C. E.; Grifoni, A.; Ramirez, S. I.; Haupt, S.; Frazier, A.; Nakao, C.; Rayaprolu, V.; Rawlings, S. A.; Peters, B.; Krammer, F.; Simon, V.; Saphire, E. O.; Smith, D. M.; Weiskopf, D.; Sette, A.; Crotty, S., Immunological memory to SARS-CoV-2 assessed for up to 8 months after infection. *Science* **2021**, eabf4063. https://science.sciencemag.org/content/sci/early/2021/01/06/science.abf4063.full.pdf
162. Dasgupta, S.; Bowen, V. B. L., A.; al., e., Association Between Social Vulnerability and a County's Risk for Becoming a COVID-19 Hotspot — United States, June 1–July 25, 2020. *Morbidity and Mortality*

Weekly Report **2020,** *2020* (69), 1535-1541.
https://www.cdc.gov/mmwr/volumes/69/wr/mm6942a3.htm
163. Dattner, I.; Goldberg, Y.; Katriel, G.; Yaari, R.; Gal, N.; Miron, Y.; Ziv, A.; Sheffer, R.; Hamo, Y.; Huppert, A., The role of children in the spread of COVID-19: Using household data from Bnei Brak, Israel, to estimate the relative susceptibility and infectivity of children. *medRxiv* **2020**, 2020.06.03.20121145.
https://www.medrxiv.org/content/medrxiv/early/2020/10/11/2020.06.03.20121145.full.pdf
164. Davies, A.; Thompson, K. A.; Giri, K.; Kafatos, G.; Walker, J.; Bennett, A., Testing the efficacy of homemade masks: would they protect in an influenza pandemic? *Disaster Med Public Health Prep* **2013,** *7* (4), 413-8. https://www.ncbi.nlm.nih.gov/pubmed/24229526
165. Davies, N. G.; Barnard, R. C.; Jarvis, C. I.; Kucharski, A. J.; Munday, J. D.; Pearson, C.; Russell, T. W.; Tully, D. C.; Abbott, S.; Gimma, A.; Waites, W.; Wong, K. L. M.; van Zandvoort, K.; CMMID COVID-19 Working Group; Eggo, R. M.; Funk, S.; Jit, M.; Atkins, K. E.; Edmunds, J. E., Estimated transmissibility and severity of novel SARS-CoV-2 Variant of Concern 202012/01 in England. *Preprint* **2020**.
https://cmmid.github.io/topics/covid19/reports/uk-novel-variant/2020_12_23_Transmissibility_and_severity_of_VOC_202012_01_in_England.pdf
166. Davies, N. G.; Barnard, R. C.; Jarvis, C. I.; Russell, T. W.; Semple, M. G.; Jit, M.; Edmunds, W. J., Association of tiered restrictions and a second lockdown with COVID-19 deaths and hospital admissions in England: a modelling study. *The Lancet Infectious Diseases* **2020**.
http://www.sciencedirect.com/science/article/pii/S1473309920309841
167. Davis, H. E.; Assaf, G. S.; McCorkell, L.; Wei, H.; Low, R. J.; Re'em, Y.; Redfield, S.; Austin, J. P.; Akrami, A., Characterizing Long COVID in an International Cohort: 7 Months of Symptoms and Their Impact. *medRxiv* **2020**, 2020.12.24.20248802.
https://www.medrxiv.org/content/medrxiv/early/2020/12/27/2020.12.24.20248802.full.pdf
168. Davis, N., Up to 90 volunteers in UK to take part in pioneering Covid infection trial. *The Guardian* 2021. https://www.theguardian.com/world/2021/feb/17/uk-to-begin-worlds-first-covid-human-challenge-study-within-weeks
169. De Albuquerque, N.; Baig, E.; Ma, X.; Zhang, J.; He, W.; Rowe, A.; Habal, M.; Liu, M.; Shalev, I.; Downey, G. P.; Gorczynski, R.; Butany, J.; Leibowitz, J.; Weiss, S. R.; McGilvray, I. D.; Phillips, M. J.; Fish, E. N.; Levy, G. A., Murine hepatitis virus strain 1 produces a clinically relevant model of severe acute respiratory syndrome in A/J mice. *J Virol* **2006,** *80* (21), 10382-94.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1641767/pdf/0747-06.pdf
170. de Haan, C. A. M.; Haijema, B. J.; Schellen, P.; Schreur, P. W.; te Lintelo, E.; Vennema, H.; Rottier, P. J. M., Cleavage of Group 1 Coronavirus Spike Proteins: How Furin Cleavage Is Traded Off against Heparan Sulfate Binding upon Cell Culture Adaptation. *Journal of Virology* **2008,** *82* (12), 6078-6083.
https://jvi.asm.org/content/jvi/82/12/6078.full.pdf
171. de Vries, R. D.; Schmitz, K. S.; Bovier, F. T.; Noack, D.; Haagmans, B. L.; Biswas, S.; Rockx, B.; Gellman, S. H.; Alabi, C. A.; de Swart, R. L.; Moscona, A.; Porotto, M., Intranasal fusion inhibitory lipopeptide prevents direct contact SARS-CoV-2 transmission in ferrets. *bioRxiv* **2020**, 2020.11.04.361154.
https://www.biorxiv.org/content/biorxiv/early/2020/11/05/2020.11.04.361154.full.pdf
172. de Vries, R. D.; Schmitz, K. S.; Bovier, F. T.; Predella, C.; Khao, J.; Noack, D.; Haagmans, B. L.; Herfst, S.; Stearns, K. N.; Drew-Bear, J.; Biswas, S.; Rockx, B.; McGill, G.; Dorrello, N. V.; Gellman, S. H.; Alabi, C. A.; de Swart, R. L.; Moscona, A.; Porotto, M., Intranasal fusion inhibitory lipopeptide prevents direct-contact SARS-CoV-2 transmission in ferrets. *Science* **2021**, eabf4896.
https://science.sciencemag.org/content/sci/early/2021/02/16/science.abf4896.full.pdf
173. Dediego, M. L.; Pewe, L.; Alvarez, E.; Rejas, M. T.; Perlman, S.; Enjuanes, L., Pathogenicity of severe acute respiratory coronavirus deletion mutants in hACE-2 transgenic mice. *Virology* **2008,** *376* (2), 379-389. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2810402/

174. Degesys, N. F.; Wang, R. C.; Kwan, E.; Fahimi, J.; Noble, J. A.; Raven, M. C., Correlation Between N95 Extended Use and Reuse and Fit Failure in an Emergency Department. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.9843
175. Demichev, V.; Tober-Lau, P.; Nazarenko, T.; Thibeault, C.; Whitwell, H.; Lemke, O.; Röhl, A.; Freiwald, A.; Szyrwiel, L.; Ludwig, D.; Correia-Melo, C.; Helbig, E. T.; Stubbemann, P.; Grüning, N.-M.; Blyuss, O.; Vernardis, S.; White, M.; Messner, C. B.; Joannidis, M.; Sonnweber, T.; Klein, S. J.; Pizzini, A.; Wohlfarter, Y.; Sahanic, S.; Hilbe, R.; Schaefer, B.; Wagner, S.; Mittermaier, M.; Machleidt, F.; Garcia, C.; Ruwwe-Glösenkamp, C.; Lingscheid, T.; de Jarcy, L. B.; Stegemann, M. S.; Pfeiffer, M.; Jürgens, L.; Denker, S.; Zickler, D.; Enghard, P.; Zelezniak, A.; Campbell, A.; Hayward, C.; Porteous, D. J.; Marioni, R. E.; Uhrig, A.; Müller-Redetzky, H.; Zoller, H.; Löffler-Ragg, J.; Keller, M. A.; Tancevski, I.; Timms, J. F.; Zaikin, A.; Hippenstiel, S.; Ramharter, M.; Witzenrath, M.; Suttorp, N.; Lilley, K.; Mülleder, M.; Sander, L. E.; Ralser, M.; Kurth, F., A time-resolved proteomic and diagnostic map characterizes COVID-19 disease progression and predicts outcome. *medRxiv* **2020**, 2020.11.09.20228015. https://www.medrxiv.org/content/medrxiv/early/2020/11/12/2020.11.09.20228015.full.pdf
176. Denas, G.; Gennaro, N.; Ferroni, E.; Fedeli, U.; Lorenzoni, G.; Gregori, D.; Iliceto, S.; Pengo, V., Reduction in all-cause mortality in COVID-19 patients on chronic oral anticoagulation: A population-based propensity score matched study. *Int J Cardiol* **2020**. https://www.sciencedirect.com/science/article/pii/S0167527320342728?via%3Dihub
177. Deng, W.; Bao, L.; Gao, H.; Xiang, Z.; Qu, Y.; Song, Z.; Gong, S.; Liu, J.; Liu, J.; Yu, P.; Qi, F.; Xu, Y.; Li, F.; Xiao, C.; Lv, Q.; Xue, J.; Wei, Q.; Liu, M.; Wang, G.; Wang, S.; Yu, H.; Chen, T.; Liu, X.; Zhao, W.; Han, Y.; Qin, C., Ocular conjunctival inoculation of SARS-CoV-2 can cause mild COVID-19 in rhesus macaques. *Nature Communications* **2020,** *11* (1), 4400. https://doi.org/10.1038/s41467-020-18149-6
178. Deng, W.; Bao, L.; Gao, H.; Xiang, Z.; Qu, Y.; Song, Z.; Gong, S.; Liu, J.; Liu, J.; Yu, P.; Qi, F.; Xu, Y.; Li, F.; Xiao, C.; Lv, Q.; Xue, J.; Wei, Q.; Liu, M.; Wang, G.; Wang, S.; Yu, H.; Liu, X.; Zhao, W.; Han, Y.; Qin, C., Ocular conjunctival inoculation of SARS-CoV-2 can cause mild COVID-19 in Rhesus macaques. *bioRxiv* **2020**.
179. Dentali, F.; Sironi, A. P.; Ageno, W.; Turato, S.; Bonfanti, C.; Frattini, F.; Crestani, S.; Franchini, M., In *Non-O blood type is the commonest genetic risk factor for VTE: results from a meta-analysis of the literature*, Seminars in thrombosis and hemostasis, Thieme Medical Publishers: 2012; pp 535-548.
180. DHS, Estimated Airborne Decay of SARS-CoV-2. https://www.dhs.gov/science-and-technology/sars-airborne-calculator.
181. DHS, Estimated Natural Decay of SARS-CoV-2 (virus that causes COVID-19) on surfaces under a range of temperatures and relative humidity. https://www.dhs.gov/science-and-technology/sars-calculator.
182. DHS, *Low-Cost Decontamination of N95 Respirators*; Department of Homeland Security Science &Technology Directorate: 2020. https://www.dhs.gov/sites/default/files/publications/multicooker_n95_decontamination_factsheet_v9_2020_06_15.pdf
183. Dollard, P.; Griffin, I.; Berro, A.; al., e., Risk Assessment and Management of COVID-19 Among Travelers Arriving at Designated U.S. Airports, January 17–September 13, 2020. *Morbidity and Mortality Weekly Report* **2020,** *2020* (69), 1681-1685. https://www.cdc.gov/mmwr/volumes/69/wr/mm6945a4.htm
184. Domi, M.; Leitson, M.; Gifford, D.; Sreenivas, K., *Nursing Home Resident and Staff Covid-19 Cases After the First Vaccination Clinic*; Center for Health Policy Evaluation in Long-Term Care: 2021. https://www.ahcancal.org/Data-and-Research/Center-for-HPE/Documents/CHPE-Report-Vaccine-Effectiveness-Feb2021.pdf

185. Dong, Y.; Mo, X.; Hu, Y.; Qi, X.; Jiang, F.; Jiang, Z.; Tong, S., Epidemiological Characteristics of 2143 Pediatric Patients With 2019 Coronavirus Disease in China. *Pediatrics* **2020**, e20200702. https://pediatrics.aappublications.org/content/pediatrics/early/2020/03/16/peds.2020-0702.full.pdf
186. Donnelly, J. P.; Wang, X. Q.; Iwashyna, T. J.; Prescott, H. C., Readmission and Death After Initial Hospital Discharge Among Patients With COVID-19 in a Large Multihospital System. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.21465
187. Doung-Ngern, P.; Suphanchaimat, R.; Panjangampatthana, A.; Janekrongtham, C.; Ruampoom, D.; Daochaeng, N.; Eungkanit, N.; Pisitpayat, N.; Srisong, N.; Yasopa, O.; Plernprom, P.; Promduangsi, P.; Kumphon, P.; Suangtho, P.; Watakulsin, P.; Chaiya, S.; Kripattanapong, S.; Chantian, T.; Bloss, E.; Namwat, C.; Limmathurotsakul, D., Case-Control Study of Use of Personal Protective Measures and Risk for Severe Acute Respiratory Syndrome Coronavirus 2 Infection, Thailand. *Emerg Infect Dis* **2020,** *26* (11).
188. du Plessis, L.; McCrone, J. T.; Zarebski, A. E.; Hill, V.; Ruis, C.; Gutierrez, B.; Raghwani, J.; Ashworth, J.; Colquhoun, R.; Connor, T. R.; Faria, N. R.; Jackson, B.; Loman, N. J.; O'Toole, Á.; Nicholls, S. M.; Parag, K. V.; Scher, E.; Vasylyeva, T. I.; Volz, E. M.; Watts, A.; Bogoch, I. I.; Khan, K.; Aanensen, D. M.; Kraemer, M. U. G.; Rambaut, A.; Pybus, O. G., Establishment and lineage dynamics of the SARS-CoV-2 epidemic in the UK. *Science* **2021**, eabf2946. https://science.sciencemag.org/content/sci/early/2021/01/07/science.abf2946.full.pdf
189. Du, Z.; Xu, X.; Wang, L.; Fox, S. J.; Cowling, B. J.; Galvani, A. P.; Meyers, L. A., Effects of Proactive Social Distancing on COVID-19 Outbreaks in 58 Cities, China. *Emerg Infect Dis* **2020,** *26* (9).
190. Du, Z.; Xu, x.; Wu, Y.; Wang, L.; Cowling, B. J.; Meyers, L. A., COVID-19 serial interval estimates based on confirmed cases in public reports from 86 Chinese cities. *medRxiv* **2020**, 2020.04.23.20075796. https://www.medrxiv.org/content/medrxiv/early/2020/04/27/2020.04.23.20075796.full.pdf
191. Du, Z.; Xu, X.; Wu, Y.; Wang, L.; Cowling, B. J.; Meyers, L. A., The serial interval of COVID-19 from publicly reported confirmed cases. *medRxiv* **2020**, 2020.02.19.20025452. https://www.medrxiv.org/content/medrxiv/early/2020/03/13/2020.02.19.20025452.full.pdf
192. Dufort, E. M.; Koumans, E. H.; Chow, E. J.; Rosenthal, E. M.; Muse, A.; Rowlands, J.; Barranco, M. A.; Maxted, A. M.; Rosenberg, E. S.; Easton, D.; Udo, T.; Kumar, J.; Pulver, W.; Smith, L.; Hutton, B.; Blog, D.; Zucker, H., Multisystem Inflammatory Syndrome in Children in New York State. *New England Journal of Medicine* **2020,** *383* (4), 347-358. https://www.nejm.org/doi/full/10.1056/NEJMoa2021756
193. Dunker, S.; Hornick, T.; Szczepankiewicz, G.; Maier, M.; Bastl, M.; Bumberger, J.; Treudler, R.; Liebert, U. G.; Simon, J.-C., No SARS-CoV-2 detected in air samples (pollen and particulate matter) in Leipzig during the first spread. *Science of The Total Environment* **2020**, 142881. http://www.sciencedirect.com/science/article/pii/S0048969720364111
194. Dzien, C.; Halder, W.; Winner, H.; Lechleitner, M., Covid-19 screening: are forehead temperature measurements during cold outdoor temperatures really helpful? *Wiener Klinische Wochenschrift* **2020**, 1-5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7582437/
195. ECDC, *Rapid increase of a SARS-CoV-2 variant with multiple spike protein mutations observed in the United Kingdom* European Centre for Disease Prevention and Control: 20 December 2020, 2020. https://www.ecdc.europa.eu/sites/default/files/documents/SARS-CoV-2-variant-multiple-spike-protein-mutations-United-Kingdom.pdf
196. Edridge, A. W. D.; Kaczorowska, J.; Hoste, A. C. R.; Bakker, M.; Klein, M.; Jebbink, M. F.; Matser, A.; Kinsella, C. M.; Rueda, P.; Prins, M.; Sastre, P.; Deijs, M.; Hoek, L. v. d., Coronavirus protective immunity is short-lasting *Pre-print* **2020**. https://www.medrxiv.org/content/10.1101/2020.05.11.20086439v2.full.pdf
197. Edwards, D. A.; Ausiello, D.; Salzman, J.; Devlin, T.; Langer, R.; Beddingfield, B. J.; Fears, A. C.; Doyle-Meyers, L. A.; Redmann, R. K.; Killeen, S. Z.; Maness, N. J.; Roy, C. J., Exhaled aerosol increases with

COVID-19 infection, age, and obesity. *Proceedings of the National Academy of Sciences* **2021,** *118* (8), e2021830118. https://www.pnas.org/content/pnas/118/8/e2021830118.full.pdf
198. Edwards, E., J&J says vaccine effective against Covid, though weaker against South Africa variant. *NBC news* 2021. https://www.nbcnews.com/health/health-news/j-j-vaccine-effective-against-covid-though-weaker-against-south-n1255400
199. Eikenberry, S. E.; Mancuso, M.; Iboi, E.; Phan, T.; Eikenberry, K.; Kuang, Y.; Kostelich, E.; Gumel, A. B., To mask or not to mask: Modeling the potential for face mask use by the general public to curtail the COVID-19 pandemic. *Infectious Disease Modelling* **2020**.
200. Ellume Health, FDA Authorizes Ellume COVID-19 Home Test as First Over-the-Counter Fully At-Home Diagnostic Test. https://www.globenewswire.com/news-release/2020/12/15/2145612/0/en/FDA-Authorizes-Ellume-COVID-19-Home-Test-as-First-Over-the-Counter-Fully-At-Home-Diagnostic-Test.html (accessed 16 Dec 2020).
201. EMA, Comirnaty. https://www.ema.europa.eu/en/medicines/human/EPAR/comirnaty.
202. EMA, EMA recommends COVID-19 Vaccine AstraZeneca for authorisation in the EU. https://www.ema.europa.eu/en/news/ema-recommends-covid-19-vaccine-astrazeneca-authorisation-eu.
203. EMA, EMA recommends COVID-19 Vaccine Moderna for authorisation in the EU. https://www.ema.europa.eu/en/news/ema-recommends-covid-19-vaccine-moderna-authorisation-eu.
204. Endeman, H.; van der Zee, P.; van Genderen, M. E.; van den Akker, J. P. C.; Gommers, D., Progressive respiratory failure in COVID-19: a hypothesis. *The Lancet Infectious Diseases* **2020**. https://doi.org/10.1016/S1473-3099(20)30366-2
205. Endo, A.; Abbott, S.; Kucharski, A.; Funk, S., Estimating the overdispersion in COVID-19 transmission using outbreak sizes outside China [version 1; peer review: 1 approved, 1 approved with reservations]. *Wellcome Open Research* **2020,** *5* (67). https://wellcomeopenresearch.org/articles/5-67/v1
206. England, P. H., *Investigation of novel SARS-CoV-2 variant. Variant of Concern 202012/01*; 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957504/Variant_of_Concern_VOC_202012_01_Technical_Briefing_5_England.pdf
207. Environmental Protection Agency (EPA), List N: Disinfectants for Use Against SARS-CoV-2 (COVID-19). https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2-covid-19 (accessed 21 Sept 2020).
208. Environmental Protection Agency (EPA), Section 18 Emergency Exemption Requests and Coronavirus (COVID-19). https://www.epa.gov/pesticide-registration/section-18-emergency-exemption-requests-and-coronavirus-covid-19 (accessed 31 August 2020).
209. Fabre Estremera, M.; Ruiz-Martinez, S.; Monserrat, M. E.; Cortizo Garrido, S.; Beunza Fabra, Z.; PerÃ¡n, M.; Benito, R.; Mateo, P.; Paules, C.; OrÃ³s, D., EXPRESS: SARS-CoV-2 immunochromatographic IgM/IgG rapid test in pregnancy: a false friend? *Annals of Clinical Biochemistry* **2020**, 0004563220980495. https://doi.org/10.1177/0004563220980495
210. Facchetti, F.; Bugatti, M.; Drera, E.; Tripodo, C.; Sartori, E.; Cancila, V.; Papaccio, M.; Castellani, R.; Casola, S.; Boniotti, M. B.; Cavadini, P.; Lavazza, A., SARS-CoV2 vertical transmission with adverse effects on the newborn revealed through integrated immunohistochemical, electron microscopy and molecular analyses of Placenta. *EBioMedicine* **2020,** *59*. https://doi.org/10.1016/j.ebiom.2020.102951
211. Fagre, A.; Lewis, J.; Eckley, M.; Zhan, S.; Rocha, S. M.; Sexton, N. R.; Burke, B.; Geiss, B. J.; Peersen, O.; Kading, R.; Rovnak, J.; Ebel, G. D.; Tjalkens, R. B.; Aboellail, T.; Schountz, T., SARS-CoV-2 infection, neuropathogenesis and transmission among deer mice: Implications for reverse zoonosis to New World rodents. *bioRxiv* **2020**, 2020.08.07.241810. http://biorxiv.org/content/early/2020/08/07/2020.08.07.241810.abstract
212. Faria, N. R.; Claro, I. M.; Candido, D.; Franco, L. A. M.; Andrade, P. S.; Coletti, T. M.; Silva, C. A. M.; Sales, F. C.; Manuli, E. R.; Aguiar, R. S.; Gaburo, N.; Camilo, C. d. C.; Fraiji, N. A.; Crispim, M. A. E.;

Carvalho, M. d. P. S. S.; Rambaut, A.; Loman, N.; Pybus, O. G.; Sabino, E. C.; Network, C. G., Genomic characterisation of an emergent SARS-CoV-2 lineage in Manaus: preliminary findings. https://virological.org/t/genomic-characterisation-of-an-emergent-sars-cov-2-lineage-in-manaus-preliminary-findings/586.
213. Fazio, R. H.; Ruisch, B. C.; Moore, C. A.; Granados Samayoa, J. A.; Boggs, S. T.; Ladanyi, J. T., Social distancing decreases an individual's likelihood of contracting COVID-19. *Proceedings of the National Academy of Sciences* **2021,** *118* (8), e2023131118. https://www.pnas.org/content/pnas/118/8/e2023131118.full.pdf
214. FDA, COVID-19 Update: FDA Broadens Emergency Use Authorization for Veklury (remdesivir) to Include All Hospitalized Patients for Treatment of COVID-19. Food and Drug Administration: 2020. https://www.fda.gov/news-events/press-announcements/covid-19-update-fda-broadens-emergency-use-authorization-veklury-remdesivir-include-all-hospitalized
215. FDA, *Emergency Use Authorization*; Food and Drug Administration: 2020. https://www.fda.gov/media/136529/download
216. FDA, FAQs on Shortages of Surgical Masks and Gowns. https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/faqs-shortages-surgical-masks-and-gowns#kn95.
217. FDA, FAQs on Testing for SARS-CoV-2. https://www.fda.gov/medical-devices/emergency-situations-medical-devices/faqs-testing-sars-cov-2#nolonger.
218. FDA, FDA Takes Additional Action in Fight Against COVID-19 By Issuing Emergency Use Authorization for Second COVID-19 Vaccine. https://www.fda.gov/news-events/press-announcements/fda-takes-additional-action-fight-against-covid-19-issuing-emergency-use-authorization-second-covid.
219. FDA, FDA Takes Key Action in Fight Against COVID-19 By Issuing Emergency Use Authorization for First COVID-19 Vaccine. https://www.fda.gov/news-events/press-announcements/fda-takes-key-action-fight-against-covid-19-issuing-emergency-use-authorization-first-covid-19.
220. FDA, Protective Barrier Enclosures Without Negative Pressure Used During the COVID-19 Pandemic May Increase Risk to Patients and Health Care Providers - Letter to Health Care Providers. Food and Drug Administration: 2020. https://www.fda.gov/medical-devices/letters-health-care-providers/protective-barrier-enclosures-without-negative-pressure-used-during-covid-19-pandemic-may-increase
221. FDA, Quest Diagnostics RC COVID-19 +Flu RT-PCR. https://www.fda.gov/media/144180/download.
222. FDA, Respirator Models Removed from Appendix A. https://www.fda.gov/media/137928/download (accessed 05/15/2020).
223. FDA, U. S., FDA Approves First Treatment for COVID-19. 2020. https://www.fda.gov/news-events/press-announcements/fda-approves-first-treatment-covid-19
224. Fears, A.; Klimstra, W.; Duprex, P.; Hartman, A.; Weaver, S.; Plante, K.; Mirchandani, D.; Plante, J. A.; Aguilar, P.; Fernández, D.; Nalca, A.; Totura, A.; Dyer, D.; Kearney, B.; Lackemeyer, M.; Bohannon, J. K.; Johnson, R.; Garry, R.; Reed, D.; Roy, C., Persistence of Severe Acute Respiratory Syndrome Coronavirus 2 in Aerosol Suspensions. *Emerging Infectious Disease journal* **2020,** *26* (9). https://wwwnc.cdc.gov/eid/article/26/9/20-1806_article
225. Feldman, O.; Meir, M.; Shavit, D.; Idelman, R.; Shavit, I., Exposure to a Surrogate Measure of Contamination From Simulated Patients by Emergency Department Personnel Wearing Personal Protective Equipment. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.6633
226. Figueiredo-Campos, P.; Blankenhaus, B.; Mota, C.; Gomes, A.; Serrano, M.; Ariotti, S.; Costa, C.; Nunes-Cabaço, H.; Mendes, A. M.; Gaspar, P.; Pereira-Santos, M. C.; Rodrigues, F.; Condeço, J.; Escoval, M. A.; Santos, M.; Ramirez, M.; Melo-Cristino, J.; Simas, J. P.; Vasconcelos, E.; Afonso, Â.; Veldhoen, M., Seroprevalence of anti-SARS-CoV-2 antibodies in COVID-19 patients and healthy volunteers up to six

months post disease onset. *European Journal of Immunology n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1002/eji.202048970
227. Fiolet, T.; Guihur, A.; Rebeaud, M.; Mulot, M.; Peiffer-Smadja, N.; Mahamat-Saleh, Y., Effect of hydroxychloroquine with or without azithromycin on the mortality of COVID-19 patients: a systematic review and meta-analysis. *Clinical Microbiology and Infection* **2020**. http://www.sciencedirect.com/science/article/pii/S1198743X2030505X
228. Firth, J. A.; Hellewell, J.; Klepac, P.; Kissler, S. M.; Group, C. C.-W.; Kucharski, A. J.; Spurgin, L. G., Combining fine-scale social contact data with epidemic modelling reveals interactions between contact tracing, quarantine, testing and physical distancing for controlling COVID-19. *Preprint* **2020**. https://cmmid.github.io/topics/covid19/reports/2020_05_25_firth_et_al_manuscript.pdf
229. Fischer, E. P.; Fischer, M. C.; Grass, D.; Henrion, I.; Warren, W. S.; Westman, E., Low-cost measurement of facemask efficacy for filtering expelled droplets during speech. *Science Advances* **2020,** *07 August 2020*.
230. Fischer, K. A.; Olson, S. M.; Tenforde, M. W.; al., e., Telework Before Illness Onset Among Symptomatic Adults Aged ≥18 Years With and Without COVID-19 in 11 Outpatient Health Care Facilities — United States, July 2020. *Morbidity and Mortality Weekly Report* **2020,** *2020* (69), 1648-1653. https://www.cdc.gov/mmwr/volumes/69/wr/mm6944a4.htm?s_cid=mm6944a4_w
231. Fischer, R.; Morris, D.; van Doremalen, N.; Sarchette, S.; Matson, M. J.; Bushmaker, T.; Yinda, C. K.; Seifert, S.; Gamble, A.; Williamson, B.; Judson, S.; de Wit, E.; Lloyd-Smith, J.; Munster, V., Effectiveness of N95 Respirator Decontamination and Reuse against SARS-CoV-2 Virus. *Emerging Infectious Disease journal* **2020,** *26* (9), 2253. https://wwwnc.cdc.gov/eid/article/26/9/20-1524_article
232. Fischer, R.; Morris, D. H.; van Doremalen, N.; Sarchette, S.; Matson, J.; Bushmaker, T.; Yinda, C. K.; Seifert, S.; Gamble, A.; Williamson, B.; Judson, S.; de Wit, E.; Lloyd-Smith, J.; Munster, V., Assessment of N95 respirator decontamination and re-use for SARS-CoV-2. *medRxiv* **2020**, 2020.04.11.20062018. https://www.medrxiv.org/content/medrxiv/early/2020/04/24/2020.04.11.20062018.full.pdf
233. Fisher, D.; Reilly, A.; Zheng, A. K. E.; Cook, A. R.; Anderson, D. E., Seeding of outbreaks of COVID-19 by contaminated fresh and frozen food. *bioRxiv* **2020**, 2020.08.17.255166. https://www.biorxiv.org/content/biorxiv/early/2020/08/18/2020.08.17.255166.full.pdf
234. Fisher, K. A.; Tenforde, M. W.; Feldstein, L. R.; al., e., Community and Close Contact Exposures Associated with COVID-19 Among Symptomatic Adults ≥18 Years in 11 Outpatient Health Care Facilities — United States, July 2020. *Morbidity and Mortality Weekly Report* **2020,** *2020* (69), 1258-1264. https://www.cdc.gov/mmwr/volumes/69/wr/mm6936a5.htm
235. Fitzpatrick, J.; DeSalvo, K., Helping public health officials combat COVID-19. Google: 2020. https://www.blog.google/technology/health/covid-19-community-mobility-reports?hl=en
236. Flannery, D. D.; Gouma, S.; Dhudasia, M. B.; Mukhopadhyay, S.; Pfeifer, M. R.; Woodford, E. C.; Gerber, J. S.; Arevalo, C. P.; Bolton, M. J.; Weirick, M. E.; Goodwin, E. C.; Anderson, E. M.; Greenplate, A. R.; Kim, J.; Han, N.; Pattekar, A.; Dougherty, J.; Kuthuru, O.; Mathew, D.; Baxter, A. E.; Vella, L. A.; Weaver, J.; Verma, A.; Leite, R.; Morris, J. S.; Rader, D. J.; Elovitz, M. A.; Wherry, E. J.; Puopolo, K. M.; Hensley, S. E., SARS-CoV-2 seroprevalence among parturient women in Philadelphia. *Science Immunology* **2020,** *5* (49), eabd5709. https://immunology.sciencemag.org/content/immunology/5/49/eabd5709.full.pdf
237. Flannery, D. D.; Gouma, S.; Dhudasia, M. B.; Mukhopadhyay, S.; Pfeifer, M. R.; Woodford, E. C.; Triebwasser, J. E.; Gerber, J. S.; Morris, J. S.; Weirick, M. E.; McAllister, C. M.; Bolton, M. J.; Arevalo, C. P.; Anderson, E. M.; Goodwin, E. C.; Hensley, S. E.; Puopolo, K. M., Assessment of Maternal and Neonatal Cord Blood SARS-CoV-2 Antibodies and Placental Transfer Ratios. *JAMA Pediatrics* **2021**. https://doi.org/10.1001/jamapediatrics.2021.0038
238. Flores-Alanis, A.; Sandner-Miranda, L.; Delgado, G.; Cravioto, A.; Morales-Espinosa, R., The receptor binding domain of SARS-CoV-2 spike protein is the result of an ancestral recombination between the

bat-CoV RaTG13 and the pangolin-CoV MP789. *BMC Research Notes* **2020,** *13* (1), 398. https://doi.org/10.1186/s13104-020-05242-8
239. Food and Drug Administration (FDA), Coronavirus (COVID-19) Update: FDA Authorizes Antigen Test as First Over-the-Counter Fully At-Home Diagnostic Test for COVID-19. https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-antigen-test-first-over-counter-fully-home-diagnostic (accessed 17 Dec 2020).
240. Food and Drug Administration (FDA), Coronavirus (COVID-19) Update: February 5, 2021. https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-february-5-2021 (accessed 08 Feb 2021).
241. Food and Drug Administration (FDA), Coronavirus (COVID-19) Update: February 19, 2021. https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-february-19-2021 (accessed 22 Feb 2021).
242. Food and Drug Administration (FDA), FDA tracks impact of COVID-19 mutations on test performance. https://www.medtechdive.com/news/fda-tracks-impact-covid-19-mutations-on-tests/592970/ (accessed 07 Jan 2021).
243. Food and Drug Administration (FDA), SARS-CoV-2 Reference Panel Comparative Data. https://www.fda.gov/medical-devices/coronavirus-covid-19-and-medical-devices/sars-cov-2-reference-panel-comparative-data (accessed 28 Sept 2020).
244. Frank, S.; Brown, S. M.; Capriotti, J. A.; Westover, J. B.; Pelletier, J. S.; Tessema, B., In Vitro Efficacy of a Povidone-Iodine Nasal Antiseptic for Rapid Inactivation of SARS-CoV-2. *JAMA Otolaryngology–Head & Neck Surgery* **2020**. https://doi.org/10.1001/jamaoto.2020.3053
245. Fraser, D. D.; Slessarev, M.; Martin, C. M.; Daley, M.; Patel, M. A.; Miller, M. R.; Patterson, E. K.; O'Gorman, D. B.; Gill, S. E.; Wishart, D. S.; Mandal, R.; Cepinskas, G.; Team, O. b. o. t. L. C. S., Metabolomics Profiling of Critically Ill Coronavirus Disease 2019 Patients: Identification of Diagnostic and Prognostic Biomarkers. *Critical Care Explorations* **2020,** *2* (10), e0272. https://journals.lww.com/ccejournal/Fulltext/2020/10000/Metabolomics_Profiling_of_Critically_Ill.44.aspx
246. Freuling, C. M.; Breithaupt, A.; Müller, T.; Sehl, J.; Balkema-Buschmann, A.; Rissmann, M.; Klein, A.; Wylezich, C.; Höper, D.; Wernike, K.; Aebischer, A.; Hoffmann, D.; Friedrichs, V.; Dorhoi, A.; Groschup, M. H.; Beer, M.; Mettenleiter, T. C., Susceptibility of raccoon dogs for experimental SARS-CoV-2 infection. *bioRxiv* **2020**, 2020.08.19.256800. http://biorxiv.org/content/early/2020/08/20/2020.08.19.256800.abstract
247. Fricchione, M. J.; Seo, J. Y.; Arwady, M. A., Data-Driven Reopening of Urban Public Education Through Chicago's Tracking of COVID-19 School Transmission. *Journal of Public Health Management and Practice* **9000,** *Publish Ahead of Print*. https://journals.lww.com/jphmp/Fulltext/9000/Data_Driven_Reopening_of_Urban_Public_Education.99206.aspx
248. Gaebler, C.; Wang, Z.; Lorenzi, J. C. C.; Muecksch, F.; Finkin, S.; Tokuyama, M.; Ladinsky, M.; Cho, A.; Jankovic, M.; Schaefer-Babajew, D.; Oliveira, T. Y.; Cipolla, M.; Viant, C.; Barnes, C. O.; Hurley, A.; Turroja, M.; Gordon, K.; Millard, K. G.; Ramos, V.; Schmidt, F.; Weisblum, Y.; Jha, D.; Tankelevich, M.; Yee, J.; Shimeliovich, I.; Robbiani, D. F.; Zhao, Z.; Gazumyan, A.; Hatziioannou, T.; Bjorkman, P. J.; Mehandru, S.; Bieniasz, P. D.; Caskey, M.; Nussenzweig, M. C., Evolution of Antibody Immunity to SARS-CoV-2. *bioRxiv* **2020**, 2020.11.03.367391. https://www.biorxiv.org/content/biorxiv/early/2020/11/05/2020.11.03.367391.full.pdf
249. Gallaway, M. S.; Rigler, J.; Robinson, S.; al., e., Trends in COVID-19 Incidence After Implementation of Mitigation Measures — Arizona, January 22–August 7, 2020. *Morbidity and Mortality Weekly Report* **2020,** *2020* (69), 1460-1463.

250. Galloway, S. E.; Paul, P.; MacCannell, D. R.; al., e., Emergence of SARS-CoV-2 B.1.1.7 Lineage — United States, December 29, 2020–January 12, 2021. *Morbidity and Mortality Weekly Report* **2021,** *ePub: 15 January 2021*. https://www.cdc.gov/mmwr/volumes/70/wr/mm7003e2.htm
251. Gao, G.; Wang, A.; Wang, S.; Qian, F.; Chen, M.; Yu, F.; Zhang, J.; Wang, X.; Ma, X.; Zhao, T.; Zhang, F.; Chen, Z., A retrospective evaluation on the efficacy of Lopinavir/ritonavir and chloroquine to treat non-severe COVID-19 patients. *J Acquir Immune Defic Syndr* **2020**.
252. Garcia-Beltran, W. F.; Lam, E. C.; St. Denis, K.; Nitido, A. D.; Garcia, Z. H.; Hauser, B. M.; Feldman, J.; Pavlovic, M. N.; Gregory, D. J.; Poznansky, M. C.; Sigal, A.; Schmidt, A. G.; Iafrate, A. J.; Naranbhai, V.; Balazs, A. B., Circulating SARS-CoV-2 variants escape neutralization by vaccine-induced humoral immunity. *medRxiv* **2021**, 2021.02.14.21251704.
http://medrxiv.org/content/early/2021/02/18/2021.02.14.21251704.abstract
253. Garg, M.; Sharma, A. L.; Singh, S., Advancement in biosensors for inflammatory biomarkers of SARS-CoV-2 during 2019–2020. *Biosensors and Bioelectronics* **2021,** *171*, 112703.
http://www.sciencedirect.com/science/article/pii/S0956566320306928
254. Garg, S., Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019—COVID-NET, 14 States, March 1–30, 2020. *MMWR. Morbidity and Mortality Weekly Report* **2020,** *69*.
255. Gasser, R.; Cloutier, M.; Prévost, J.; Fink, C.; Ducas, É.; Ding, S.; Dussault, N.; Landry, P.; Tremblay, T.; Laforce-Lavoie, A.; Lewin, A.; Beaudoin-Bussières, G.; Laumaea, A.; Medjahed, H.; Larochelle, C.; Richard, J.; Dekaban, G. A.; Dikeakos, J. D.; Bazin, R.; Finzi, A., Major role of IgM in the neutralizing activity of convalescent plasma against SARS-CoV-2. *bioRxiv* **2020**, 2020.10.09.333278.
https://www.biorxiv.org/content/biorxiv/early/2020/10/09/2020.10.09.333278.full.pdf
256. Gatto, M.; Bertuzzo, E.; Mari, L.; Miccoli, S.; Carraro, L.; Casagrandi, R.; Rinaldo, A., Spread and dynamics of the COVID-19 epidemic in Italy: Effects of emergency containment measures. *Proceedings of the National Academy of Sciences* **2020**, 202004978.
https://www.pnas.org/content/pnas/early/2020/04/22/2004978117.full.pdf
257. Gee, J.; Marquez, P.; Su, J.; al., e., First Month of COVID-19 Vaccine Safety Monitoring — United States, December 14, 2020–January 13, 2021. *Morbidity and Mortality Weekly Report* **2021,** *ePub: 19 February 2021*. https://www.cdc.gov/mmwr/volumes/70/wr/mm7008e3.htm?s_cid=mm7008e3_w
258. Gendelman, O.; Amital, H.; Bragazzi, N. L.; Watad, A.; Chodick, G., Continuous hydroxychloroquine or colchicine therapy does not prevent infection with SARS-CoV-2: Insights from a large healthcare database analysis. *Autoimmunity Reviews* **2020**, 102566.
http://www.sciencedirect.com/science/article/pii/S1568997220301282
259. Giacomet, V.; Stracuzzi, M.; Paradiso, L.; Di Cosimo, M. E.; Rubinacci, V.; Zuccotti, G., Defining the clinical phenotype of COVID-19 in children. *Pediatric Allergy and Immunology* **2020,** *31* (S26), 82-84.
https://onlinelibrary.wiley.com/doi/abs/10.1111/pai.13355
260. Gibbons, A., Captive gorillas test positive for coronavirus. *Science* January 12, 2021, 2021.
https://www.sciencemag.org/news/2021/01/captive-gorillas-test-positive-coronavirus
261. GlobenNewswire, Delta 9 Develops Proprietary Decontamination Technology to Help Fight COVID-19 Pandemic. https://www.globenewswire.com/news-release/2020/11/25/2134134/0/en/Delta-9-Develops-Proprietary-Decontamination-Technology-to-Help-Fight-COVID-19-Pandemic.html (accessed 30 Nov 2020).
262. Godfred-Cato, S.; Bryant, B.; Leung, J.; Oster, M. E.; Conklin, L.; Abrams, J.; Roguski, K.; Wallace, B.; Prezzato, E.; Koumans, E. H.; Lee, E. H.; Geevarughese, A.; Lash, M. K.; Reilly, K. H.; Pulver, W. P.; Thomas, D.; Feder, K. A.; Hsu, K. K.; Plipat, N.; Richardson, G.; Reid, H.; Lim, S.; Schmitz, A.; Pierce, T.; Hrapcak, S.; Datta, D.; Morris, S. B.; Clarke, K.; Belay, E.; Team, C. M.-C. R., COVID-19–Associated Multisystem Inflammatory Syndrome in Children — United States, March–July 2020.
https://www.cdc.gov/mmwr/volumes/69/wr/mm6932e2.htm?s_cid=mm6932e2_w.

263. Godoy, M., Mystery Inflammatory Syndrome In Kids And Teens Likely Linked To COVID-19. *NPR* 2020. https://www.npr.org/sections/health-shots/2020/05/07/851725443/mystery-inflammatory-syndrome-in-kids-and-teens-likely-linked-to-covid-19
264. Gold, J. A.; Gettings, J. R.; Kimball, A.; al., e., Clusters of SARS-CoV-2 Infection Among Elementary School Educators and Students in One School District — Georgia, December 2020–January 2021. *Morbidity and Mortality Weekly Report* **2021,** *ePub: 22 February 2021*. https://www.cdc.gov/mmwr/volumes/70/wr/mm7008e4.htm?s_cid=mm7008e4_w
265. Gold, J. A.; Rossen, L. M.; Ahmad, F. B.; al., e., Race, Ethnicity, and Age Trends in Persons Who Died from COVID-19 — United States, May–August 2020. *Morbidity and Mortality Weekly Report* **2020,** *ePub: 16 October 2020*. https://www.cdc.gov/mmwr/volumes/69/wr/mm6942e1.htm
266. Goldbaum, C., Is the Subway Risky? It May Be Safer Than You Think. *The New York Times* 2020. https://www.nytimes.com/2020/08/02/nyregion/nyc-subway-coronavirus-safety.html
267. Goldstein, E.; Lipsitch, M.; Cevik, M., On the Effect of Age on the Transmission of SARS-CoV-2 in Households, Schools, and the Community. *The Journal of Infectious Diseases* **2020**. https://doi.org/10.1093/infdis/jiaa691
268. Golinelli, D.; Boetto, E.; Maietti, E.; Fantini, M. P., The association between ABO blood group and SARS-CoV-2 infection: A meta-analysis. *PLOS ONE* **2020,** *15* (9), e0239508. https://doi.org/10.1371/journal.pone.0239508
269. Google, U.S. COVID-19 Public Forecasts. https://datastudio.google.com/reporting/52f6e744-66c6-47aa-83db-f74201a7c4df/page/EfwUB?s=ou-b6M0HXag.
270. Gorzalski, A. J.; Hartley, P.; Laverdure, C.; Kerwin, H.; Tillett, R.; Verma, S.; Rossetto, C.; Morzunov, S.; Van Hooser, S.; Pandori, M. W., Characteristics of viral specimens collected from asymptomatic and fatal cases of COVID-19. *Journal of biomedical research* **2020,** *34* (6), 431-436. https://pubmed.ncbi.nlm.nih.gov/33243941
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7718074/
271. Götzinger, F.; Santiago-García, B.; Noguera-Julián, A.; al., e., COVID-19 in children and adolescents in Europe: a multinational, multicentre cohort study. *The Lancet Child & Adolescent Health* **2020**. https://doi.org/10.1016/S2352-4642(20)30177-2
272. Goyal, M. K.; Simpson, J. N.; Boyle, M. D.; Badolato, G. M.; Delaney, M.; McCarter, R.; Cora-Bramble, D., Racial/Ethnic and Socioeconomic Disparities of SARS-CoV-2 Infection Among Children. *Pediatrics* **2020**, e2020009951. https://pediatrics.aappublications.org/content/pediatrics/early/2020/08/03/peds.2020-009951.full.pdf
273. Graham, C.; Seow, J.; Huettner, I.; Khan, H.; Kouphou, N.; Acors, S.; Winstone, H.; Pickering, S.; Galao, R. P.; Lista, M. J.; Jimenez-Guardeno, J. M.; Laing, A. G.; Wu, Y.; Joseph, M.; Muir, L.; Ng, W. M.; Duyvesteyn, H. M. E.; Zhao, Y.; Bowden, T. A.; Shankar-Hari, M.; Rosa, A.; Cherepanov, P.; McCoy, L. E.; Hayday, A. C.; Neil, S. J. D.; Malim, M. H.; Doores, K. J., Impact of the B.1.1.7 variant on neutralizing monoclonal antibodies recognizing diverse epitopes on SARS-CoV-2 Spike. *bioRxiv* **2021**, 2021.02.03.429355. https://www.biorxiv.org/content/biorxiv/early/2021/02/03/2021.02.03.429355.full.pdf
274. Graham, L., Two variants have merged into heavily mutated coronavirus. *New Scientist* 2021. https://www.newscientist.com/article/2268014-exclusive-two-variants-have-merged-into-heavily-mutated-coronavirus/
275. Greaney, A. J.; Loes, A. N.; Crawford, K. H. D.; Starr, T. N.; Malone, K. D.; Chu, H. Y.; Bloom, J. D., Comprehensive mapping of mutations in the SARS-CoV-2 receptor-binding domain that affect recognition by polyclonal human plasma antibodies. *Cell Host & Microbe*. https://doi.org/10.1016/j.chom.2021.02.003
276. Griffin, B. D.; Chan, M.; Tailor, N.; Mendoza, E. J.; Leung, A.; Warner, B. M.; Duggan, A. T.; Moffat, E.; He, S.; Garnett, L.; Tran, K. N.; Banadyga, L.; Albietz, A.; Tierney, K.; Audet, J.; Bello, A.; Vendramelli,

R.; Boese, A. S.; Fernando, L.; Lindsay, L. R.; Jardine, C. M.; Wood, H.; Poliquin, G.; Strong, J. E.; Drebot, M.; Safronetz, D.; Embury-Hyatt, C.; Kobasa, D., North American deer mice are susceptible to SARS-CoV-2. *bioRxiv* **2020**, 2020.07.25.221291. http://biorxiv.org/content/early/2020/07/26/2020.07.25.221291.abstract
277. Griffin, J.; Casey, M.; Collins, Á.; Hunt, K.; McEvoy, D.; Byrne, A.; McAloon, C.; Barber, A.; Lane, E. A.; More, S., Rapid review of available evidence on the serial interval and generation time of COVID-19. *BMJ Open* **2020,** *10* (11), e040263. https://bmjopen.bmj.com/content/bmjopen/10/11/e040263.full.pdf
278. Griffin, S., Covid-19: Lopinavir-ritonavir does not benefit hospitalised patients, UK trial finds. *BMJ* **2020,** *370*, m2650. http://www.bmj.com/content/370/bmj.m2650.abstract
279. Grifoni, A.; Weiskopf, D.; Ramirez, S. I.; Mateus, J.; Dan, J. M.; Moderbacher, C. R.; Rawlings, S. A.; Sutherland, A.; Premkumar, L.; Jadi, R. S., Targets of T cell responses to SARS-CoV-2 coronavirus in humans with COVID-19 disease and unexposed individuals. *Cell* **2020**.
280. Grijalva, C. G.; Rolfes, M. A.; Zhu, Y.; al., e., Transmission of SARS-COV-2 Infections in Households — Tennessee and Wisconsin, April–September 2020. *Morbidity and Mortality Weekly Report* **2020,** *ePub* (30 October 2020). https://www.cdc.gov/mmwr/volumes/69/wr/mm6944e1.htm?s_cid=mm6944e1_w
281. Group, C. s. T. a. F., *Update on Children, Schools and Transmission*; Scientific Advisory Group for Emergencies (SAGE): 4 November 2020, 2020. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/935125/tfc-covid-19-children-transmission-s0860-041120.pdf
282. Group, V. T., *Investigation of novel SARS-CoV-2 variant; Variant of Concern 202012/01*; Public Health England: 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957504/Variant_of_Concern_VOC_202012_01_Technical_Briefing_5_England.pdf
283. GSK, Medicago and GSK announce start of Phase 2/3 clinical trials of adjuvanted COVID-19 vaccine candidate. https://www.gsk.com/en-gb/media/press-releases/medicago-and-gsk-announce-start-of-phase-23-clinical-trials-of-adjuvanted-covid-19-vaccine-candidate/.
284. Guan, L.; Zhou, L.; Zhang, J.; Peng, W.; Chen, R., More awareness is needed for severe acute respiratory syndrome coronavirus 2019 transmission through exhaled air during non-invasive respiratory support: experience from China. *European Respiratory Journal* **2020,** *55* (3), 2000352. https://erj.ersjournals.com/content/erj/55/3/2000352.full.pdf
285. Guan, W.-j.; Ni, Z.-y.; Hu, Y.; Liang, W.-h.; Ou, C.-q.; He, J.-x.; Liu, L.; Shan, H.; Lei, C.-l.; Hui, D. S. C.; Du, B.; Li, L.-j.; Zeng, G.; Yuen, K.-Y.; Chen, R.-c.; Tang, C.-l.; Wang, T.; Chen, P.-y.; Xiang, J.; Li, S.-y.; Wang, J.-l.; Liang, Z.-j.; Peng, Y.-x.; Wei, L.; Liu, Y.; Hu, Y.-h.; Peng, P.; Wang, J.-m.; Liu, J.-y.; Chen, Z.; Li, G.; Zheng, Z.-j.; Qiu, S.-q.; Luo, J.; Ye, C.-j.; Zhu, S.-y.; Zhong, N.-s., Clinical Characteristics of Coronavirus Disease 2019 in China. *New England Journal of Medicine* **2020,** *382*, 1708-1720. https://www.nejm.org/doi/full/10.1056/NEJMoa2002032?query=recirc_artType_railA_article
286. Guardian, Covid patients have lung damage 'weeks after leaving hospital'. *The Guardian* 2020. https://www.theguardian.com/world/2020/sep/06/covid-patients-have-lung-damage-weeks-after-leaving-hospital
287. Gudbjartsson, D. F.; Norddahl, G. L.; Melsted, P.; Gunnarsdottir, K.; Holm, H.; Eythorsson, E.; Arnthorsson, A. O.; Helgason, D.; Bjarnadottir, K.; Ingvarsson, R. F.; Thorsteinsdottir, B.; Kristjansdottir, S.; Birgisdottir, K.; Kristinsdottir, A. M.; Sigurdsson, M. I.; Arnadottir, G. A.; Ivarsdottir, E. V.; Andresdottir, M.; Jonsson, F.; Agustsdottir, A. B.; Berglund, J.; Eiriksdottir, B.; Fridriksdottir, R.; Gardarsdottir, E. E.; Gottfredsson, M.; Gretarsdottir, O. S.; Gudmundsdottir, S.; Gudmundsson, K. R.; Gunnarsdottir, T. R.; Gylfason, A.; Helgason, A.; Jensson, B. O.; Jonasdottir, A.; Jonsson, H.; Kristjansson, T.; Kristinsson, K. G.; Magnusdottir, D. N.; Magnusson, O. T.; Olafsdottir, L. B.; Rognvaldsson, S.; le Roux, L.; Sigmundsdottir, G.; Sigurdsson, A.; Sveinbjornsson, G.; Sveinsdottir, K. E.; Sveinsdottir, M.; Thorarensen, E. A.; Thorbjornsson, B.; Thordardottir, M.; Saemundsdottir, J.; Kristjansson, S. H.;

Josefsdottir, K. S.; Masson, G.; Georgsson, G.; Kristjansson, M.; Moller, A.; Palsson, R.; Gudnason, T.; Thorsteinsdottir, U.; Jonsdottir, I.; Sulem, P.; Stefansson, K., Humoral Immune Response to SARS-CoV-2 in Iceland. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2026116

288. Gudmundsdottir, Á.; Scheving, R.; Lindberg, F.; Stefansson, B., Inactivation of SARS-CoV-2 and HCoV-229E in vitro by ColdZyme® a medical device mouth spray against common cold. *Journal of Medical Virology n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1002/jmv.26554

289. Guenezan, J.; Garcia, M.; Strasters, D.; Jousselin, C.; Lévêque, N.; Frasca, D.; Mimoz, O., Povidone Iodine Mouthwash, Gargle, and Nasal Spray to Reduce Nasopharyngeal Viral Load in Patients With COVID-19: A Randomized Clinical Trial. *JAMA Otolaryngology–Head & Neck Surgery* **2021**. https://doi.org/10.1001/jamaoto.2020.5490

290. Guilamo-Ramos, V.; Benzekri, A.; Thimm-Kaiser, M.; Hidalgo, A.; Perlman, D. C., Reconsidering assumptions of adolescent and young adult SARS-CoV-2 transmission dynamics. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa1348

291. Gussow, A. B.; Auslander, N.; Faure, G.; Wolf, Y. I.; Zhang, F.; Koonin, E. V., Genomic determinants of pathogenicity in SARS-CoV-2 and other human coronaviruses. *Proceedings of the National Academy of Sciences* **2020**, 202008176. https://www.pnas.org/content/pnas/early/2020/06/09/2008176117.full.pdf

292. Hackett, M., Fitbit receives Army award to further develop its COVID-19 early detection algorithm. *mobihealthnews* 2020. https://www.mobihealthnews.com/news/fitbit-receives-army-award-further-develop-its-covid-19-early-detection-algorithm

293. Haddow, A. D.; Watt, T. R.; Bloomfield, H. A.; Fetterer, D. P.; Harbourt, D. E., Modeling the Stability of SARS-CoV-2 on Personal Protective Equipment (PPE). *The American Journal of Tropical Medicine and Hygiene* **2020**. http://www.ajtmh.org/content/journals/10.4269/ajtmh.20-1508

294. Halfmann, P. J.; Hatta, M.; Chiba, S.; Maemura, T.; Fan, S.; Takeda, M.; Kinoshita, N.; Hattori, S. I.; Sakai-Tagawa, Y.; Iwatsuki-Horimoto, K.; Imai, M.; Kawaoka, Y., Transmission of SARS-CoV-2 in Domestic Cats. *N Engl J Med* **2020**.

295. Hall, J. S.; Knowles, S.; Nashold, S. W.; Ip, H. S.; Leon, A. E.; Rocke, T.; Keller, S.; Carossino, M.; Balasuriya, U.; Hofmeister, E., Experimental challenge of a North American bat species, big brown bat (Eptesicus fuscus), with SARS-CoV-2. *Transboundary and Emerging Diseases* **2020,** *n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1111/tbed.13949

296. Hall, V.; Foulkes, S.; Charlett, A.; Atti, A.; Monk, E.; Simmons, R.; Wellington, E.; Cole, M.; Saei, A.; Oguti, B.; Munro, K.; Wallace, S.; Kirwan, P.; Shrotri, M.; Vusirikala, A.; Rokadiya, S.; Kall, M.; Zambon, M.; Ramsay, M.; Brooks, T.; Brown, C.; Chand, M.; Hopkins, S., Do antibody positive healthcare workers have lower SARS-CoV-2 infection rates than antibody negative healthcare workers? Large multi-centre prospective cohort study (the SIREN study), England: June to November 2020. *medRxiv* **2021**, 2021.01.13.21249642. https://www.medrxiv.org/content/medrxiv/early/2021/01/15/2021.01.13.21249642.full.pdf

297. Hall, V. J.; Foulkes, S.; Saei, A.; Andrews, N.; Oguti, B.; Charlett, A.; Wellington, E.; Stowe, J.; Gillson, N.; Atti, A.; Islam, J.; Karagiannis, I.; Munro, K.; Khawam, J.; Group, S. S.; Chand, M.; Brown, C.; Ramsay, M. E.; Bernal, J. L.; Hopkins, S., Effectiveness of BNT162b2 mRNA Vaccine Against Infection and COVID-19 Vaccine Coverage in Healthcare Workers in England, Multicentre Prospective Cohort Study (the SIREN Study). *SSRN* **2021**. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3790399

298. Han, J.; Zhang, X.; He, S.; Jia, P., Can the coronavirus disease be transmitted from food? A review of evidence, risks, policies and knowledge gaps. *Environmental Chemistry Letters* **2020**. https://doi.org/10.1007/s10311-020-01101-x

299. Hanson, K. E.; Caliendo, A. M.; Arias, C. A.; Hayden, M. K.; Englund, J. A.; Lee, M. J.; Leob, M.; Patel, R.; El Alayli, A.; Altayar, O.; Patel, P.; Falk-Ytter, Y.; Lavergne, V.; Morgan, R. L.; Murad, M. H.; Sultan, S.; Bhimraj, A.; Mustafa, R. A., The Infectious Diseases Society of America Guidelines on the Diagnosis of

COVID-19: Molecular Diagnostic Testing. https://www.idsociety.org/practice-guideline/covid-19-guideline-diagnostics/ (accessed 07 Jan 2020).
300. Harbourt, D.; Haddow, A.; Piper, A.; Bloomfield, H.; Kearney, B.; Gibson, K.; Minogue, T., Modeling the Stability of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) on Skin, Currency, and Clothing. *medRxiv* **2020**, 2020.07.01.20144253. https://www.medrxiv.org/content/medrxiv/early/2020/07/03/2020.07.01.20144253.full.pdf
301. Harris, J. E., Data from the COVID-19 epidemic in Florida suggest that younger cohorts have been transmitting their infections to less socially mobile older adults. *Review of Economics of the Household* **2020**. https://doi.org/10.1007/s11150-020-09496-w
302. Harrison, C.; Lindholm, D. E.; Steer, A. C.; Osowicki, J., A systematic review and meta-analysis of upper airways swab collection for detection of viral and bacterial pathogens by individuals or caregivers compared to healthcare workers. *Journal of Clinical Microbiology* **2021**, JCM.02304-20. https://jcm.asm.org/content/jcm/early/2021/01/14/JCM.02304-20.full.pdf
303. Hart, B.; Tu, Y. P.; Jennings, R.; Verma, P.; Padgett, L. R.; Rains, D.; Vojta, D.; Berke, E. M., A comparison of health care worker-collected foam and polyester nasal swabs in convalescent COVID-19 patients. *PLoS One* **2020,** *15* (10), e0241100.
304. Hartman, A. L.; Nambulli, S.; McMillen, C. M.; White, A. G.; Tilston-Lunel, N.; Albe, J. R.; Cottle, E. L.; Dunn, M. D.; Frye, L. J.; Gilliland, T. H.; Olsen, E. L.; Malley, K. J.; Schwarz, M. M.; Tomko, J. A.; Walker, R. C.; Xia, M.; Hartman, M. S.; Klein, E.; Scanga, C.; Flynn, J. L.; Klimstra, W. B.; McElroy, A. K.; Reed, D. S.; Duprex, W. P., SARS-CoV-2 infection of African green monkeys results in mild respiratory disease discernible by PET/CT imaging and prolonged shedding of infectious virus from both respiratory and gastrointestinal tracts. *bioRxiv* **2020**, 2020.06.20.137687. http://biorxiv.org/content/early/2020/06/21/2020.06.20.137687.abstract
305. Harvey, A. P.; Fuhrmeister, E. R.; Cantrell, M.; Pitol, A. K.; Swarthout, J. M.; Powers, J. E.; Nadimpalli, M. L.; Julian, T. R.; Pickering, A. J., Longitudinal monitoring of SARS-CoV-2 RNA on high-touch surfaces in a community setting. *medRxiv* **2020**, 2020.10.27.20220905. https://www.medrxiv.org/content/medrxiv/early/2020/11/01/2020.10.27.20220905.full.pdf
306. Hashem, A. M.; Alhabbab, R. Y.; Algaissi, A.; Alfaleh, M. A.; Hala, S.; Abujamel, T. S.; ElAssouli, M.-Z.; AL-Somali, A. A.; Alofi, F. S.; Khogeer, A. A.; Alkayyal, A. A.; Mahmoud, A. B.; Almontashiri, N. A. M.; Pain, A., Performance of Commercially Available Rapid Serological Assays for the Detection of SARS-CoV-2 Antibodies. *Pathogens* **2020,** *9* (12), 1067. https://www.mdpi.com/2076-0817/9/12/1067
307. He, R.; Lu, Z.; Zhang, L.; Fan, T.; Xiong, R.; Shen, X.; Feng, H.; Meng, H.; Lin, W.; Jiang, W.; Geng, Q., The clinical course and its correlated immune status in COVID-19 pneumonia. *Journal of Clinical Virology* **2020,** *127*, 104361. http://www.sciencedirect.com/science/article/pii/S1386653220301037
308. He, X.; Lau, E. H. Y.; Wu, P.; Deng, X.; Wang, J.; Hao, X.; Lau, Y. C.; Wong, J. Y.; Guan, Y.; Tan, X.; Mo, X.; Chen, Y.; Liao, B.; Chen, W.; Hu, F.; Zhang, Q.; Zhong, M.; Wu, Y.; Zhao, L.; Zhang, F.; Cowling, B. J.; Li, F.; Leung, G. M., Temporal dynamics in viral shedding and transmissibility of COVID-19. *Nature Medicine* **2020**. https://doi.org/10.1038/s41591-020-0869-5
309. Hermine, O.; Mariette, X.; Tharaux, P.-L.; Resche-Rigon, M.; Porcher, R.; Ravaud, P.; Group, C.-C., Effect of Tocilizumab vs Usual Care in Adults Hospitalized With COVID-19 and Moderate or Severe Pneumonia: A Randomized Clinical Trial. *JAMA Internal Medicine* **2020**. https://doi.org/10.1001/jamainternmed.2020.6820
310. Hernández-Mora, M. G.; Cabello Úbeda, A.; Pérez, L. P.; Álvarez, F. V.; Álvarez, B.; Rodríguez Nieto, M. J.; Acosta, I. C.; Ormaechea, I. F.; Al-Hayani, A. W. M.; Carballosa, P.; Martínez, S. C.; Ezzine, F.; González, M. C.; Naya, A.; de Las Heras, M. L.; Rodríguez Guzmán, M. J.; Guijarro, A. C.; Lavado, A. B.; Valcayo, A. M.; García, M. M.; Martínez, J. B.; Roblas, R. F.; Piris Pinilla, M.; Alen, J. F.; Pernaute, O. S.; Bueno, F. R.; Frades, S. H.; Romero, G. P. B., Compassionate Use of Tocilizumab in Severe SARS-CoV2 Pneumonia. *Int J Infect Dis* **2020**.

311. Hirten, R. P.; Danieletto, M.; Tomalin, L.; Choi, K. H.; Zweig, M.; Golden, E.; Kaur, S.; Helmus, D.; Biello, A.; Pyzik, R.; Charney, A.; Miotto, R.; Glicksberg, B. S.; Levin, M.; Nabeel, I.; Aberg, J.; Reich, D.; Charney, D.; Bottinger, E. P.; Keefer, L.; Suarez-Farinas, M.; Nadkarni, G. N.; Fayad, Z. A., Physiological Data from a Wearable Device Identifies SARS-CoV-2 Infection and Symptoms and Predicts COVID-19 Diagnosis: Observational Study. *J Med Internet Res* **2021**.
312. Hobbs, C. V.; Martin, L. M.; Kim, S. S.; al., e., Factors Associated with Positive SARS-CoV-2 Test Results in Outpatient Health Facilities and Emergency Departments Among Children and Adolescents Aged <18 Years — Mississippi, September–November 2020. *Morbidity and Mortality Weekly Report* **2020,** *2020* (69), 1925-1929. https://www.cdc.gov/mmwr/volumes/69/wr/mm6950e3.htm
313. Hodcroft, E. B.; Domman, D. B.; Oguntuyo, K.; Snyder, D. J.; Van Diest, M.; Densmore, K. H.; Schwalm, K. C.; Femling, J.; Carroll, J. L.; Scott, R. S.; Whyte, M. M.; Edwards, M. D.; Hull, N. C.; Kevil, C. G.; Vanchiere, J. A.; Lee, B.; Dinwiddie, D. L.; Cooper, V. S.; Kamil, J. P., Emergence in late 2020 of multiple lineages of SARS-CoV-2 Spike protein variants affecting amino acid position 677. *medRxiv* **2021**, 2021.02.12.21251658.
https://www.medrxiv.org/content/medrxiv/early/2021/02/14/2021.02.12.21251658.full.pdf
314. Hoehl, S.; Karaca, O.; Kohmer, N.; Westhaus, S.; Graf, J.; Goetsch, U.; Ciesek, S., Assessment of SARS-CoV-2 Transmission on an International Flight and Among a Tourist Group. *JAMA Network Open* **2020,** *3* (8), e2018044-e2018044. https://doi.org/10.1001/jamanetworkopen.2020.18044
315. Hoff, B. W.; McConaha, J. W.; Cohick, Z. W.; Franzi, M. A.; Enderich, D. A.; Revelli, D.; Cox, J.; Irshad, H.; Pohle, H. H.; Schmitt-Sody, A.; Schaub, S. C.; Baros, A. E.; Lewis, N. C.; Luginsland, J. W.; Lanagan, M. T.; Perini, S., Apparatus for controlled microwave exposure of aerosolized pathogens. *Review of Scientific Instruments* **2021,** *92* (1), 014707. https://aip.scitation.org/doi/abs/10.1063/5.0032823
316. Hoiland, R. L.; Fergusson, N. A.; Mitra, A. R.; Griesdale, D. E. G.; Devine, D. V.; Stukas, S.; Cooper, J.; Thiara, S.; Foster, D.; Chen, L. Y. C.; Lee, A. Y. Y.; Conway, E. M.; Wellington, C. L.; Sekhon, M. S., The association of ABO blood group with indices of disease severity and multiorgan dysfunction in COVID-19. *Blood Advances* **2020,** *4* (20), 4981-4989. https://doi.org/10.1182/bloodadvances.2020002623
317. Holmes, L.; Enwere, M.; Williams, J.; Ogundele, B.; Chavan, P.; Piccoli, T.; Chinacherem, C.; Comeaux, C.; Pelaez, L.; Okundaye, O.; Stalnaker, L.; Kalle, F.; Deepika, K.; Philipcien, G.; Poleon, M.; Ogungbade, G.; Elmi, H.; John, V.; Dabney, K. W., Black–White Risk Differentials in COVID-19 (SARS-COV2) Transmission, Mortality and Case Fatality in the United States: Translational Epidemiologic Perspective and Challenges. *International Journal of Environmental Research and Public Health* **2020,** *17* (12), 4322. https://www.mdpi.com/1660-4601/17/12/4322
318. Honein, M. A.; Barrios, L. C.; Brooks, J. T., Data and Policy to Guide Opening Schools Safely to Limit the Spread of SARS-CoV-2 Infection. *JAMA* **2021**. https://doi.org/10.1001/jama.2021.0374
319. Honein, M. A.; Christie, A.; Rose, D. A.; al., e., Summary of Guidance for Public Health Strategies to Address High Levels of Community Transmission of SARS-CoV-2 and Related Deaths, December 2020. *Morbidity and Mortality Weekly Report* **2020,** *ePub: 4 December 2020*.
https://www.cdc.gov/mmwr/volumes/69/wr/mm6949e2.htm
320. Hoong, C. W. S.; Amin, M. N. M. E.; Tan, T. C.; Lee, J. E., Viral arthralgia a new manifestation of COVID-19 infection? A cohort study of COVID-19-associated musculoskeletal symptoms. *International Journal of Infectious Diseases* **2021**.
http://www.sciencedirect.com/science/article/pii/S1201971221000436
321. Horby, P.; Huntley, C.; Davies, N.; Edmunds, J.; Ferguson, N.; Medley, G.; Hayward, A.; Cevik, M.; Semple, C., *NERVTAG note on B.1.1.7 severity*; New and Emerging Respiratory Virus Threats Advisory Group: 22 January 2021, 2021. https://www.gov.uk/government/publications/nervtag-paper-on-covid-19-variant-of-concern-b117
322. Horby, P.; Huntley, C.; Davies, N.; Edmunds, J.; Ferguson, N.; Medley, G.; Hayward, A.; Cevik, M.; Semple, C., *NERVTAG update note on B.1.1.7 severity*; New and Emerging Respiratory Virus Threats

Advisory Group: 11 February 2021, 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/961042/S1095_NERVTAG_update_note_on_B.1.1.7_severity_20210211.pdf
323. Horby, P.; Lim, W. S.; Emberson, J.; Mafham, M.; Bell, J.; Linsell, L.; Staplin, N.; Brightling, C.; Ustianowski, A.; Elmahi, E.; Prudon, B.; Green, C.; Felton, T.; Chadwick, D.; Rege, K.; Fegan, C.; Chappell, L. C.; Faust, S. N.; Jaki, T.; Jeffery, K.; Montgomery, A.; Rowan, K.; Juszczak, E.; Baillie, J. K.; Haynes, R.; Landray, M. J., Effect of Dexamethasone in Hospitalized Patients with COVID-19: Preliminary Report. *medRxiv* **2020**, 2020.06.22.20137273. https://www.medrxiv.org/content/medrxiv/early/2020/06/22/2020.06.22.20137273.full.pdf
324. Horby, P.; Openshaw, P. J. M.; Hayward, A. H.; Lim, W. S.; Edmunds, J.; Ferguson, N.; Dingwall, R.; Cevik, M.; Barclay, W.; Rubin, J.; Connell, D.; McMenamin, J.; Semple, C.; Evans, C., *NERVTAG meeting on SARS-CoV-2 variant under investigation VUI-202012/01*; New and Emerging Respiratory Virus Threats Advisory Group: 2020. https://khub.net/documents/135939561/338928724/SARS-CoV-2+variant+under+investigation%2C+meeting+minutes.pdf/962e866b-161f-2fd5-1030-32b6ab467896?t=1608470511452
325. Horby, P. W.; Pessoa-Amorim, G.; Peto, L.; Brightling, C. E.; Sarkar, R.; Thomas, K.; Jeebun, V.; Ashish, A.; Tully, R.; Chadwick, D.; Sharafat, M.; Stewart, R.; Rudran, B.; Baillie, J. K.; Buch, M. H.; Chappell, L. C.; Day, J. N.; Furst, S. N.; Jaki, T.; Jeffery, K.; Juszczak, E.; Lim, W. S.; Montgomery, A.; Mumford, A.; Rowan, K.; Thwaites, G.; Mafham, M.; Haynes, R.; Landray, M. J., Tocilizumab in patients admitted to hospital with COVID-19 (RECOVERY): preliminary results of a randomised, controlled, open-label, platform trial. *medRxiv* **2021**, 2021.02.11.21249258. http://medrxiv.org/content/early/2021/02/11/2021.02.11.21249258.abstract
326. Howard, J.; Huang, A.; Li, Z.; Tufekci, Z.; Zdimal, V.; van der Westhuizen, H.-M.; von Delft, A.; Price, A.; Fridman, L.; Tang, L.-H.; Tang, V.; Watson, G. L.; Bax, C. E.; Shaikh, R.; Questier, F.; Hernandez, D.; Chu, L. F.; Ramirez, C. M.; Rimoin, A. W., An evidence review of face masks against COVID-19. *Proceedings of the National Academy of Sciences* **2021,** *118* (4), e2014564118. https://www.pnas.org/content/pnas/118/4/e2014564118.full.pdf
327. Hu, M.; Lin, H.; Wang, J.; Xu, C.; Tatem, A. J.; Meng, B.; Zhang, X.; Liu, Y.; Wang, P.; Wu, G.; Xie, H.; Lai, S., The risk of COVID-19 transmission in train passengers: an epidemiological and modelling study. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa1057
328. Hu, Z.; Song, C.; Xu, C.; Jin, G.; Chen, Y.; Xu, X.; Ma, H.; Chen, W.; Lin, Y.; Zheng, Y.; Wang, J.; Hu, Z.; Yi, Y.; Shen, H., Clinical characteristics of 24 asymptomatic infections with COVID-19 screened among close contacts in Nanjing, China. *Science China Life Sciences* **2020**. https://doi.org/10.1007/s11427-020-1661-4
329. Huang, C.; Huang, L.; Wang, Y.; Li, X.; Ren, L.; Gu, X.; Kang, L.; Guo, L.; Liu, M.; Zhou, X.; Luo, J.; Huang, Z.; Tu, S.; Zhao, Y.; Chen, L.; Xu, D.; Li, Y.; Li, C.; Peng, L.; Li, Y.; Xie, W.; Cui, D.; Shang, L.; Fan, G.; Xu, J.; Wang, G.; Wang, Y.; Zhong, J.; Wang, C.; Wang, J.; Zhang, D.; Cao, B., 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *The Lancet*. https://doi.org/10.1016/S0140-6736(20)32656-8
330. Huang, C.; Wang, Y.; Li, X.; Ren, L.; Zhao, J.; Hu, Y.; Zhang, L.; Fan, G.; Xu, J.; Gu, X.; Cheng, Z.; Yu, T.; Xia, J.; Wei, Y.; Wu, W.; Xie, X.; Yin, W.; Li, H.; Liu, M.; Xiao, Y.; Gao, H.; Guo, L.; Xie, J.; Wang, G.; Jiang, R.; Gao, Z.; Jin, Q.; Wang, J.; Cao, B., Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet* **2020**. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30183-5/fulltext
331. Huang, R.; Xia, J.; Chen, Y.; Shan, C.; Wu, C., A family cluster of SARS-CoV-2 infection involving 11 patients in Nanjing, China. *The Lancet Infectious Diseases* **2020,** *20* (5), 534-535. https://doi.org/10.1016/S1473-3099(20)30147-X

332. Huang, Y.; Lyu, X.; Li, D.; Wang, Y.; Wang, L.; Zou, W.; Wei, Y.; Wu, X., A cohort study of 223 patients explores the clinical risk factors for the severity diagnosis of COVID-19. *medRxiv* **2020**, 2020.04.18.20070656. https://www.medrxiv.org/content/medrxiv/early/2020/04/24/2020.04.18.20070656.full.pdf
333. Hutchins, H. J.; Wolff, B.; Leeb, R.; al., e., COVID-19 Mitigation Behaviors by Age Group — United States, April–June 2020. *Morbidity and Mortality Weekly Report* **2020,** *2020* (69), 1584-1590. https://www.cdc.gov/mmwr/volumes/69/wr/mm6943e4.htm?s_cid=mm6943e4_w
334. Hyde, Z., COVID-19, children and schools: overlooked and at risk. *Medical Journal of Australia* **2020,** *213* (10), 444-446.e1. https://onlinelibrary.wiley.com/doi/abs/10.5694/mja2.50823
335. Ibrahim, D.; Dulipsingh, L.; Zapatka, L.; Eadie, R.; Crowell, R.; Williams, K.; Wakefield, D. B.; Cook, L.; Puff, J.; Hussain, S. A., Factors Associated with Good Patient Outcomes Following Convalescent Plasma in COVID-19: A Prospective Phase II Clinical Trial. *Infect Dis Ther* **2020**, 1-14.
336. IHME, COVID-19 Projections. https://covid19.healthdata.org/united-states-of-america.
337. IHME, First COVID-19 Global Forecast: IHME Projects Three-Quarters of a Million Lives Could be Saved by January 1. Institute for Health Metrics and Evaluation: 2020. https://www.prnewswire.com/il/news-releases/first-covid-19-global-forecast-ihme-projects-three-quarters-of-a-million-lives-could-be-saved-by-january-1-807013447.html
338. India, T. o., CDSCO recommends nod for Zydus Cadila's phase-3 vaccine trials. https://timesofindia.indiatimes.com/city/ahmedabad/cdsco-recommends-nod-for-zydus-cadilas-phase-3-vaccine-trials/articleshow/80077209.cms.
339. Institute of Museum and Library Services; OCLC; Battelle, REopening Archives, Libraries, and Museums (REALM) Test 5: Natural attenuation as a decontamination approach for SARS-CoV-2 on textile materials. https://www.webjunction.org/content/dam/WebJunction/Documents/webJunction/realm/test5-report.pdf (accessed 26 Oct 2020).
340. Institute, S. S., Public Health Authority, State Serum Institute, Report of Findings. 2020. https://coronasmitte.dk/-/media/mediefiler/corona/mink/risikovurdering-af-human-sundhed-ved-fortsat-minkavl_03112020.pdf?la=da&hash=721871D898F1D9F1F9D99E3A002C35F9537F5CEA
341. International Commission on Microbiological Specifications for Foods (ICMSF), ICMSF opinion on SARS-CoV-2 and its relationship to food safety. https://www.icmsf.org/wp-content/uploads/2020/09/ICMSF2020-Letterhead-COVID-19-opinion-final-03-Sept-2020.BF_.pdf (accessed 08 Sept 2020).
342. IQ, H., COVID-19 Forecast for United States. https://app.hospiq.com/covid19?region=.
343. Ismail, S. A.; Saliba, V.; Lopez Bernal, J.; Ramsay, M. E.; Ladhani, S. N., SARS-CoV-2 infection and transmission in educational settings: a prospective, cross-sectional analysis of infection clusters and outbreaks in England. *The Lancet Infectious Diseases* **2020**. https://doi.org/10.1016/S1473-3099(20)30882-3
344. Jain, A.; Pandey, A. K.; Kaur, J.; Kumar, L.; Singh, M.; Das, S.; Purohit, S., Is there a correlation between viral load and olfactory & taste dysfunction in COVID-19 patients? *American Journal of Otolaryngology* **2021,** *42* (3), 102911. http://www.sciencedirect.com/science/article/pii/S0196070921000120
345. Jarvis, C. I.; Van Zandvoort, K.; Gimma, A.; Prem, K.; Klepac, P.; Rubin, G. J.; Edmunds, W. J., Quantifying the impact of physical distance measures on the transmission of COVID-19 in the UK. *BMC Med* **2020,** *18* (1), 124.
346. Jering, K. S.; Claggett, B. L.; Cunningham, J. W.; Rosenthal, N.; Vardeny, O.; Greene, M. F.; Solomon, S. D., Clinical Characteristics and Outcomes of Hospitalized Women Giving Birth With and Without COVID-19. *JAMA Internal Medicine* **2021**. https://doi.org/10.1001/jamainternmed.2020.9241

347. JHU, Coronavirus COVID-19 Global Cases by Johns Hopkins CSSE. https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6.
348. Jiang, N.; Chen, Z.; Yin, X.; Liu, L.; Yang, H.; Tan, X.; Wang, J.; Li, H.; Tian, M.; Lu, Z.; Xiong, N.; Gong, Y., Association of metformin with mortality or ARDS in patients with COVID-19 and type 2 diabetes: a retrospective cohort study. *Diabetes Research and Clinical Practice* **2020**, 108619. http://www.sciencedirect.com/science/article/pii/S0168822720308767
349. Johansson, M. A.; Quandelacy, T. M.; Kada, S.; Prasad, P. V.; Steele, M.; Brooks, J. T.; Slayton, R. B.; Biggerstaff, M.; Butler, J. C., SARS-CoV-2 Transmission From People Without COVID-19 Symptoms. *JAMA Network Open* **2021,** *4* (1), e2035057-e2035057. https://doi.org/10.1001/jamanetworkopen.2020.35057
350. John, A. R.; Raju, S.; Cadnum, J. L.; Lee, K.; McClellan, P.; Akkus, O.; Miller, S. K.; Jennings, W. D.; Buehler, J. A.; Li, D. F.; Redmond, S. N.; Braskie, M.; Hoyen, C. K.; Donskey, C. J., Scalable In-hospital Decontamination of N95 Filtering Facepiece Respirator with a Peracetic Acid Room Disinfection System. *Infection Control & Hospital Epidemiology* **2020**, 1-26. https://www.cambridge.org/core/article/scalable-inhospital-decontamination-of-n95-filtering-facepiece-respirator-with-a-peracetic-acid-room-disinfection-system/4B56043CF6D905CA6E8EF07B19FCF054
351. Johnston, S. C.; Jay, A.; Raymond, J. L.; Rossi, F.; Zeng, X.; Scruggs, J.; Dyer, D.; Frick, O.; Moore, J.; Berrier, K.; Esham, H.; Shamblin, J.; Sifford, W.; Fiallos, J.; Klosterman, L.; Stevens, S.; White, L.; Bowling, P.; Garcia, T.; Jensen, C.; Ghering, J.; Nyakiti, D.; Bellanca, S.; Kearney, B.; Giles, W.; Alli, N.; Paz, F.; Akers, K.; Danner, D.; Barth, J.; Johnson, J. A.; Durant, M.; Kim, R.; Pitt, M. L. M.; Nalca, A., Development of a Coronavirus Disease 2019 Nonhuman Primate Model Using Airborne Exposure. *bioRxiv* **2020**, 2020.06.26.174128. http://biorxiv.org/content/early/2020/06/26/2020.06.26.174128.abstract
352. Jones, A., *Coronavirus Variant Linked to COVID-19 Outbreaks in California*; The Scientist, 2021. https://www.the-scientist.com/news-opinion/coronavirus-variant-linked-to-covid-19-outbreaks-in-california-68365
353. Jones, R. M., Relative contributions of transmission routes for COVID-19 among healthcare personnel providing patient care. *Journal of Occupational and Environmental Hygiene* **2020**, 1-8. https://doi.org/10.1080/15459624.2020.1784427
354. Joyner, M. J.; Bruno, K. A.; Klassen, S. A.; Kunze, K. L.; Johnson, P. W.; Lesser, E. R.; Wiggins, C. C.; Senefeld, J. W.; Klompas, A. M.; Hodge, D. O.; Shepherd, J. R. A.; Rea, R. F.; Whelan, E. R.; Clayburn, A. J.; Spiegel, M. R.; Baker, S. E.; Larson, K. F.; Ripoll, J. G.; Andersen, K. J.; Buras, M. R.; Vogt, M. N. P.; Herasevich, V.; Dennis, J. J.; Regimbal, R. J.; Bauer, P. R.; Blair, J. E.; Van Buskirk, C. M.; Winters, J. L.; Stubbs, J. R.; van Helmond, N.; Butterfield, B. P.; Sexton, M. A.; Diaz Soto, J. C.; Paneth, N. S.; Verdun, N. C.; Marks, P.; Casadevall, A.; Fairweather, D.; Carter, R. E.; Wright, R. S., Safety Update: COVID-19 Convalescent Plasma in 20,000 Hospitalized Patients. *Mayo Clinic Proceedings* **2020**. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7368917/
355. Joyner, M. J.; Carter, R. E.; Senefeld, J. W.; Klassen, S. A.; Mills, J. R.; Johnson, P. W.; Theel, E. S.; Wiggins, C. C.; Bruno, K. A.; Klompas, A. M.; Lesser, E. R.; Kunze, K. L.; Sexton, M. A.; Diaz Soto, J. C.; Baker, S. E.; Shepherd, J. R. A.; van Helmond, N.; Verdun, N. C.; Marks, P.; van Buskirk, C. M.; Winters, J. L.; Stubbs, J. R.; Rea, R. F.; Hodge, D. O.; Herasevich, V.; Whelan, E. R.; Clayburn, A. J.; Larson, K. F.; Ripoll, J. G.; Andersen, K. J.; Buras, M. R.; Vogt, M. N. P.; Dennis, J. J.; Regimbal, R. J.; Bauer, P. R.; Blair, J. E.; Paneth, N. S.; Fairweather, D.; Wright, R. S.; Casadevall, A., Convalescent Plasma Antibody Levels and the Risk of Death from Covid-19. *New England Journal of Medicine* **2021**. https://doi.org/10.1056/NEJMoa2031893
356. Joyner, M. J.; Senefeld, J. W.; Klassen, S. A.; Mills, J. R.; Johnson, P. W.; Theel, E. S.; Wiggins, C. C.; Bruno, K. A.; Klompas, A. M.; Lesser, E. R.; Kunze, K. L.; Sexton, M. A.; Diaz Soto, J. C.; Baker, S. E.; Shepherd, J. R. A.; van Helmond, N.; van Buskirk, C. M.; Winters, J. L.; Stubbs, J. R.; Rea, R. F.; Hodge, D. O.; Herasevich, V.; Whelan, E. R.; Clayburn, A. J.; Larson, K. F.; Ripoll, J. G.; Andersen, K. J.; Buras, M. R.;

Vogt, M. N. P.; Dennis, J. J.; Regimbal, R. J.; Bauer, P. R.; Blair, J. E.; Paneth, N. S.; Fairweather, D.; Wright, R. S.; Carter, R. E.; Casadevall, A., Effect of Convalescent Plasma on Mortality among Hospitalized Patients with COVID-19: Initial Three-Month Experience. *medRxiv* **2020**, 2020.08.12.20169359. http://medrxiv.org/content/early/2020/08/12/2020.08.12.20169359.abstract

357. Jr., K. D., Pfizer fully enrolls pediatric COVID-19 vaccine trial with more than 2K kids. https://www.healio.com/news/primary-care/20210128/pfizer-fully-enrolls-pediatric-covid19-vaccine-trial-with-more-than-2k-kids.

358. Kain, M. P.; Childs, M. L.; Becker, A. D.; Mordecai, E. A., Chopping the tail: How preventing superspreading can help to maintain COVID-19 control. *Epidemics* **2021,** *34*, 100430. http://www.sciencedirect.com/science/article/pii/S1755436520300487

359. Kalil, A. C.; Patterson, T. F.; Mehta, A. K.; Tomashek, K. M.; Wolfe, C. R.; Ghazaryan, V.; Marconi, V. C.; Ruiz-Palacios, G. M.; Hsieh, L.; Kline, S.; Tapson, V.; Iovine, N. M.; Jain, M. K.; Sweeney, D. A.; El Sahly, H. M.; Branche, A. R.; Regalado Pineda, J.; Lye, D. C.; Sandkovsky, U.; Luetkemeyer, A. F.; Cohen, S. H.; Finberg, R. W.; Jackson, P. E. H.; Taiwo, B.; Paules, C. I.; Arguinchona, H.; Goepfert, P.; Ahuja, N.; Frank, M.; Oh, M.-d.; Kim, E. S.; Tan, S. Y.; Mularski, R. A.; Nielsen, H.; Ponce, P. O.; Taylor, B. S.; Larson, L.; Rouphael, N. G.; Saklawi, Y.; Cantos, V. D.; Ko, E. R.; Engemann, J. J.; Amin, A. N.; Watanabe, M.; Billings, J.; Elie, M.-C.; Davey, R. T.; Burgess, T. H.; Ferreira, J.; Green, M.; Makowski, M.; Cardoso, A.; de Bono, S.; Bonnett, T.; Proschan, M.; Deye, G. A.; Dempsey, W.; Nayak, S. U.; Dodd, L. E.; Beigel, J. H., Baricitinib plus Remdesivir for Hospitalized Adults with Covid-19. *New England Journal of Medicine* **2020**. https://doi.org/10.1056/NEJMoa2031994

360. Karnakov, P.; Arampatzis, G.; Kičić, I.; Wermelinger, F.; Wälchli, D.; Papadimitriou, C.; Koumoutsakos, P., Data driven inference of the reproduction number (R0) for COVID-19 before and after interventions for 51 European countries. **2020**.

361. Kawasuji, H.; Takegoshi, Y.; Kaneda, M.; Ueno, A.; Miyajima, Y.; Kawago, K.; Fukui, Y.; Yoshida, Y.; Kimura, M.; Yamada, H.; Sakamaki, I.; Tani, H.; Morinaga, Y.; Yamamoto, Y., Transmissibility of COVID-19 depends on the viral load around onset in adult and symptomatic patients. *PLOS ONE* **2020,** *15* (12), e0243597. https://doi.org/10.1371/journal.pone.0243597

362. Kelland, K., Trial of COVID-19 blood plasma finds no benefit in severely ill patients. *Reuters* 2021. https://www.msn.com/en-us/health/medical/trial-of-covid-19-blood-plasma-finds-no-benefit-in-severely-ill-patients/ar-BB1cEoOP

363. Kelly, M.; O'Connor, R.; Townsend, L.; Coghlan, M.; Relihan, E.; Moriarty, M.; Carr, B.; Melanophy, G.; Doyle, C.; Bannan, C.; O'Riordan, R.; Merry, C.; Clarke, S.; Bergin, C., Clinical outcomes and adverse events in patients hospitalised with COVID -19, treated with off- label hydroxychloroquine and azithromycin. *Br J Clin Pharmacol* **2020**.

364. Kennedy, M.; Helfand, B. K. I.; Gou, R. Y.; Gartaganis, S. L.; Webb, M.; Moccia, J. M.; Bruursema, S. N.; Dokic, B.; McCulloch, B.; Ring, H.; Margolin, J. D.; Zhang, E.; Anderson, R.; Babine, R. L.; Hshieh, T.; Wong, A. H.; Taylor, R. A.; Davenport, K.; Teresi, B.; Fong, T. G.; Inouye, S. K., Delirium in Older Patients With COVID-19 Presenting to the Emergency Department. *JAMA Network Open* **2020,** *3* (11), e2029540-e2029540. https://doi.org/10.1001/jamanetworkopen.2020.29540

365. Kennedy, M.; Lee, S. J.; Epstein, M., Modeling aerosol transmission of SARS-CoV-2 in multi-room facility. *Journal of Loss Prevention in the Process Industries* **2020**, 104336. http://www.sciencedirect.com/science/article/pii/S0950423020306239

366. Kerr, C. C.; Stuart, R. M.; Mistry, D.; Abeysuriya, R. G.; Hart, G.; Rosenfeld, K.; Selvaraj, P.; Nunez, R. C.; Hagedorn, B.; George, L.; Izzo, A.; Palmer, A.; Delport, D.; Bennette, C.; Wagner, B.; Chang, S.; Cohen, J. A.; Panovska-Griffiths, J.; Jastrzebski, M.; Oron, A. P.; Wenger, E.; Famulare, M.; Klein, D. J., Covasim: an agent-based model of COVID-19 dynamics and interventions. *medRxiv* **2020**, 2020.05.10.20097469. https://www.medrxiv.org/content/medrxiv/early/2020/05/15/2020.05.10.20097469.full.pdf

367. Khanh, N. C.; Thai, P. Q.; Quach, H.-L.; Thi, N.-A. H.; Dinh, P. C.; Duong, T. N.; Mai, L. T. Q.; Nghia, N. D.; Tu, T. A.; Quang, L. N.; Quang, T. D.; Nguyen, T.-T.; Vogt, F.; Anh, D. D., Transmission of Severe Acute Respiratory Syndrome Coronavirus 2 During Long Flight. *Emerging Infectious Disease journal* **2020,** *26* (11). https://wwwnc.cdc.gov/eid/article/26/11/20-3299_article
368. Kidd, M.; Richter, A.; Best, A.; Cumley, N.; Mirza, J.; Percival, B.; Mayhew, M.; Megram, O.; Ashford, F.; White, T.; Moles-Garcia, E.; Crawford, L.; Bosworth, A.; Atabani, S. F.; Plant, T.; McNally, A., S-variant SARS-CoV-2 lineage B1.1.7 is associated with significantly higher viral loads in samples tested by ThermoFisher TaqPath RT-qPCR. *The Journal of Infectious Diseases* **2021**. https://doi.org/10.1093/infdis/jiab082
369. Kim, S. E.; Jeong, H. S.; Yu, Y.; Shin, S. U.; Kim, S.; Oh, T. H.; Kim, U. J.; Kang, S. J.; Jang, H. C.; Jung, S. I.; Park, K. H., Viral kinetics of SARS-CoV-2 in asymptomatic carriers and presymptomatic patients. *Int J Infect Dis* **2020**.
370. Kim, U. J.; Lee, S. Y.; Lee, J. Y.; Lee, A.; Kim, S. E.; Choi, O.-J.; Lee, J. S.; Kee, S.-J.; Jang, H.-C., Air and Environmental Contamination Caused by COVID-19 Patients: a Multi-Center Study. *J Korean Med Sci* **2020,** *35* (37). https://doi.org/10.3346/jkms.2020.35.e332
371. Kim, Y.-I.; Kim, S.-G.; Kim, S.-M.; Kim, E.-H.; Park, S.-J.; Yu, K.-M.; Chang, J.-H.; Kim, E. J.; Lee, S.; Casel, M. A. B.; Um, J.; Song, M.-S.; Jeong, H. W.; Lai, V. D.; Kim, Y.; Chin, B. S.; Park, J.-S.; Chung, K.-H.; Foo, S.-S.; Poo, H.; Mo, I.-P.; Lee, O.-J.; Webby, R. J.; Jung, J. U.; Choi, Y. K., Infection and Rapid Transmission of SARS-CoV-2 in Ferrets. *Cell Host & Microbe* **2020**. http://www.sciencedirect.com/science/article/pii/S1931312820301876
372. King, J. A.; Whitten, T. A.; Bakal, J. A.; McAlister, F. A., Symptoms associated with a positive result for a swab for SARS-CoV-2 infection among children in Alberta. *Canadian Medical Association Journal* **2020**, cmaj.202065. https://www.cmaj.ca/content/cmaj/early/2020/11/23/cmaj.202065.full.pdf
373. Knight, S. R.; Ho, A.; Pius, R.; Buchan, I.; Carson, G.; Drake, T. M.; Dunning, J.; Fairfield, C. J.; Gamble, C.; Green, C. A.; Gupta, R.; Halpin, S.; Hardwick, H. E.; Holden, K. A.; Horby, P. W.; Jackson, C.; Mclean, K. A.; Merson, L.; Nguyen-Van-Tam, J. S.; Norman, L.; Noursadeghi, M.; Olliaro, P. L.; Pritchard, M. G.; Russell, C. D.; Shaw, C. A.; Sheikh, A.; Solomon, T.; Sudlow, C.; Swann, O. V.; Turtle, L. C.; Openshaw, P. J.; Baillie, J. K.; Semple, M. G.; Docherty, A. B.; Harrison, E. M., Risk stratification of patients admitted to hospital with covid-19 using the ISARIC WHO Clinical Characterisation Protocol: development and validation of the 4C Mortality Score. *BMJ* **2020,** *370*, m3339. https://www.bmj.com/content/bmj/370/bmj.m3339.full.pdf
374. Konda, A.; Prakash, A.; Moss, G. A.; Schmoldt, M.; Grant, G. D.; Guha, S., Aerosol Filtration Efficiency of Common Fabrics Used in Respiratory Cloth Masks. *ACS Nano* **2020**. https://www.ncbi.nlm.nih.gov/pubmed/32329337
375. Kong, D.; Zheng, Y.; Wu, H.; Pan, H.; Wagner, A. L.; Zheng, Y.; Gong, X.; Zhu, Y.; Jin, B.; Xiao, W.; Mao, S.; Lin, S.; Han, R.; Yu, X.; Cui, P.; Jiang, C.; Fang, Q.; Lu, Y.; Fu, C., Pre-symptomatic transmission of novel coronavirus in community settings. *Influenza and Other Respiratory Viruses* **2020,** *n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1111/irv.12773
376. Kong, T.-k., Longer incubation period of coronavirus disease 2019 (COVID-19) in older adults. *AGING MEDICINE* **2020,** *3* (2), 102-109. https://onlinelibrary.wiley.com/doi/abs/10.1002/agm2.12114
377. Korevaar, H. M.; Becker, A. D.; Miller, I. F.; Grenfell, B. T.; Metcalf, C. J. E.; Mina, M. J., Quantifying the impact of US state non-pharmaceutical interventions on COVID-19 transmission. *medRxiv* **2020**, 2020.06.30.20142877. https://www.medrxiv.org/content/medrxiv/early/2020/07/01/2020.06.30.20142877.full.pdf
378. Korte, W.; Buljan, M.; Rösslein, M.; Wick, P.; Golubov, V.; Jentsch, J.; Reut, M.; Peier, K.; Nohynek, B.; Fischer, A.; Stolz, R.; Cettuzzi, M.; Nolte, O., SARS-CoV-2 IgG and IgA antibody response is gender dependent; and IgG antibodies rapidly decline early on. *Journal of Infection* **2020**. https://doi.org/10.1016/j.jinf.2020.08.032

379. Kraemer, M. U. G.; Yang, C.-H.; Gutierrez, B.; Wu, C.-H.; Klein, B.; Pigott, D. M.; du Plessis, L.; Faria, N. R.; Li, R.; Hanage, W. P.; Brownstein, J. S.; Layan, M.; Vespignani, A.; Tian, H.; Dye, C.; Pybus, O. G.; Scarpino, S. V., The effect of human mobility and control measures on the COVID-19 epidemic in China. *Science* **2020**, eabb4218. https://science.sciencemag.org/content/sci/early/2020/03/25/science.abb4218.full.pdf
380. Kratzel, A.; Todt, D.; V'kovski, P.; Steiner, S.; Gultom, M. L.; Thao, T. T. N.; Ebert, N.; Holwerda, M.; Steinmann, J.; Niemeyer, D.; Dijkman, R.; Kampf, G.; Drosten, C.; Steinmann, E.; Thiel, V.; Pfaender, S., Efficient inactivation of SARS-CoV-2 by WHO-recommended hand rub formulations and alcohols. *bioRxiv* **2020**, 2020.03.10.986711. https://www.biorxiv.org/content/biorxiv/early/2020/03/17/2020.03.10.986711.full.pdf
381. Krieger, L. M., Worrisome coronavirus variant now linked to half of cases in California. *The Mercury News* 2021. https://www.mercurynews.com/2021/02/22/worrisome-coronavirus-variant-now-linked-to-half-of-cases-in-california/
382. Kucharski, A. J.; Klepac, P.; Conlan, A. J. K.; Kissler, S. M.; Tang, M. L.; Fry, H.; Gog, J. R.; Edmunds, W. J., Effectiveness of isolation, testing, contact tracing, and physical distancing on reducing transmission of SARS-CoV-2 in different settings: a mathematical modelling study. *Lancet Infect Dis* **2020**.
383. Kucharski, A. J.; Russell, T. W.; Diamond, C.; Liu, Y.; Edmunds, J.; Funk, S.; Eggo, R. M.; Sun, F.; Jit, M.; Munday, J. D., Early dynamics of transmission and control of COVID-19: a mathematical modelling study. *The lancet infectious diseases* **2020**.
384. Kucirka, L. M.; Lauer, S. A.; Laeyendecker, O.; Boon, D., Variation in False-Negative Rate of Reverse Transcriptase Polymerase Chain Reaction–Based SARS-CoV-2 Tests by Time Since Exposure. *Annals of Internal Medicine* **2020,** *0* (0), null. https://www.acpjournals.org/doi/abs/10.7326/M20-1495
385. Kumar, L.; Kahlon, N.; Jain, A.; Kaur, J.; Singh, M.; Pandey, A. K., Loss of smell and taste in COVID-19 infection in adolescents. *International Journal of Pediatric Otorhinolaryngology* **2021,** *142*, 110626. http://www.sciencedirect.com/science/article/pii/S0165587621000197
386. Lai, S.; Ruktanonchai, N. W.; Zhou, L.; Prosper, O.; Luo, W.; Floyd, J. R.; Wesolowski, A.; Santillana, M.; Zhang, C.; Du, X.; Yu, H.; Tatem, A. J., Effect of non-pharmaceutical interventions to contain COVID-19 in China. *Nature* **2020**. https://doi.org/10.1038/s41586-020-2293-x
387. Lalau, J. D.; Al-Salameh, A.; Hadjadj, S.; Goronflot, T.; Wiernsperger, N.; Pichelin, M.; Allix, I.; Amadou, C.; Bourron, O.; Duriez, T.; Gautier, J. F.; Dutour, A.; Gonfroy, C.; Gouet, D.; Joubert, M.; Julier, I.; Larger, E.; Marchand, L.; Marre, M.; Meyer, L.; Olivier, F.; Prevost, G.; Quiniou, P.; Raffaitin-Cardin, C.; Roussel, R.; Saulnier, P. J.; Seret-Begue, D.; Thivolet, C.; Vatier, C.; Desailloud, R.; Wargny, M.; Gourdy, P.; Cariou, B., Metformin use is associated with a reduced risk of mortality in patients with diabetes hospitalised for COVID-19. *Diabetes Metab* **2020**, 101216.
388. Lam, T. T.-Y.; Shum, M. H.-H.; Zhu, H.-C.; Tong, Y.-G.; Ni, X.-B.; Liao, Y.-S.; Wei, W.; Cheung, W. Y.-M.; Li, W.-J.; Li, L.-F.; Leung, G. M.; Holmes, E. C.; Hu, Y.-L.; Guan, Y., Identifying SARS-CoV-2 related coronaviruses in Malayan pangolins. *Nature* **2020**. https://doi.org/10.1038/s41586-020-2169-0
389. LANL, COVID-19 Confirmed and Forecasted Case Data. https://covid-19.bsvgateway.org/.
390. Lapin, T., About a dozen US mink farms in quarantine as officials probe COVID-19 outbreaks. *New York Post* 2020. https://nypost.com/2020/11/10/us-mink-farms-in-quarantine-as-officials-probe-covid-19-outbreaks/
391. Larosa, E.; Djuric, O.; Cassinadri, M.; Cilloni, S.; Bisaccia, E.; Vicentini, M.; Venturelli, F.; Giorgi Rossi, P.; Pezzotti, P.; Bedeschi, E.; Group, t. R. E. C.-W., Secondary transmission of COVID-19 in preschool and school settings in northern Italy after their reopening in September 2020: a population-based study. *Eurosurveillance* **2020,** *25* (49), 2001911. https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.49.2001911

392. Larsen, J. R.; Martin, M. R.; Martin, J. D.; Kuhn, P.; Hicks, J. B., Modeling the Onset of Symptoms of COVID-19. *Frontiers in Public Health* **2020,** *8* (473). https://www.frontiersin.org/article/10.3389/fpubh.2020.00473
393. Larue, R. C.; Xing, E.; Kenney, A. D.; Zhang, Y.; Tuazon, J. A.; Li, J.; Yount, J. S.; Li, P.-K.; Sharma, A., Rationally Designed ACE2-Derived Peptides Inhibit SARS-CoV-2. *Bioconjugate Chemistry* **2021,** *32* (1), 215-223. https://doi.org/10.1021/acs.bioconjchem.0c00664
394. Lasry, A.; Kidder, D.; Hast, M.; Poovey, J.; Sunshine, G.; Zviedrite, N.; Ahmed, F.; Ethier, K. A., Timing of community mitigation and changes in reported COVID-19 and community mobility—four US metropolitan areas, February 26–April 1, 2020. *morbidity and Mortality Weekly Report* **2020,** *69*, 451-457. https://www.cdc.gov/mmwr/volumes/69/wr/mm6915e2.htm
395. Lassaunière, R.; Frische, A.; Harboe, Z. B.; Nielsen, A. C.; Fomsgaard, A.; Krogfelt, K. A.; Jørgensen, C. S., Evaluation of nine commercial SARS-CoV-2 immunoassays. *medRxiv* **2020**, 2020.04.09.20056325. https://www.medrxiv.org/content/medrxiv/early/2020/04/10/2020.04.09.20056325.full.pdf
396. Latinne, A.; Hu, B.; Olival, K. J.; Zhu, G.; Zhang, L.; Li, H.; Chmura, A. A.; Field, H. E.; Zambrana-Torrelio, C.; Epstein, J. H.; Li, B.; Zhang, W.; Wang, L.-F.; Shi, Z.-L.; Daszak, P., Origin and cross-species transmission of bat coronaviruses in China. *Nature Communications* **2020,** *11* (1), 4235. https://doi.org/10.1038/s41467-020-17687-3
397. Latz, C. A.; DeCarlo, C.; Boitano, L.; Png, C. Y. M.; Patell, R.; Conrad, M. F.; Eagleton, M.; Dua, A., Blood type and outcomes in patients with COVID-19. *Annals of Hematology* **2020**. https://doi.org/10.1007/s00277-020-04169-1
398. Lau, M. S. Y.; Grenfell, B.; Thomas, M.; Bryan, M.; Nelson, K.; Lopman, B., Characterizing superspreading events and age-specific infectiousness of SARS-CoV-2 transmission in Georgia, USA. *Proceedings of the National Academy of Sciences* **2020**, 202011802. https://www.pnas.org/content/pnas/early/2020/08/19/2011802117.full.pdf
399. Lauer, S. A.; Grantz, K. H.; Bi, Q.; Jones, F. K.; Zheng, Q.; Meredith, H. R.; Azman, A. S.; Reich, N. G.; Lessler, J., The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. *Annals of Internal Medicine* **2020**. https://doi.org/10.7326/M20-0504
400. Lauring, A. S.; Hodcroft, E. B., Genetic Variants of SARS-CoV-2—What Do They Mean? *JAMA* **2021**. https://doi.org/10.1001/jama.2020.27124
401. Lavery, A. M.; Preston, L. E.; Ko, J. Y.; al., e., Characteristics of Hospitalized COVID-19 Patients Discharged and Experiencing Same-Hospital Readmission — United States, March–August 2020. *Morbidity and Mortality Weekly Report* **2020,** *ePub: 9 November 2020*. https://www.cdc.gov/mmwr/volumes/69/wr/mm6945e2.htm
402. Lavine, J. S.; Bjornstad, O. N.; Antia, R., Immunological characteristics govern the transition of COVID-19 to endemicity. *Science* **2021**, eabe6522. https://science.sciencemag.org/content/sci/early/2021/01/11/science.abe6522.full.pdf
403. Laws, R. L.; Chancey, R. J.; Rabold, E. M.; Chu, V. T.; Lewis, N. M.; Fajans, M.; Reses, H. E.; Duca, L. M.; Dawson, P.; Conners, E. E.; Gharpure, R.; Yin, S.; Buono, S.; Pomeroy, M.; Yousaf, A. R.; Owusu, D.; Wadhwa, A.; Pevzner, E.; Battey, K. A.; Njuguna, H.; Fields, V. L.; Salvatore, P.; O'Hegarty, M.; Vuong, J.; Gregory, C. J.; Banks, M.; Rispens, J.; Dietrich, E.; Marcenac, P.; Matanock, A.; Pray, I.; Westergaard, R.; Dasu, T.; Bhattacharyya, S.; Christiansen, A.; Page, L.; Dunn, A.; Atkinson-Dunn, R.; Christensen, K.; Kiphibane, T.; Willardson, S.; Fox, G.; Ye, D.; Nabity, S. A.; Binder, A.; Freeman, B. D.; Lester, S.; Mills, L.; Thornburg, N.; Hall, A. J.; Fry, A. M.; Tate, J. E.; Tran, C. H.; Kirking, H. L., Symptoms and Transmission of SARS-CoV-2 Among Children — Utah and Wisconsin, March–May 2020. *Pediatrics* **2020**, e2020027268. https://pediatrics.aappublications.org/content/pediatrics/early/2020/12/01/peds.2020-027268.full.pdf
404. Laxminarayan, R.; Wahl, B.; Dudala, S. R.; Gopal, K.; Mohan, C.; Neelima, S.; Jawahar Reddy, K. S.; Radhakrishnan, J.; Lewnard, J. A., Epidemiology and transmission dynamics of COVID-19 in two Indian

states. *Science* **2020**, eabd7672.
https://science.sciencemag.org/content/sci/early/2020/09/29/science.abd7672.full.pdf
405. Le Bert, N.; Clapham, H. E.; Tan, A. T.; Chia, W. N.; Tham, C. Y.; Lim, J. M.; Kunasegaran, K.; Tan, L.; Dutertre, C.-A.; Shankar, N.; Lim, J. M.; Sun, L. J.; Zahari, M.; Tun, Z. M.; Kumar, V.; Lim, B. L.; Lim, S. H.; Chia, A.; Tan, Y.-J.; Tambyah, P. A.; Kalimuddin, S.; Lye, D. C.; Low, J. G.; Wang, L.-F.; Wan, W. Y.; Hsu, L. Y.; Bertoletti, A.; Tam, C. C., Highly functional virus-specific cellular immune response in asymptomatic SARS-CoV-2 infection. *bioRxiv* **2020**, 2020.11.25.399139.
https://www.biorxiv.org/content/biorxiv/early/2020/11/27/2020.11.25.399139.full.pdf
406. Lechien, J. R.; Chiesa-Estomba, C. M.; Beckers, E.; Mustin, V.; Ducarme, M.; Journe, F.; Marchant, A.; Jouffe, L.; Barillari, M. R.; Cammaroto, G.; Circiu, M. P.; Hans, S.; Saussez, S., Prevalence and 6-month recovery of olfactory dysfunction: a multicentre study of 1363 COVID-19 patients. *Journal of Internal Medicine* **2021,** *n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1111/joim.13209
407. Leclerc, Q.; Fuller, N.; Knight, L.; null, n.; Funk, S.; Knight, G., What settings have been linked to SARS-CoV-2 transmission clusters? [version 2; peer review: 2 approved]. *Wellcome Open Research* **2020,** *5* (83). https://wellcomeopenresearch.org/articles/5-83/v2
408. Ledford, H., COVID reinfections are unusual — but could still help the virus to spread. https://www.nature.com/articles/d41586-021-00071-6.
409. Lee, E. H.; Kepler, K. L.; Geevarughese, A.; Paneth-Pollak, R.; Dorsinville, M. S.; Ngai, S.; Reilly, K. H., Race/Ethnicity Among Children With COVID-19–Associated Multisystem Inflammatory Syndrome. *JAMA Network Open* **2020,** *3* (11), e2030280-e2030280.
https://doi.org/10.1001/jamanetworkopen.2020.30280
410. Lee, J.; Hughes, T.; Lee, M.-H.; Field, H.; Rovie-Ryan, J. J.; Sitam, F. T.; Sipangkui, S.; Nathan, S. K. S. S.; Ramirez, D.; Kumar, S. V.; Lasimbang, H.; Epstein, J. H.; Daszak, P., No evidence of coronaviruses or other potentially zoonotic viruses in Sunda pangolins (Manis javanica) entering the wildlife trade via Malaysia. *bioRxiv* **2020**, 2020.06.19.158717.
https://www.biorxiv.org/content/biorxiv/early/2020/06/19/2020.06.19.158717.full.pdf
411. Lee, Y.-H.; Hong, C. M.; Kim, D. H.; Lee, T. H.; Lee, J., Clinical Course of Asymptomatic and Mildly Symptomatic Patients with Coronavirus Disease Admitted to Community Treatment Centers, South Korea. *Emerging Infectious Disease journal* **2020,** *26* (10). https://wwwnc.cdc.gov/eid/article/26/10/20-1620_article
412. Leidman, E.; Duca, L. M.; Omura, J. D.; Proia, K.; Stephens, J. W.; Sauber-Schatz, E. K., COVID-19 Trends Among Persons Aged 0–24 Years — United States, March 1–December 12, 2020. *Morbidity and Mortality Weekly Report* **2021,** *ePub: 13 January 2021*.
https://www.cdc.gov/mmwr/volumes/70/wr/mm7003e1.htm
413. Leidner, A. J.; Barry, V.; Bowen, V. B.; al., e., Opening of Large Institutions of Higher Education and County-Level COVID-19 Incidence — United States, July 6–September 17, 2020. *Morbidity and Mortality Weekly Report* **2021,** *2021* (70), 14-19. https://www.cdc.gov/mmwr/volumes/70/wr/mm7001a4.htm
414. Lendvay, T. S.; Chen, J.; Harcourt, B. H.; Scholte, F. E. M.; Kilinc-Balci, F. S.; Lin, Y. L.; Lamb, M. M.; Chu, L. F.; Price, A.; Evans, D.; Lin, Y.-C.; Mores, C. N.; Sahni, J.; Kabra, K. B.; Haubruge, E.; Thiry, E.; Heyne, B.; Laperre, J.; Simmons, S.; Davies, J. M.; Cui, Y.; Wagner, T.; Clark, T.; Smit, S. J.; Parker, R.; Gallagher, T.; Timm, E.; Ludwig-Begall, L. F.; Macia, N.; Mackie, C.; Hope, K.; Page, K.; Reader, S.; Faris, P.; Jolois, O.; Patel, A.; Lemyre, J.-L.; Molloy-Simard, V.; Homdayjanakul, K.; Tritsch, S. R.; Wielick, C.; Mayo, M.; Malott, R.; Willaert, J.-F.; Nauwynck, H.; Dams, L.; De Jaeger, S.; Liao, L.; Zhao, M.; Chu, S.; Conly, J. M.; Chu, M. C., Addressing Personal Protective Equipment (PPE) Decontamination: Methylene Blue and Light Inactivates SARS-CoV-2 on N95 Respirators and Masks with Maintenance of Integrity and Fit. *medRxiv* **2020**, 2020.12.11.20236919.
https://www.medrxiv.org/content/medrxiv/early/2020/12/12/2020.12.11.20236919.full.pdf

415. Letizia, A. G.; Ge, Y.; Vangeti, S.; Goforth, C.; Weir, D. L.; Kuzmina, N. A.; Chen, H. W.; Ewing, D.; Soares-Schanoski, A.; George, M.-C.; Graham, W. D.; Jones, F.; Bharaj, P.; Lizewski, R. A.; Lizewski, S. A.; Marayag, J.; Marjanovic, N.; Miller, C.; Mofsowitz, S.; Nair, V. D.; Nunez, E.; Parent, D. M.; Porter, C. K.; Ana, E. S.; Schilling, M.; Stadlbauer, D.; Sugiharto, V.; Termini, M.; Sun, P.; Tracy, R. P.; Krammer, F.; Bukreyev, A.; Ramos, I.; Sealfon, S. C., SARS-CoV-2 seropositivity and subsequent infection risk in healthy young adults: a prospective cohort study. *medRxiv* **2021**, 2021.01.26.21250535. https://www.medrxiv.org/content/medrxiv/early/2021/01/29/2021.01.26.21250535.full.pdf
416. Letizia, A. G.; Ramos, I.; Obla, A.; Goforth, C.; Weir, D. L.; Ge, Y.; Bamman, M. M.; Dutta, J.; Ellis, E.; Estrella, L.; George, M.-C.; Gonzalez-Reiche, A. S.; Graham, W. D.; van de Guchte, A.; Gutierrez, R.; Jones, F.; Kalomoiri, A.; Lizewski, R.; Lizewski, S.; Marayag, J.; Marjanovic, N.; Millar, E. V.; Nair, V. D.; Nudelman, G.; Nunez, E.; Pike, B. L.; Porter, C.; Regeimbal, J.; Rirak, S.; Santa Ana, E.; Sealfon, R. S. G.; Sebra, R.; Simons, M. P.; Soares-Schanoski, A.; Sugiharto, V.; Termini, M.; Vangeti, S.; Williams, C.; Troyanskaya, O. G.; van Bakel, H.; Sealfon, S. C., SARS-CoV-2 Transmission among Marine Recruits during Quarantine. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2029717
417. Leung, N. H. L.; Chu, D. K. W.; Shiu, E. Y. C.; Chan, K.-H.; McDevitt, J. J.; Hau, B. J. P.; Yen, H.-L.; Li, Y.; Ip, D. K. M.; Peiris, J. S. M.; Seto, W.-H.; Leung, G. M.; Milton, D. K.; Cowling, B. J., Respiratory virus shedding in exhaled breath and efficacy of face masks. *Nature Medicine* **2020**. https://doi.org/10.1038/s41591-020-0843-2
418. Levin, A. T.; Hanage, W. P.; Owusu-Boaitey, N.; Cochran, K. B.; Walsh, S. P.; Meyerowitz-Katz, G., Assessing the age specificity of infection fatality rates for COVID-19: systematic review, meta-analysis, and public policy implications. *European Journal of Epidemiology* **2020,** *35* (12), 1123-1138. https://doi.org/10.1007/s10654-020-00698-1
419. Lewis, D., COVID-19 Rarely Infects Through Surfaces. So Why Are We Still Deep Cleaning? *Nature* **2021,** *590*. https://media.nature.com/original/magazine-assets/d41586-021-00251-4/d41586-021-00251-4.pdf
420. Lewis, D., Is the coronavirus airborne? Experts can't agree. *Nature* **2020**. 10.1038/d41586-020-00974-w
421. Lewis, N. M.; Chu, V. T.; Ye, D.; al., e., Household Transmission of SARS-CoV-2 in the United States. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa1166
422. Li, F.; Li, Y.-Y.; Liu, M.-J.; Fang, L.-Q.; Dean, N. E.; Wong, G. W. K.; Yang, X.-B.; Longini, I.; Halloran, M. E.; Wang, H.-J.; Liu, P.-L.; Pang, Y.-H.; Yan, Y.-Q.; Liu, S.; Xia, W.; Lu, X.-X.; Liu, Q.; Yang, Y.; Xu, S.-Q., Household transmission of SARS-CoV-2 and risk factors for susceptibility and infectivity in Wuhan: a retrospective observational study. *The Lancet Infectious Diseases* **2021**. https://doi.org/10.1016/S1473-3099(20)30981-6
423. Li, J.; Giabbanelli, P. J., Returning to a normal life via COVID-19 vaccines in the USA: a large-scale agent-based simulation study. *medRxiv* **2021**, 2021.01.31.21250872. https://www.medrxiv.org/content/medrxiv/early/2021/02/03/2021.01.31.21250872.full.pdf
424. Li, K.; Wohlford-Lenane, C.; Perlman, S.; Zhao, J.; Jewell, A. K.; Reznikov, L. R.; Gibson-Corley, K. N.; Meyerholz, D. K.; McCray, P. B., Jr., Middle East Respiratory Syndrome Coronavirus Causes Multiple Organ Damage and Lethal Disease in Mice Transgenic for Human Dipeptidyl Peptidase 4. *J Infect Dis* **2016,** *213* (5), 712-22. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4747621/pdf/jiv499.pdf
425. Li, Q.; Guan, X.; Wu, P.; Wang, X.; Zhou, L.; Tong, Y.; Ren, R.; Leung, K. S. M.; Lau, E. H. Y.; Wong, J. Y.; Xing, X.; Xiang, N.; Wu, Y.; Li, C.; Chen, Q.; Li, D.; Liu, T.; Zhao, J.; Liu, M.; Tu, W.; Chen, C.; Jin, L.; Yang, R.; Wang, Q.; Zhou, S.; Wang, R.; Liu, H.; Luo, Y.; Liu, Y.; Shao, G.; Li, H.; Tao, Z.; Yang, Y.; Deng, Z.; Liu, B.; Ma, Z.; Zhang, Y.; Shi, G.; Lam, T. T. Y.; Wu, J. T.; Gao, G. F.; Cowling, B. J.; Yang, B.; Leung, G. M.; Feng, Z., Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2001316

https://www.nejm.org/doi/10.1056/NEJMoa2001316
426. Li, R.; Pei, S.; Chen, B.; Song, Y.; Zhang, T.; Yang, W.; Shaman, J., Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV2). *Science* **2020**, eabb3221. https://science.sciencemag.org/content/sci/early/2020/03/13/science.abb3221.full.pdf
427. Li, X.; Giorgi, E. E.; Marichannegowda, M. H.; Foley, B.; Xiao, C.; Kong, X.-P.; Chen, Y.; Gnanakaran, S.; Korber, B.; Gao, F., Emergence of SARS-CoV-2 through recombination and strong purifying selection. *Science Advances* **2020**, eabb9153. https://advances.sciencemag.org/content/advances/early/2020/05/28/sciadv.abb9153.full.pdf
428. Li, X.; Xiao, K.; Chen, X.; Liang, X.; Zhang, X.; Zhang, Z.; Zhai, J.; Wang, R.; Zhou, N.; Chen, Z.-J.; Su, R.; Zhou, F.; Holmes, E. C.; Irwin, D. M.; Chen, R.-A.; He, Q.; Wu, Y.-J.; Wang, C.; Du, X.-Q.; Peng, S.-M.; Xie, W.-J.; Shan, F.; Li, W.-P.; Dai, J.-W.; Shen, X.; Feng, Y.; Xiao, L.; Chen, W.; Shen, Y., Pathogenicity, tissue tropism and potential vertical transmission of SARSr-CoV-2 in Malayan pangolins. *bioRxiv* **2020**, 2020.06.22.164442. http://biorxiv.org/content/early/2020/06/22/2020.06.22.164442.abstract
429. Li, X.; Zai, J.; Zhao, Q.; Nie, Q.; Li, Y.; Foley, B. T.; Chaillon, A., Evolutionary history, potential intermediate animal host, and cross-species analyses of SARS-CoV-2. *Journal of Medical Virology* **2020,** *n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1002/jmv.25731
430. Li, Y.; Campbell, H.; Kulkarni, D.; Harpur, A.; Nundy, M.; Wang, X.; Nair, H., The temporal association of introducing and lifting non-pharmaceutical interventions with the time-varying reproduction number (R) of SARS-CoV-2: a modelling study across 131 countries. *The Lancet Infectious Diseases* **2020**. https://doi.org/10.1016/S1473-3099(20)30785-4
431. Li, Y.; Qian, H.; Hang, J.; Chen, X.; Hong, L.; Liang, P.; Li, J.; Xiao, S.; Wei, J.; Liu, L.; Kang, M., Evidence for probable aerosol transmission of SARS-CoV-2 in a poorly ventilated restaurant. *medRxiv* **2020**, 2020.04.16.20067728. https://www.medrxiv.org/content/medrxiv/early/2020/04/22/2020.04.16.20067728.full.pdf
432. Li, Y.; Xie, Z.; Lin, W.; Cai, W.; Wen, C.; Guan, Y.; Mo, X.; Wang, J.; Wang, Y.; Peng, P.; Chen, X.; Hong, W.; Xiao, G.; Liu, J.; Zhang, L.; Hu, F.; Li, F.; Zhang, F.; Deng, X.; Li, L., Efficacy and safety of lopinavir/ritonavir or arbidol in adult patients with mild/moderate COVID-19: an exploratory randomized controlled trial. *Med*. https://doi.org/10.1016/j.medj.2020.04.001
433. Liao, J.; Fan, S.; Chen, J.; Wu, J.; Xu, S.; Guo, Y.; Li, C.; Zhang, X.; Wu, C.; Mou, H., Epidemiological and clinical characteristics of COVID-19 in adolescents and young adults. *The Innovation* **2020,** *1* (1), 100001.
434. Libster, R.; Pérez Marc, G.; Wappner, D.; Coviello, S.; Bianchi, A.; Braem, V.; Esteban, I.; Caballero, M. T.; Wood, C.; Berrueta, M.; Rondan, A.; Lescano, G.; Cruz, P.; Ritou, Y.; Fernández Viña, V.; Álvarez Paggi, D.; Esperante, S.; Ferreti, A.; Ofman, G.; Ciganda, Á.; Rodriguez, R.; Lantos, J.; Valentini, R.; Itcovici, N.; Hintze, A.; Oyarvide, M. L.; Etchegaray, C.; Neira, A.; Name, I.; Alfonso, J.; López Castelo, R.; Caruso, G.; Rapelius, S.; Alvez, F.; Etchenique, F.; Dimase, F.; Alvarez, D.; Aranda, S. S.; Sánchez Yanotti, C.; De Luca, J.; Jares Baglivo, S.; Laudanno, S.; Nowogrodzki, F.; Larrea, R.; Silveyra, M.; Leberzstein, G.; Debonis, A.; Molinos, J.; González, M.; Perez, E.; Kreplak, N.; Pastor Argüello, S.; Gibbons, L.; Althabe, F.; Bergel, E.; Polack, F. P., Early High-Titer Plasma Therapy to Prevent Severe Covid-19 in Older Adults. *New England Journal of Medicine* **2021**. https://www.nejm.org/doi/full/10.1056/NEJMoa2033700
435. Lieu, A.; Mah, J.; Zanichelli, V.; Exantus, R. C.; Longtin, Y., Impact of Extended Use and Decontamination with Vaporized Hydrogen Peroxide on N95 Respirator Fit. *American Journal of Infection Control* **2020**. https://doi.org/10.1016/j.ajic.2020.08.010
436. Lilly, E., Bamlanivimab for COVID-19. Eli Lilly: 2020. https://www.lilly.com/news/media/media-kits/bamlanivimab-covid19
437. Liotta, E. M.; Batra, A.; Clark, J. R.; Shlobin, N. A.; Hoffman, S. C.; Orban, Z. S.; Koralnik, I. J., Frequent neurologic manifestations and encephalopathy-associated morbidity in Covid-19 patients.

Annals of Clinical and Translational Neurology **2020,** *n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1002/acn3.51210
438. Liotti, F. M.; Menchinelli, G.; Marchetti, S.; Posteraro, B.; Landi, F.; Sanguinetti, M.; Cattani, P., Assessment of SARS-CoV-2 RNA Test Results Among Patients Who Recovered From COVID-19 With Prior Negative Results. *JAMA Internal Medicine* **2020**. https://doi.org/10.1001/jamainternmed.2020.7570
439. Lisboa Bastos, M.; Tavaziva, G.; Abidi, S. K.; Campbell, J. R.; Haraoui, L.-P.; Johnston, J. C.; Lan, Z.; Law, S.; MacLean, E.; Trajman, A.; Menzies, D.; Benedetti, A.; Ahmad Khan, F., Diagnostic accuracy of serological tests for covid-19: systematic review and meta-analysis. *BMJ* **2020,** *370*, m2516. https://www.bmj.com/content/bmj/370/bmj.m2516.full.pdf
440. Liu, D.; Thompson, J. R.; Carducci, A.; Bi, X., Potential secondary transmission of SARS-CoV-2 via wastewater. *Science of The Total Environment* **2020,** *749*, 142358. http://www.sciencedirect.com/science/article/pii/S0048969720358873
441. Liu, M.; Li, Q.; Zhou, J.; Ai, W.; Zheng, X.; Zeng, J.; Liu, Y.; Xiang, X.; Guo, R.; Li, X.; Wu, X.; Xu, H.; Jiang, L.; Zhang, H.; Chen, J.; Tian, L.; Luo, J.; Luo, C., Value of swab types and collection time on SARS-COV-2 detection using RT-PCR assay. *Journal of Virological Methods* **2020,** *286*, 113974. http://www.sciencedirect.com/science/article/pii/S0166093420302263
442. Liu, N.; Zhang, T.; Ma, L.; Zhang, H.; Wang, H.; Wei, W.; Pei, H.; Li, H., The impact of ABO blood group on COVID-19 infection risk and mortality: A systematic review and meta-analysis. *Blood Rev* **2020**, 100785.
443. Liu, P.; Chen, W.; Chen, J.-P., Viral Metagenomics Revealed Sendai Virus and Coronavirus Infection of Malayan Pangolins (Manis javanica). *Viruses* **2019,** *11* (11), 979. https://www.mdpi.com/1999-4915/11/11/979
444. Liu, P.; Jiang, J.-Z.; Wan, X.-F.; Hua, Y.; Li, L.; Zhou, J.; Wang, X.; Hou, F.; Chen, J.; Zou, J.; Chen, J., Are pangolins the intermediate host of the 2019 novel coronavirus (SARS-CoV-2)? *PLOS Pathogens* **2020,** *16* (5), e1008421. https://doi.org/10.1371/journal.ppat.1008421
445. Liu, P.; Jiang, J.-Z.; Wan, X.-F.; Hua, Y.; Wang, X.; Hou, F.; Chen, J.; Zou, J.; Chen, J., Are pangolins the intermediate host of the 2019 novel coronavirus (2019-nCoV) ? *bioRxiv* **2020**, 2020.02.18.954628. http://biorxiv.org/content/early/2020/02/20/2020.02.18.954628.abstract
446. Liu, S., U of Guelph team tests produce decontamination technology on hospital gowns. https://www.cbc.ca/news/canada/kitchener-waterloo/decontaminate-hospital-gowns-1.5788587 (accessed 09 Nov 2020).
447. Liu, W.; Zhang, Q.; Chen, J.; Xiang, R.; Song, H.; Shu, S.; Chen, L.; Liang, L.; Zhou, J.; You, L.; Wu, P.; Zhang, B.; Lu, Y.; Xia, L.; Huang, L.; Yang, Y.; Liu, F.; Semple, M. G.; Cowling, B. J.; Lan, K.; Sun, Z.; Yu, H.; Liu, Y., Detection of Covid-19 in Children in Early January 2020 in Wuhan, China. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMc2003717
448. Liu, Y.; Li, T.; Deng, Y.; Liu, S.; Zhang, D.; Li, H.; Wang, X.; Jia, L.; Han, J.; Bei, Z.; Zhou, Y.; Li, L.; Li, J., Stability of SARS-CoV-2 on environmental surfaces and in human excreta. *medRxiv* **2020**, 2020.05.07.20094805. https://www.medrxiv.org/content/medrxiv/early/2020/05/12/2020.05.07.20094805.full.pdf
449. Liu, Y.; Liu, J.; Xia, H.; Zhang, X.; Fontes-Garfias, C. R.; Swanson, K. A.; Cai, H.; Sarkar, R.; Chen, W.; Cutler, M.; Cooper, D.; Weaver, S. C.; Muik, A.; Sahin, U.; Jansen, K. U.; Xie, X.; Dormitzer, P. R.; Shi, P.-Y., Neutralizing Activity of BNT162b2-Elicited Serum — Preliminary Report. *New England Journal of Medicine* **2021**. https://doi.org/10.1056/NEJMc2102017
450. Liu, Z.; Li, J.; Long, W.; Zeng, W.; Gao, R.; Zeng, G.; Chen, D.; Wang, S.; Li, Q.; Hu, D.; Guo, L.; Li, Z.; Wu, X., Bilirubin Levels as Potential Indicators of Disease Severity in Coronavirus Disease Patients: A Retrospective Cohort Study. *Frontiers in Medicine* **2020,** *7* (799). https://www.frontiersin.org/article/10.3389/fmed.2020.598870

451. Liu, Z.; VanBlargan, L. A.; Bloyet, L.-M.; Rothlauf, P. W.; Chen, R. E.; Stumpf, S.; Zhao, H.; Errico, J. M.; Theel, E. S.; Liebeskind, M. J.; Alford, B.; Buchser, W. J.; Ellebedy, A. H.; Fremont, D. H.; Diamond, M. S.; Whelan, S. P. J., Identification of SARS-CoV-2 spike mutations that attenuate monoclonal and serum antibody neutralization. *Cell Host & Microbe* **2021**. https://www.sciencedirect.com/science/article/pii/S1931312821000445
452. Liu, Z.; VanBlargan, L. A.; Bloyet, L.-M.; Rothlauf, P. W.; Chen, R. E.; Stumpf, S.; Zhao, H.; Errico, J. M.; Theel, E. S.; Liebeskind, M. J.; Alford, B.; Buchser, W. J.; Ellebedy, A. H.; Fremont, D. H.; Diamond, M. S.; Whelan, S. P. J., Landscape analysis of escape variants identifies SARS-CoV-2 spike mutations that attenuate monoclonal and serum antibody neutralization. *bioRxiv* **2021**, 2020.11.06.372037. http://biorxiv.org/content/early/2021/01/11/2020.11.06.372037.abstract
453. Logue, J. K.; Franko, N. M.; McCulloch, D. J.; McDonald, D.; Magedson, A.; Wolf, C. R.; Chu, H. Y., Sequelae in Adults at 6 Months After COVID-19 Infection. *JAMA Network Open* **2021,** *4* (2), e210830-e210830. https://doi.org/10.1001/jamanetworkopen.2021.0830
454. Logunov, D. Y.; Dolzhikova, I. V.; Shcheblyakov, D. V.; Tukhvatulin, A. I.; Zubkova, O. V.; Dzharullaeva, A. S.; Kovyrshina, A. V.; Lubenets, N. L.; Grousova, D. M.; Erokhova, A. S.; Botikov, A. G.; Izhaeva, F. M.; Popova, O.; Ozharovskaya, T. A.; Esmagambetov, I. B.; Favorskaya, I. A.; Zrelkin, D. I.; Voronina, D. V.; Shcherbinin, D. N.; Semikhin, A. S.; Simakova, Y. V.; Tokarskaya, E. A.; Egorova, D. A.; Shmarov, M. M.; Nikitenko, N. A.; Gushchin, V. A.; Smolyarchuk, E. A.; Zyryanov, S. K.; Borisevich, S. V.; Naroditsky, B. S.; Gintsburg, A. L., Safety and efficacy of an rAd26 and rAd5 vector-based heterologous prime-boost COVID-19 vaccine: an interim analysis of a randomised controlled phase 3 trial in Russia. *The Lancet* **2021**. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00234-8/fulltext
455. Long, Q.-X.; Liu, B.-Z.; Deng, H.-J.; Wu, G.-C.; Deng, K.; Chen, Y.-K.; Liao, P.; Qiu, J.-F.; Lin, Y.; Cai, X.-F.; Wang, D.-Q.; Hu, Y.; Ren, J.-H.; Tang, N.; Xu, Y.-Y.; Yu, L.-H.; Mo, Z.; Gong, F.; Zhang, X.-L.; Tian, W.-G.; Hu, L.; Zhang, X.-X.; Xiang, J.-L.; Du, H.-X.; Liu, H.-W.; Lang, C.-H.; Luo, X.-H.; Wu, S.-B.; Cui, X.-P.; Zhou, Z.; Zhu, M.-M.; Wang, J.; Xue, C.-J.; Li, X.-F.; Wang, L.; Li, Z.-J.; Wang, K.; Niu, C.-C.; Yang, Q.-J.; Tang, X.-J.; Zhang, Y.; Liu, X.-M.; Li, J.-J.; Zhang, D.-C.; Zhang, F.; Liu, P.; Yuan, J.; Li, Q.; Hu, J.-L.; Chen, J.; Huang, A.-L., Antibody responses to SARS-CoV-2 in patients with COVID-19. *Nature Medicine* **2020**. https://doi.org/10.1038/s41591-020-0897-1
456. Long, Q.-X.; Tang, X.-J.; Shi, Q.-L.; Li, Q.; Deng, H.-J.; Yuan, J.; Hu, J.-L.; Xu, W.; Zhang, Y.; Lv, F.-J.; Su, K.; Zhang, F.; Gong, J.; Wu, B.; Liu, X.-M.; Li, J.-J.; Qiu, J.-F.; Chen, J.; Huang, A.-L., Clinical and immunological assessment of asymptomatic SARS-CoV-2 infections. *Nature Medicine* **2020**. https://doi.org/10.1038/s41591-020-0965-6
457. Lopes, R. D.; Macedo, A. V. S.; de Barros E Silva, P. G. M.; Moll-Bernardes, R. J.; dos Santos, T. M.; Mazza, L.; Feldman, A.; D'Andréa Saba Arruda, G.; de Albuquerque, D. C.; Camiletti, A. S.; de Sousa, A. S.; de Paula, T. C.; Giusti, K. G. D.; Domiciano, R. A. M.; Noya-Rabelo, M. M.; Hamilton, A. M.; Loures, V. A.; Dionísio, R. M.; Furquim, T. A. B.; De Luca, F. A.; dos Santos Sousa, Í. B.; Bandeira, B. S.; Zukowski, C. N.; de Oliveira, R. G. G.; Ribeiro, N. B.; de Moraes, J. L.; Petriz, J. L. F.; Pimentel, A. M.; Miranda, J. S.; de Jesus Abufaiad, B. E.; Gibson, C. M.; Granger, C. B.; Alexander, J. H.; de Souza, O. F.; Investigators, B. C., Effect of Discontinuing vs Continuing Angiotensin-Converting Enzyme Inhibitors and Angiotensin II Receptor Blockers on Days Alive and Out of the Hospital in Patients Admitted With COVID-19: A Randomized Clinical Trial. *JAMA* **2021,** *325* (3), 254-264. https://doi.org/10.1001/jama.2020.25864
458. Lu, J.; Plessis, L. d.; Liu, Z.; Hill, V.; Kang, M.; Lin, H.; Sun, J.; Francois, S.; Kraemer, M. U. G.; Faria, N. R.; McCrone, J. T.; Peng, J.; Xiong, Q.; Yuan, R.; Zeng, L.; Zhou, P.; Liang, C.; Yi, L.; Liu, J.; Xiao, J.; Hu, J.; Liu, T.; Ma, W.; Li, W.; Su, J.; Zheng, H.; Peng, B.; Fang, S.; Su, W.; Li, K.; Sun, R.; Bai, R.; Tang, X.; Liang, M.; Quick, J.; Song, T.; Rambaut, A.; Loman, N.; Raghwani, J.; Pybus, O.; Ke, C., Genomic epidemiology of SARS-CoV-2 in Guangdong Province, China. *medRxiv* **2020**, 2020.04.01.20047076. https://www.medrxiv.org/content/medrxiv/early/2020/04/04/2020.04.01.20047076.full.pdf

459. Lu, R.; Zhao, X.; Li, J.; Niu, P.; Yang, B.; Wu, H.; Wang, W.; Song, H.; Huang, B.; Zhu, N.; Bi, Y.; Ma, X.; Zhan, F.; Wang, L.; Hu, T.; Zhou, H.; Hu, Z.; Zhou, W.; Zhao, L.; Chen, J.; Meng, Y.; Wang, J.; Lin, Y.; Yuan, J.; Xie, Z.; Ma, J.; Liu, W. J.; Wang, D.; Xu, W.; Holmes, E. C.; Gao, G. F.; Wu, G.; Chen, W.; Shi, W.; Tan, W., Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *The Lancet* **2020**. https://doi.org/10.1016/S0140-6736(20)30251-8
460. Lu, S.; Zhao, Y.; Yu, W.; Yang, Y.; Gao, J.; Wang, J.; Kuang, D.; Yang, M.; Yang, J.; Ma, C.; Xu, J.; Qian, X.; Li, H.; Zhao, S.; Li, J.; Wang, H.; Long, H.; Zhou, J.; Luo, F.; Ding, K.; Wu, D.; Zhang, Y.; Dong, Y.; Liu, Y.; Zheng, Y.; Lin, X.; Jiao, L.; Zheng, H.; Dai, Q.; Sun, Q.; Hu, Y.; Ke, C.; Liu, H.; Peng, X., Comparison of nonhuman primates identified the suitable model for COVID-19. *Signal Transduction and Targeted Therapy* **2020,** *5* (1), 157. https://doi.org/10.1038/s41392-020-00269-6
461. Lu, S.; Zhao, Y.; Yu, W.; Yang, Y.; Gao, J.; Wang, J.; Kuang, D.; Yang, M.; Yang, J.; Ma, C.; Xu, J.; Qian, X.; Li, H.; Zhao, S.; Li, J.; Wang, H.; Long, H.; Zhou, J.; Luo, F.; Ding, K.; Wu, D.; Zhang, Y.; Dong, Y.; Liu, Y.; Zheng, Y.; Lin, X.; Jiao, L.; Zheng, H.; Dai, Q.; Sun, Q.; Hu, Y.; Ke, C.; Liu, H.; Peng, X., Comparison of SARS-CoV-2 infections among 3 species of non-human primates. *bioRxiv* **2020**, 2020.04.08.031807. https://www.biorxiv.org/content/biorxiv/early/2020/04/12/2020.04.08.031807.full.pdf
462. Lu, X.; Zhang, L.; Du, H.; Zhang, J.; Li, Y. Y.; Qu, J.; Zhang, W.; Wang, Y.; Bao, S.; Li, Y.; Wu, C.; Liu, H.; Liu, D.; Shao, J.; Peng, X.; Yang, Y.; Liu, Z.; Xiang, Y.; Zhang, F.; Silva, R. M.; Pinkerton, K. E.; Shen, K.; Xiao, H.; Xu, S.; Wong, G. W. K., SARS-CoV-2 Infection in Children. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMc2005073
463. Lu, Y.-f.; Pan, L.-y.; Zhang, W.-W.; Cheng, F.; Hu, S.-S.; Zhang, X.; Jiang, H.-y., A meta-analysis of the incidence of venous thromboembolic events and impact of anticoagulation on mortality in patients with COVID-19. *International Journal of Infectious Diseases* **2020**. https://doi.org/10.1016/j.ijid.2020.08.023
464. Lu, Y.; Li, Y.; Deng, W.; Liu, M.; He, Y.; Huang, L.; Lv, M.; Li, J.; Du, H., Symptomatic Infection is Associated with Prolonged Duration of Viral Shedding in Mild Coronavirus Disease 2019: A Retrospective Study of 110 Children in Wuhan. *Pediatr Infect Dis J* **2020**.
465. Lukito, A. A.; Pranata, R.; Henrina, J.; Lim, M. A.; Lawrensia, S.; Suastika, K., The Effect of Metformin Consumption on Mortality in Hospitalized COVID-19 patients: a systematic review and meta-analysis. *Diabetes Metab Syndr* **2020,** *14* (6), 2177-2183.
466. Lumley, S. F.; O'Donnell, D.; Stoesser, N. E.; Matthews, P. C.; Howarth, A.; Hatch, S. B.; Marsden, B. D.; Cox, S.; James, T.; Warren, F.; Peck, L. J.; Ritter, T. G.; de Toledo, Z.; Warren, L.; Axten, D.; Cornall, R. J.; Jones, E. Y.; Stuart, D. I.; Screaton, G.; Ebner, D.; Hoosdally, S.; Chand, M.; Crook, D. W.; O'Donnell, A.-M.; Conlon, C. P.; Pouwels, K. B.; Walker, A. S.; Peto, T. E. A.; Hopkins, S.; Walker, T. M.; Jeffery, K.; Eyre, D. W., Antibody Status and Incidence of SARS-CoV-2 Infection in Health Care Workers. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMoa2034545
467. Lundgren, J. D.; Grund, B.; Barkauskas, C. E.; Holland, T. L.; Gottlieb, R. L.; Sandkovsky, U.; Brown, S. M.; Knowlton, K. U.; Self, W. H.; Files, D. C.; Jain, M. K.; Benfield, T.; Bowdish, M. E.; Leshnower, B. G.; Baker, J. V.; Jensen, J. U.; Gardner, E. M.; Ginde, A. A.; Harris, E. S.; Johansen, I. S.; Markowitz, N.; Matthay, M. A.; Østergaard, L.; Chang, C. C.; Davey, V. J.; Goodman, A.; Higgs, E. S.; Murray, D. D.; Murray, T. A.; Paredes, R.; Parmar, M. K. B.; Phillips, A. N.; Reilly, C.; Sharma, S.; Dewar, R. L.; Teitelbaum, M.; Wentworth, D.; Cao, H.; Klekotka, P.; Babiker, A. G.; Gelijns, A. C.; Kan, V. L.; Polizzotto, M. N.; Thompson, B. T.; Lane, H. C.; Neaton, J. D., A Neutralizing Monoclonal Antibody for Hospitalized Patients with Covid-19. *N Engl J Med* **2020**.
468. Luo, K.; Lei, Z.; Hai, Z.; Xiao, S.; Rui, J.; Yang, H.; Jing, X.; Wang, H.; Xie, Z.; Luo, P.; Li, W.; Li, Q.; Tan, H.; Xu, Z.; Yang, Y.; Hu, S.; Chen, T., Transmission of SARS-CoV-2 in Public Transportation Vehicles: A Case Study in Hunan Province, China. *Open Forum Infectious Diseases* **2020,** *7* (10). https://doi.org/10.1093/ofid/ofaa430
469. Luo, Y.; Trevathan, E.; Qian, Z.; Li, Y.; Li, J.; Xiao, W.; Tu, N.; Zeng, Z.; Mo, P.; Xiong, Y.; Ye, G., Asymptomatic SARS-CoV-2 Infection in Household Contacts of a Healthcare Provider, Wuhan, China.

Emerging Infectious Disease journal **2020,** *26* (8). https://wwwnc.cdc.gov/eid/article/26/8/20-1016_article
470. Ma, J.; Qi, X.; Chen, H.; Li, X.; Zhang, Z.; Wang, H.; Sun, L.; Zhang, L.; Guo, J.; Morawska, L.; Grinshpun, S. A.; Biswas, P.; Flagan, R. C.; Yao, M., COVID-19 patients in earlier stages exhaled millions of SARS-CoV-2 per hour. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa1283
471. Mack, C. D.; Wasserman, E. B.; Perrine, C. G.; al., e., Implementation and Evolution of Mitigation Measures, Testing, and Contact Tracing in the National Football League, August 9–November 21, 2020. *Morbidity and Mortality Weekly Report* **2021,** *ePub: 25 January 2021*. https://www.cdc.gov/mmwr/volumes/70/wr/mm7004e2.htm
472. Madera, S.; Crawford, E.; Langelier, C.; Tran, N. K.; Thornborrow, E.; Miller, S.; DeRisi, J. L., Nasopharyngeal SARS-CoV-2 viral loads in young children do not differ significantly from those in older children and adults. *Scientific Reports* **2021,** *11* (1), 3044. https://doi.org/10.1038/s41598-021-81934-w
473. Madewell, Z. J.; Yang, Y.; Longini, I. M., Jr; Halloran, M. E.; Dean, N. E., Household Transmission of SARS-CoV-2: A Systematic Review and Meta-analysis. *JAMA Network Open* **2020,** *3* (12), e2031756-e2031756. https://doi.org/10.1001/jamanetworkopen.2020.31756
474. Magleby, R.; Westblade, L. F.; Trzebucki, A.; Simon, M. S.; Rajan, M.; Park, J.; Goyal, P.; Safford, M. M.; Satlin, M. J., Impact of SARS-CoV-2 Viral Load on Risk of Intubation and Mortality Among Hospitalized Patients with Coronavirus Disease 2019. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa851
475. Mahase, E., Covid-19: Past infection provides 83% protection for five months but may not stop transmission, study finds. *BMJ* **2021,** *372*, n124. https://www.bmj.com/content/bmj/372/bmj.n124.full.pdf
476. Maier, B. F.; Brockmann, D., Effective containment explains subexponential growth in recent confirmed COVID-19 cases in China. *Science* **2020,** *368* (6492), 742-746. https://science.sciencemag.org/content/sci/368/6492/742.full.pdf
477. Majumder, M.; Mandl, K., Early transmissibility assessment of a novel coronavirus in Wuhan, China. *SSRN* **2020**. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3524675
478. Malgie, J.; Schoones, J. W.; Pijls, B. G., Decreased mortality in COVID-19 patients treated with Tocilizumab: a rapid systematic review and meta-analysis of observational studies. *Clin Infect Dis* **2020**.
479. Mallapaty, S., Coronavirus can infect cats — dogs, not so much. *Nature* **2020**. https://www.nature.com/articles/d41586-020-00984-8
480. Mallett, S.; Allen, A. J.; Graziadio, S.; Taylor, S. A.; Sakai, N. S.; Green, K.; Suklan, J.; Hyde, C.; Shinkins, B.; Zhelev, Z.; Peters, J.; Turner, P. J.; Roberts, N. W.; di Ruffano, L. F.; Wolff, R.; Whiting, P.; Winter, A.; Bhatnagar, G.; Nicholson, B. D.; Halligan, S., At what times during infection is SARS-CoV-2 detectable and no longer detectable using RT-PCR-based tests? A systematic review of individual participant data. *BMC Med* **2020,** *18* (1), 346.
481. Mandavilli, A., Pregnant Women May Receive Covid Vaccines Safely, W.H.O. Says. https://www.nytimes.com/2021/01/29/health/covid-vaccine-pregnancy.html.
482. Maor, Y.; Cohen, D.; Paran, N.; Israely, T.; Ezra, V.; Axelrod, O.; Shinar, E.; Izak, M.; Rahav, G.; Rahimi-Levene, N.; Bazofin, B. M.; Gelman, R.; Dicker, D.; Brosh-Nissimov, T.; Megged, O.; Dahan, D.; Benov, A.; Paz, A.; Edward, K.; Moran, A.; Rogowski, O.; Sorkine, P.; Mayo, A.; Zimhony, O.; Chen, J., Compassionate use of convalescent plasma for treatment of moderate and severe pneumonia in COVID-19 patients and association with IgG antibody levels in donated plasma. *EClinicalMedicine* **2020**, 100525.
483. Masana, L.; Correig, E.; Rodríguez-Borjabad, C.; Anoro, E.; Arroyo, J. A.; Jericó, C.; Pedragosa, A.; Miret, M.; Näf, S.; Pardo, A.; Perea, V.; Pérez-Bernalte, R.; Plana, N.; Ramírez-Montesinos, R.; Royuela, M.; Soler, C.; Urquizu-Padilla, M.; Zamora, A.; Pedro-Botet, J.; Group, O., EFFECT oF STATIN THERAPY oN SARS-CoV-2 INFECTION-RELATED. *Eur Heart J Cardiovasc Pharmacother* **2020**.

484. Mateus, J.; Grifoni, A.; Tarke, A.; Sidney, J.; Ramirez, S. I.; Dan, J. M.; Burger, Z. C.; Rawlings, S. A.; Smith, D. M.; Phillips, E.; Mallal, S.; Lammers, M.; Rubiro, P.; Quiambao, L.; Sutherland, A.; Yu, E. D.; da Silva Antunes, R.; Greenbaum, J.; Frazier, A.; Markmann, A. J.; Premkumar, L.; de Silva, A.; Peters, B.; Crotty, S.; Sette, A.; Weiskopf, D., Selective and cross-reactive SARS-CoV-2 T cell epitopes in unexposed humans. *Science* **2020**, eabd3871. https://science.sciencemag.org/content/sci/early/2020/08/04/science.abd3871.full.pdf
485. McElvaney, O. J.; Hobbs, B. D.; Qiao, D.; McElvaney, O. F.; Moll, M.; McEvoy, N. L.; Clarke, J.; O'Connor, E.; Walsh, S.; Cho, M. H.; Curley, G. F.; McElvaney, N. G., A linear prognostic score based on the ratio of interleukin-6 to interleukin-10 predicts outcomes in COVID-19. *EBioMedicine* **2020,** *61*, 103026. http://www.sciencedirect.com/science/article/pii/S2352396420304023
486. McGurnaghan, S. J.; Weir, A.; Bishop, J.; Kennedy, S.; Blackbourn, L. A. K.; McAllister, D. A.; Hutchinson, S.; Caparrotta, T. M.; Mellor, J.; Jeyam, A.; O'Reilly, J. E.; Wild, S. H.; Hatam, S.; Höhn, A.; Colombo, M.; Robertson, C.; Lone, N.; Murray, J.; Butterly, E.; Petrie, J.; Kennon, B.; McCrimmon, R.; Lindsay, R.; Pearson, E.; Sattar, N.; McKnight, J.; Philip, S.; Collier, A.; McMenamin, J.; Smith-Palmer, A.; Goldberg, D.; McKeigue, P. M.; Colhoun, H. M.; Whettlock, A.; McLeod, A.; Gasiorowski, A.; Merrick, A.; McAuley, A.; Went, A.; Purdie, C.; Fischbacher, C.; Ramsey, C.; Bailey, D.; Henderson, D.; McDonald, E.; Drennan, G.; Gowans, G.; Reid, G.; Murdoch, H.; Carruthers, J.; Murray, J.; Heatlie, K.; Donaldson, L.; Paton, M.; Reid, M.; Llano, M.; Murphy-Hall, M.; Hall, R.; Cameron, R.; Brownlie, S.; Gaffney, A.; Milne, A.; Sullivan, C.; McArdle, E.; Glass, E.; Young, J.; Malcolm, W.; McCoubrey, J., Risks of and risk factors for COVID-19 disease in people with diabetes: a cohort study of the total population of Scotland. *The Lancet Diabetes & Endocrinology* **2020**. https://doi.org/10.1016/S2213-8587(20)30405-8
487. Mehta, N. S.; Mytton, O. T.; Mullins, E. W. S.; Fowler, T. A.; Falconer, C. L.; Murphy, O. B.; Langenberg, C.; Jayatunga, W. J. P.; Eddy, D. H.; Nguyen-Van-Tam, J. S., SARS-CoV-2 (COVID-19): What Do We Know About Children? A Systematic Review. *Clinical Infectious Diseases* **2020,** *71* (9), 2469-2479. https://doi.org/10.1093/cid/ciaa556
488. Menachery, V. D.; Dinnon, K. H.; Yount, B. L.; McAnarney, E. T.; Gralinski, L. E.; Hale, A.; Graham, R. L.; Scobey, T.; Anthony, S. J.; Wang, L.; Graham, B.; Randell, S. H.; Lipkin, W. I.; Baric, R. S., Trypsin Treatment Unlocks Barrier for Zoonotic Bat Coronavirus Infection. *Journal of Virology* **2020,** *94* (5), e01774-19. https://jvi.asm.org/content/jvi/94/5/e01774-19.full.pdf
489. Merkler, A. E.; Parikh, N. S.; Mir, S.; Gupta, A.; Kamel, H.; Lin, E.; Lantos, J.; Schenck, E. J.; Goyal, P.; Bruce, S. S.; Kahan, J.; Lansdale, K. N.; LeMoss, N. M.; Murthy, S. B.; Stieg, P. E.; Fink, M. E.; Iadecola, C.; Segal, A. Z.; Cusick, M.; Campion, T. R., Jr; Diaz, I.; Zhang, C.; Navi, B. B., Risk of Ischemic Stroke in Patients With Coronavirus Disease 2019 (COVID-19) vs Patients With Influenza. *JAMA Neurology* **2020**. https://doi.org/10.1001/jamaneurol.2020.2730
490. Millett, G. A.; Jones, A. T.; Benkeser, D.; Baral, S.; Mercer, L.; Beyrer, C.; Honermann, B.; Lankiewicz, E.; Mena, L.; Crowley, J. S.; Sherwood, J.; Sullivan, P., Assessing Differential Impacts of COVID-19 on Black Communities. *Annals of Epidemiology* **2020**. http://www.sciencedirect.com/science/article/pii/S1047279720301769
491. Mina, M. J.; Parker, R.; Larremore, D. B., Rethinking Covid-19 Test Sensitivity — A Strategy for Containment. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMp2025631
492. MIT, DELPHI Epidemiological Case Predictions. https://www.covidanalytics.io/projections.
493. Mitja, O.; Ubals, M.; Corbacho, M.; Alemany, A.; Suner, C.; Tebe, C.; Tobias, A.; Penafiel, J.; Ballana, E.; Perez, C. A.; Admella, P.; Riera-Marti, N.; Laporte, P.; Mitja, J.; Clua, M.; Bertran, L.; Gavilan, S.; Ara, J.; Sarquella, M.; Argimon, J. M.; Cuatrecasas, G.; Canadas, P.; Elizalde-Torrent, A.; Fabregat, R.; Farre, M.; Forcada, A.; Flores-Mateo, G.; Lopez, C.; Muntada, E.; Nadal, N.; Narejos, S.; Gil-Ortega, A. N.; Prat, N.; Puig, J.; Quinones, C.; Ramirez-Viaplana, F.; Reyes-Uruena, J.; Riveira-Munoz, E.; Ruiz, L.; Sanz, S.; Sentis, A.; Sierra, A.; Velasco, C.; Vivanco-Hidalgo, R. M.; Zamora, J.; Casabona, J.; Vall-Mayans, M.; G-Beiras, C.;

Clotet, B., A Cluster-Randomized Trial of Hydroxychloroquine as Prevention of Covid-19 Transmission and Disease. *medRxiv* **2020**, 2020.07.20.20157651. http://medrxiv.org/content/early/2020/07/26/2020.07.20.20157651.abstract
494. MITRE, COVID-19 Dashboard and Tools. https://dashboards.c19hcc.org/.
495. Mizrahi, B.; Shilo, S.; Rossman, H.; Kalkstein, N.; Marcus, K.; Barer, Y.; Keshet, A.; Shamir-Stein, N. a.; Shalev, V.; Zohar, A. E.; Chodick, G.; Segal, E., Longitudinal symptom dynamics of COVID-19 infection. *Nature Communications* **2020,** *11* (1), 6208. https://doi.org/10.1038/s41467-020-20053-y
496. Moderna, Moderna Announces Longer Shelf Life for its COVID-19 Vaccine Candidate at Refrigerated Temperatures. https://investors.modernatx.com/news-releases/news-release-details/moderna-announces-longer-shelf-life-its-covid-19-vaccine.
497. Moderna, Moderna Announces Primary Efficacy Analysis in Phase 3 COVE Study for Its COVID-19 Vaccine Candidate and Filing Today with U.S. FDA for Emergency Use Authorization. https://investors.modernatx.com/news-releases/news-release-details/moderna-announces-primary-efficacy-analysis-phase-3-cove-study.
498. Moderna, A Study to Evaluate the Safety, Reactogenicity, and Effectiveness of mRNA-1273 Vaccine in Adolescents 12 to <18 Years Old to Prevent COVID-19 (TeenCove). https://clinicaltrials.gov/ct2/show/NCT04649151.
499. Mody, A.; Lyons, P. G.; Guillamet, C. V.; Michelson, A.; Yu, S.; Namwase, A. S.; Sinha, P.; Powderly, W. G.; Woeltje, K.; Geng, E. H., The Clinical Course of COVID-19 Disease in a US Hospital System: a Multi-state Analysis. *American Journal of Epidemiology* **2020**. https://doi.org/10.1093/aje/kwaa286
500. Moiseev, S.; Avdeev, S.; Tao, E.; Brovko, M.; Bulanov, N.; Zykova, A.; Akulkina, L.; Smirnova, I.; Fomin, V., Neither earlier nor late tocilizumab improved outcomes in the intensive care unit patients with COVID-19 in a retrospective cohort study. *Annals of the Rheumatic Diseases* **2020**, annrheumdis-2020-219265. http://ard.bmj.com/content/early/2020/10/30/annrheumdis-2020-219265.abstract
501. Monchatre-Leroy, E.; Lesellier, S.; Wasniewski, M.; Picard-Meyer, E.; Richomme, C.; Boué, F.; Lacôte, S.; Murri, S.; Pulido, C.; Vulin, J.; Salguero, F. J.; Gouilh, M. A.; Servat, A.; Marianneau, P., Hamster and ferret experimental infection with intranasal low dose of a single strain of SARS-CoV-2. *bioRxiv* **2020**, 2020.09.24.311977. http://biorxiv.org/content/early/2020/09/24/2020.09.24.311977.abstract
502. Monod, M.; Blenkinsop, A.; Xi, X.; Hebert, D.; Bershan, S.; Tietze, S.; Baguelin, M.; Bradley, V. C.; Chen, Y.; Coupland, H.; Filippi, S.; Ish-Horowicz, J.; McManus, M.; Mellan, T.; Gandy, A.; Hutchinson, M.; Unwin, H. J. T.; van Elsland, S. L.; Vollmer, M. A. C.; Weber, S.; Zhu, H.; Bezancon, A.; Ferguson, N. M.; Mishra, S.; Flaxman, S.; Bhatt, S.; Ratmann, O., Age groups that sustain resurging COVID-19 epidemics in the United States. *Science* **2021**, eabe8372. https://science.sciencemag.org/content/sci/early/2021/02/01/science.abe8372.full.pdf
503. Moore, J. T.; Ricaldi, J. N.; Rose, C. E.; al., e., Disparities in Incidence of COVID-19 Among Underrepresented Racial/Ethnic Groups in Counties Identified as Hotspots During June 5–18, 2020 — 22 States, February–June 2020. *Morbidity and Mortality Weekly Report* **2020,** *ePub: 14 August 2020*.
504. Morawska, L.; Milton, D. K., It is Time to Address Airborne Transmission of COVID-19. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa939
505. Moriarty, L. F.; Plucinski, M. M.; Marston, B. J. e. a., Public Health Responses fo COVID-19 Outbreaks on Cruise Ships - Worldwide, February - March 2020. *MMWR* **2020,** (ePub: 23 March 2020). https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e3.htm
506. Morley, C. P.; Anderson, K. B.; Shaw, J.; Stewart, T.; Thomas, S. J.; Wang, D., Social Distancing Metrics and Estimates of SARS-CoV-2 Transmission Rates: Associations Between Mobile Telephone Data Tracking and R. *Journal of Public Health Management and Practice* **9000,** *Publish Ahead of Print*. https://journals.lww.com/jphmp/Fulltext/9000/Social_Distancing_Metrics_and_Estimates_of.99258.aspx

507. Mueller, B.; Robbins, R.; Chutel, L., AstraZeneca's Vaccine Does Not Work Well Against Virus Variant in South Africa. *New York Times* 2021. https://www.nytimes.com/2021/02/07/world/africa/covid-vaccine-astrazeneca-south-africa.html
508. Muik, A.; Wallisch, A.-K.; Sänger, B.; Swanson, K. A.; Mühl, J.; Chen, W.; Cai, H.; Sarkar, R.; Türeci, Ö.; Dormitzer, P. R.; Sahin, U., Neutralization of SARS-CoV-2 lineage B.1.1.7 pseudovirus by BNT162b2 vaccine-elicited human sera. *bioRxiv* **2021**, 2021.01.18.426984. http://biorxiv.org/content/early/2021/01/19/2021.01.18.426984.abstract
509. Munster, V. J.; Feldmann, F.; Williamson, B. N.; van Doremalen, N.; Pérez-Pérez, L.; Schulz, J.; Meade-White, K.; Okumura, A.; Callison, J.; Brumbaugh, B.; Avanzato, V. A.; Rosenke, R.; Hanley, P. W.; Saturday, G.; Scott, D.; Fischer, E. R.; de Wit, E., Respiratory disease and virus shedding in rhesus macaques inoculated with SARS-CoV-2. *bioRxiv* **2020**, 2020.03.21.001628. https://www.biorxiv.org/content/biorxiv/early/2020/03/21/2020.03.21.001628.full.pdf
510. Murat, S.; Dogruoz Karatekin, B.; Icagasioglu, A.; Ulasoglu, C.; İçten, S.; Incealtin, O., Clinical presentations of pain in patients with COVID-19 infection. *Ir J Med Sci* **2020**.
511. Murphy, N.; Boland, M.; Bambury, N.; Fitzgerald, M.; Comerford, L.; Dever, N.; O'Sullivan, M. B.; Petty-Saphon, N.; Kiernan, R.; Jensen, M.; O'Connor, L., A large national outbreak of COVID-19 linked to air travel, Ireland, summer 2020. *Eurosurveillance* **2020,** *25* (42), 2001624. https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.42.2001624
512. Mykytyn, A. Z.; Lamers, M. M.; Okba, N. M. A.; Breugem, T. I.; Schipper, D.; van den Doel, P. B.; van Run, P.; van Amerongen, G.; de Waal, L.; Koopmans, M. P. G.; Stittelaar, K. J.; van den Brand, J. M. A.; Haagmans, B. L., Susceptibility of rabbits to SARS-CoV-2. *Emerging Microbes & Infections* **2020**, 1-17. https://doi.org/10.1080/22221751.2020.1868951
513. NACCHO, U.S. COVID-19 Dashboard. https://naccho.maps.arcgis.com/apps/opsdashboard/index.html#/745860ceff004059aad1b6f82f196fb5 .
514. Nasa, P.; Singh, A.; Upadhyay, S.; Bagadia, S.; Polumuru, S.; Shrivastava, P. K.; Sankar, R.; Vijayan, L.; Soliman, M. A.; Ali, A.; Patidar, S., Tocilizumab Use in COVID-19 Cytokine-release Syndrome: Retrospective Study of Two Centers. *Indian J Crit Care Med* **2020,** *24* (9), 771-776.
515. NASEM, *Airborne transmission of SARS-CoV-2; Proceedings of a Workshop - in Brief*; National Academies of Sciences, Engineering, and Medicine: 2020. https://www.nap.edu/read/25958/chapter/1
516. National Institutes of Health, NIH observational study of coronavirus infection and multisystem inflammatory syndrome in children begins. https://www.nih.gov/news-events/news-releases/nih-observational-study-coronavirus-infection-multisystem-inflammatory-syndrome-children-begins (accessed 16 Dec 2020).
517. National Public Radio (NPR), Still Disinfecting Surfaces? It Might Not Be Worth It. https://www.npr.org/sections/health-shots/2020/12/28/948936133/still-disinfecting-surfaces-it-might-not-be-worth-it (accessed 02 Jan 2021).
518. Ndieugnou Djangang, N.; Peluso, L.; Talamonti, M.; Izzi, A.; Gevenois, P. A.; Garufi, A.; Goffard, J.-C.; Henrard, S.; Severgnini, P.; Vincent, J.-L.; Creteur, J.; Taccone, F. S., Eosinopenia in COVID-19 Patients: A Retrospective Analysis. *Microorganisms* **2020,** *8* (12), 1929. https://www.mdpi.com/2076-2607/8/12/1929
519. Ng, K. W.; Faulkner, N.; Cornish, G. H.; Rosa, A.; Harvey, R.; Hussain, S.; Ulferts, R.; Earl, C.; Wrobel, A. G.; Benton, D. J.; Roustan, C.; Bolland, W.; Thompson, R.; Agua-Doce, A.; Hobson, P.; Heaney, J.; Rickman, H.; Paraskevopoulou, S.; Houlihan, C. F.; Thomson, K.; Sanchez, E.; Shin, G. Y.; Spyer, M. J.; Joshi, D.; O'Reilly, N.; Walker, P. A.; Kjaer, S.; Riddell, A.; Moore, C.; Jebson, B. R.; Wilkinson, M.; Marshall, L. R.; Rosser, E. C.; Radziszewska, A.; Peckham, H.; Ciurtin, C.; Wedderburn, L. R.; Beale, R.; Swanton, C.; Gandhi, S.; Stockinger, B.; McCauley, J.; Gamblin, S. J.; McCoy, L. E.; Cherepanov, P.; Nastouli, E.; Kassiotis, G., Preexisting and de novo humoral immunity to SARS-CoV-2 in humans. *Science*

2020, eabe1107.
https://science.sciencemag.org/content/sci/early/2020/11/05/science.abe1107.full.pdf
520. Ng, O. T.; Marimuthu, K.; Koh, V.; Pang, J.; Linn, K. Z.; Sun, J.; De Wang, L.; Chia, W. N.; Tiu, C.; Chan, M.; Ling, L. M.; Vasoo, S.; Abdad, M. Y.; Chia, P. Y.; Lee, T. H.; Lin, R. J.; Sadarangani, S. P.; Chen, M. I. C.; Said, Z.; Kurupatham, L.; Pung, R.; Wang, L.-F.; Cook, A. R.; Leo, Y.-S.; Lee, V. J. M., SARS-CoV-2 seroprevalence and transmission risk factors among high-risk close contacts: a retrospective cohort study. *The Lancet Infectious Diseases*. https://doi.org/10.1016/S1473-3099(20)30833-1
521. Ngonghala, C. N.; Iboi, E.; Eikenberry, S.; Scotch, M.; MacIntyre, C. R.; Bonds, M. H.; Gumel, A. B., Mathematical assessment of the impact of non-pharmaceutical interventions on curtailing the 2019 novel Coronavirus. *Mathematical Biosciences* **2020,** *325*, 108364.
http://www.sciencedirect.com/science/article/pii/S0025556420300560
522. NIH, *Fact Sheet for Patients And Parent/Caregivers - Emergency Use Authorization (EUA) Of Remdesivir For Coronavirus Disease 2019 (COVID-19)*; National Institutes of Health: 2020.
https://www.fda.gov/media/137565/download
523. NIH, Full-dose blood thinners decreased need for life support and improved outcome in hospitalized COVID-19 patients. National Institutes of Health: 2021. https://www.nih.gov/news-events/news-releases/full-dose-blood-thinners-decreased-need-life-support-improved-outcome-hospitalized-covid-19-patients?account=battelle
524. NIH, Therapeutic Management of Patients with COVID-19.
https://www.covid19treatmentguidelines.nih.gov/therapeutic-management/.
525. Niu, A.; Ning, B.; Socola, F.; Safah, H.; Reynolds, T.; Ibrahim, M.; Safa, F.; Alfonso, T.; Luk, A.; Mushatt, D. M.; Hu, T.; Saba, N. S., 313 COVID-19 in Patients with hematological Malignancies: High False Negative Rate with High Mortality. In *62nd ASH Annual Meeting and Exposition*, 2020.
https://ash.confex.com/ash/2020/webprogram/Paper138611.html
526. Noh, J.; Danuser, G., Estimation of the fraction of COVID-19 infected people in U.S. states and countries worldwide. *PLOS ONE* **2021,** *16* (2), e0246772. https://doi.org/10.1371/journal.pone.0246772
527. Nonaka, C. K. V.; Franco, M. M.; Gräf, T.; Mendes, A. V. A.; Aguiar, R. S. d.; Giovanetti, M.; Souza, B. S. d. F., Genomic Evidence of a Sars-Cov-2 Reinfection Case With E484K Spike Mutation in Brazil. *Pre-print* **2021**. https://www.preprints.org/manuscript/202101.0132/v1
528. Northeastern, Modeling of COVID-19 epidemic in the United States.
https://covid19.gleamproject.org/#icubedproj.
529. Nouvellet, P.; Bhatia, S.; Cori, A.; Ainslie, K. E. C.; Baguelin, M.; Bhatt, S.; Boonyasiri, A.; Brazeau, N. F.; Cattarino, L.; Cooper, L. V.; Coupland, H.; Cucunuba, Z. M.; Cuomo-Dannenburg, G.; Dighe, A.; Djaafara, B. A.; Dorigatti, I.; Eales, O. D.; van Elsland, S. L.; Nascimento, F. F.; FitzJohn, R. G.; Gaythorpe, K. A. M.; Geidelberg, L.; Green, W. D.; Hamlet, A.; Hauck, K.; Hinsley, W.; Imai, N.; Jeffrey, B.; Knock, E.; Laydon, D. J.; Lees, J. A.; Mangal, T.; Mellan, T. A.; Nedjati-Gilani, G.; Parag, K. V.; Pons-Salort, M.; Ragonnet-Cronin, M.; Riley, S.; Unwin, H. J. T.; Verity, R.; Vollmer, M. A. C.; Volz, E.; Walker, P. G. T.; Walters, C. E.; Wang, H.; Watson, O. J.; Whittaker, C.; Whittles, L. K.; Xi, X.; Ferguson, N. M.; Donnelly, C. A., Reduction in mobility and COVID-19 transmission. *Nature Communications* **2021,** *12* (1), 1090.
https://doi.org/10.1038/s41467-021-21358-2
530. Novavax, Novavax COVID-19 Vaccine Demonstrates 89.3% Efficacy in UK Phase 3 Trial.
https://ir.novavax.com/news-releases/news-release-details/novavax-covid-19-vaccine-demonstrates-893-efficacy-uk-phase-3.
531. Novavax, Novavax COVID-19 Vaccine Demonstrates 89.3% Efficacy in UK Phase 3 Trial. Novavax, 2021. https://ir.novavax.com/news-releases/news-release-details/novavax-covid-19-vaccine-demonstrates-893-efficacy-uk-phase-3
532. Now, C. A., America's COVID warning system. https://covidactnow.org/?s=38532.

533. O'Toole, A.; Hill, V., B.1.351 Report 2021-01-27. https://cov-lineages.org/global_report_B.1.351.html.
534. O'Toole, A.; Hill, V., B.1.429 Report. https://cov-lineages.org/lineages/lineage_B.1.429.html.
535. O'Toole, A.; Hill, V., B.1.525 Report. https://cov-lineages.org/global_report_B.1.525.html.
536. O'Hearn, K.; Gertsman, S.; Webster, R.; Tsampalieros, A.; Ng, R.; Gibson, J.; Sampson, M.; Sikora, L.; McNally, J. D., Efficacy and Safety of Disinfectants for Decontamination of N95 and SN95 Filtering Facepiece Respirators: A Systematic Review. *Journal of Hospital Infection*. https://doi.org/10.1016/j.jhin.2020.08.005
537. Observatory, U., *COVID-19 Trends for U.S. Counties*; ESRI: 2020. https://urbanobservatory.maps.arcgis.com/apps/MapSeries/index.html?appid=ad46e587a9134fcdb43ff54c16f8c39b
538. Oetjens, M. T.; Luo, J. Z.; Chang, A.; Leader, J. B.; Hartzel, D. N.; Moore, B. S.; Strande, N. T.; Kirchner, H. L.; Ledbetter, D. H.; Justice, A. E.; Carey, D. J.; Mirshahi, T., Electronic health record analysis identifies kidney disease as the leading risk factor for hospitalization in confirmed COVID-19 patients. *PLoS One* **2020,** *15* (11), e0242182.
539. Offeddu, V.; Yung, C. F.; Low, M. S. F.; Tam, C. C., Effectiveness of Masks and Respirators Against Respiratory Infections in Healthcare Workers: A Systematic Review and Meta-Analysis. *Clin Infect Dis* **2017,** *65* (11), 1934-1942. https://www.ncbi.nlm.nih.gov/pubmed/29140516
540. Ogega, C. O.; Skinner, N. E.; Blair, P. W.; Park, H.-S.; Littlefield, K.; Ganesan, A.; Ladiwala, P.; Antar, A. A.; Ray, S. C.; Betenbaugh, M. J.; Pekosz, A.; Klein, S.; Manabe, Y. C.; Cox, A. L.; Bailey, J. R., Durable SARS-CoV-2 B cell immunity after mild or severe disease. *medRxiv* **2020**, 2020.10.28.20220996. https://www.medrxiv.org/content/medrxiv/early/2020/10/30/2020.10.28.20220996.full.pdf
541. Oliveira, P. M. d.; Mesquita, L. C. C.; Gkantonas, S.; Giusti, A.; Mastorakos, E., Evolution of spray and aerosol from respiratory releases: theoretical estimates for insight on viral transmission. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences* **2021,** *477* (2245), 20200584. https://royalsocietypublishing.org/doi/abs/10.1098/rspa.2020.0584
542. Olson, D. R.; Huynh, M.; Fine, A.; Baumgartner, J.; Castro, A.; Chan, H. T.; Daskalakis, D.; Devinney, K.; Guerra, K.; Harper, S.; Kennedy, J.; Konty, K.; Li, W.; McGibbon, E.; Shaff, J.; Thompson, C.; Vora, N. M.; Van Wye, G., Preliminary Estimate of Excess Mortality During the COVID-19 Outbreak — New York City, March 11–May 2, 2020. *Morbidity and Mortality Weekly Report* **2020,** (ePub: 11 May 2020). https://www.cdc.gov/mmwr/volumes/69/wr/mm6919e5.htm?s_cid=mm6919e5_w
543. Omrani, A. S.; Pathan, S. A.; Thomas, S. A.; Harris, T. R. E.; Coyle, P. V.; Thomas, C. E.; Qureshi, I.; Bhutta, Z. A.; Mawlawi, N. A.; Kahlout, R. A.; Elmalik, A.; Azad, A. M.; Daghfal, J.; Mustafa, M.; Jeremijenko, A.; Soub, H. A.; Khattab, M. A.; Maslamani, M. A.; Thomas, S. H., Randomized double-blinded placebo-controlled trial of hydroxychloroquine with or without azithromycin for virologic cure of non-severe Covid-19. *EClinicalMedicine* **2020,** *29*, 100645.
544. Ong, S. W. X.; Tan, Y. K.; Chia, P. Y.; Lee, T. H.; Ng, O. T.; Wong, M. S. Y.; Marimuthu, K., Air, Surface Environmental, and Personal Protective Equipment Contamination by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) From a Symptomatic Patient. *Jama* **2020**. https://jamanetwork.com/journals/jama/articlepdf/2762692/jama_ong_2020_ld_200016.pdf
545. Oran, D. P.; Topol, E. J., The Proportion of SARS-CoV-2 Infections That Are Asymptomatic. *Annals of Internal Medicine* **2021,** *0* (0), null. https://www.acpjournals.org/doi/abs/10.7326/M20-6976
546. Ortolan, A.; Lorenzin, M.; Felicetti, M.; Doria, A.; Ramonda, R., Does gender influence clinical expression and disease outcomes in COVID-19? A systematic review and meta-analysis. *International Journal of Infectious Diseases* **2020**. https://doi.org/10.1016/j.ijid.2020.07.076
547. Oster, A. M.; Caruso, E.; DeVies, J.; Hartnett, K. P.; Boehmer, T. K., Transmission Dynamics by Age Group in COVID-19 Hotspot Counties — United States, April–September 2020. *Morbidity and Mortality*

Weekly Report **2020,** *ePub* (9 October 2020). https://www.cdc.gov/mmwr/volumes/69/wr/mm6941e1.htm
548. Oude Munnink, B. B.; Sikkema, R. S.; Nieuwenhuijse, D. F.; Molenaar, R. J.; Munger, E.; Molenkamp, R.; van der Spek, A.; Tolsma, P.; Rietveld, A.; Brouwer, M.; Bouwmeester-Vincken, N.; Harders, F.; Hakze-van der Honing, R.; Wegdam-Blans, M. C. A.; Bouwstra, R. J.; GeurtsvanKessel, C.; van der Eijk, A. A.; Velkers, F. C.; Smit, L. A. M.; Stegeman, A.; van der Poel, W. H. M.; Koopmans, M. P. G., Transmission of SARS-CoV-2 on mink farms between humans and mink and back to humans. *Science* **2020**, eabe5901. http://science.sciencemag.org/content/early/2020/11/09/science.abe5901.abstract
549. Pairo-Castineira, E.; Clohisey, S.; Klaric, L.; al., e., Genetic mechanisms of critical illness in Covid-19. *Nature* **2020**. https://doi.org/10.1038/s41586-020-03065-y
550. Palmer, M. V.; Martins, M.; Falkenberg, S.; Buckley, A.; Caserta, L. C.; Mitchell, P. K.; Cassmann, E. D.; Rollins, A.; Zylich, N. C.; Renshaw, R. W.; Guarino, C.; Wagner, B.; Lager, K.; Diel, D. G., Susceptibility of white-tailed deer (Odocoileus virginianus) to SARS-CoV-2. *bioRxiv* **2021**, 2021.01.13.426628. http://biorxiv.org/content/early/2021/01/14/2021.01.13.426628.abstract
551. Pan, D.; Sze, S.; Minhas, J. S.; Bangash, M. N.; Pareek, N.; Divall, P.; Williams, C. M. L.; Oggioni, M. R.; Squire, I. B.; Nellums, L. B.; Hanif, W.; Khunti, K.; Pareek, M., The impact of ethnicity on clinical outcomes in COVID-19: A systematic review. *EClinicalMedicine*. https://doi.org/10.1016/j.eclinm.2020.100404
552. Pan, F.; Ye, T.; Sun, P.; Gui, S.; Liang, B.; Li, L.; Zheng, D.; Wang, J.; Hesketh, R. L.; Yang, L.; Zheng, C., Time Course of Lung Changes On Chest CT During Recovery From 2019 Novel Coronavirus (COVID-19) Pneumonia. *Radiology 0* (0), 200370. https://pubs.rsna.org/doi/abs/10.1148/radiol.2020200370
553. Pan, H.; Peto, R.; Henao-Restrepo, A. M.; Preziosi, M. P.; Sathiyamoorthy, V.; Abdool Karim, Q.; Alejandria, M. M.; Hernández García, C.; Kieny, M. P.; Malekzadeh, R.; Murthy, S.; Reddy, K. S.; Roses Periago, M.; Abi Hanna, P.; Ader, F.; Al-Bader, A. M.; Alhasawi, A.; Allum, E.; Alotaibi, A.; Alvarez-Moreno, C. A.; Appadoo, S.; Asiri, A.; Aukrust, P.; Barratt-Due, A.; Bellani, S.; Branca, M.; Cappel-Porter, H. B. C.; Cerrato, N.; Chow, T. S.; Como, N.; Eustace, J.; García, P. J.; Godbole, S.; Gotuzzo, E.; Griskevicius, L.; Hamra, R.; Hassan, M.; Hassany, M.; Hutton, D.; Irmansyah, I.; Jancoriene, L.; Kirwan, J.; Kumar, S.; Lennon, P.; Lopardo, G.; Lydon, P.; Magrini, N.; Maguire, T.; Manevska, S.; Manuel, O.; McGinty, S.; Medina, M. T.; Mesa Rubio, M. L.; Miranda-Montoya, M. C.; Nel, J.; Nunes, E. P.; Perola, M.; Portolés, A.; Rasmin, M. R.; Raza, A.; Rees, H.; Reges, P. P. S.; Rogers, C. A.; Salami, K.; Salvadori, M. I.; Sinani, N.; Sterne, J. A. C.; Stevanovikj, M.; Tacconelli, E.; Tikkinen, K. A. O.; Trelle, S.; Zaid, H.; Røttingen, J. A.; Swaminathan, S., Repurposed Antiviral Drugs for Covid-19 - Interim WHO Solidarity Trial Results. *N Engl J Med* **2020**.
554. Papamanoli, A.; Yoo, J.; Grewal, P.; Predun, W.; Hotelling, J.; Jacob, R.; Mojahedi, A.; Skopicki, H. A.; Mansour, M.; Marcos, L. A.; Kalogeropoulos, A. P., High-Dose Methylprednisolone in Nonintubated Patients with Severe COVID-19 Pneumonia. *Eur J Clin Invest* **2020**, e13458.
555. Park, S. W.; Champredon, D.; Earn, D. J. D.; Li, M.; Weitz, J. S.; Grenfell, B. T.; Dushoff, J., Reconciling early-outbreak preliminary estimates of the basic reproductive number and its uncertainty: a new framework and applications to the novel coronavirus (2019-nCoV) outbreak. **2020**, 1-13.
556. Park, S. Y.; Kim, Y.-M.; Yi, S.; Lee, S.; Na, B.-J.; Kim, C. B.; Kim, J.-i.; Kim, H. S.; Kim, Y. B.; Park, Y.; Huh, I. S.; Kim, H. K.; Yoon, H. J.; Jang, H.; Kim, K.; Chang, Y.; Kim, I.; Lee, H.; Gwack, J.; Kim, S. S.; Kim, M.; Kweon, S.; Choe, Y. J.; Park, O.; Park, Y. J.; Jeong, E. K., Coronavirus Disease Outbreak in Call Center, South Korea. *Emerging Infectious Disease journal* **2020,** *26* (8), 1666. https://wwwnc.cdc.gov/eid/article/26/8/20-1274_article
557. Park, Y. J.; Choe, Y. J.; Park, O.; Park, S. Y.; Kim, Y.-M.; Kim, J.; Kweon, S.; Woo, Y.; Gwack, J.; Kim, S. S.; Lee, J.; Hyun, J.; Ryu, B.; Jang, Y. S.; Kim, H.; Shin, S. H.; Yi, S.; Lee, S.; Kim, H. K.; Lee, H.; Jin, Y.; Park, E.; Choi, S. W.; Kim, M.; Song, J.; Choi, S. W.; Kim, D.; Jeon, B.-H.; Yoo, H.; Jeong, E. K., Contact Tracing

during Coronavirus Disease Outbreak, South Korea, 2020. *Emerging Infectious Disease journal* **2020,** *26* (10). https://wwwnc.cdc.gov/eid/article/26/10/20-1315_article
558. Parri, N.; Lenge, M.; Buonsenso, D., Children with Covid-19 in Pediatric Emergency Departments in Italy. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMc2007617
559. Parshley, L., Kids catch and spread coronavirus half as much as adults, Iceland study confirms. *National Geographic* December 10, 2020, 2020. https://www.nationalgeographic.com/science/2020/12/we-now-know-how-much-children-spread-coronavirus/#close
560. Pascual Pareja, J. F.; García-Caballero, R.; Soler Rangel, L.; Vázquez-Ronda, M. A.; Roa Franco, S.; Navarro Jiménez, G.; Moreno Palanco, M. A.; González-Ruano, P.; López-Menchaca, R.; Ruíz-Seco, P.; Pagán Muñoz, B.; Gómez Gómez, A.; Pérez-Monte, B.; Fuerte Martínez, R.; Valle López, J. L.; Muñoz Blanco, A.; Rábago Lorite, I.; Martínez Martín, P.; Serralta San Martín, G.; Gómez-Cerezo, J. F., Effectiveness of glucocorticoids in patients hospitalized for severe SARS-CoV-2 pneumonia. *Med Clin (Barc)* **2020**.
561. Pastor-Barriuso, R.; Pérez-Gómez, B.; Hernán, M. A.; Pérez-Olmeda, M.; Yotti, R.; Oteo-Iglesias, J.; Sanmartín, J. L.; León-Gómez, I.; Fernández-García, A.; Fernández-Navarro, P.; Cruz, I.; Martín, M.; Delgado-Sanz, C.; Fernández de Larrea, N.; León Paniagua, J.; Muñoz-Montalvo, J. F.; Blanco, F.; Larrauri, A.; Pollán, M., Infection fatality risk for SARS-CoV-2 in community dwelling population of Spain: nationwide seroepidemiological study. *BMJ* **2020,** *371*, m4509. https://www.bmj.com/content/bmj/371/bmj.m4509.full.pdf
562. Patel, M. D.; Rosenstrom, E.; Ivy, J. S.; Mayorga, M. E.; Keskinocak, P.; Boyce, R. M.; Lich, K. H.; Smith, R. L.; Johnson, K. T.; Swann, J. L., The Joint Impact of COVID-19 Vaccination and Non-Pharmaceutical Interventions on Infections, Hospitalizations, and Mortality: An Agent-Based Simulation. *medRxiv* **2021**, 2020.12.30.20248888. https://www.medrxiv.org/content/medrxiv/early/2021/01/10/2020.12.30.20248888.full.pdf
563. Patolia, H.; Pan, J.; Harb, C.; Marr, L. C.; Baffoe-Bonnie, A., Filtration evaluation and clinical use of expired elastomeric P-100 filter cartridges during the COVID-19 pandemic. *Infection Control & Hospital Epidemiology* **2020**, 1-6. https://www.cambridge.org/core/article/filtration-evaluation-and-clinical-use-of-expired-elastomeric-p100-filter-cartridges-during-the-covid19-pandemic/D5EFCC5EEF65FEA210E1070149CB9DEF
564. Patterson, E. I.; Elia, G.; Grassi, A.; Giordano, A.; Desario, C.; Medardo, M.; Smith, S. L.; Anderson, E. R.; Prince, T.; Patterson, G. T.; Lorusso, E.; Lucente, M. S.; Lanave, G.; Lauzi, S.; Bonfanti, U.; Stranieri, A.; Martella, V.; Solari Basano, F.; Barrs, V. R.; Radford, A. D.; Agrimi, U.; Hughes, G. L.; Paltrinieri, S.; Decaro, N., Evidence of exposure to SARS-CoV-2 in cats and dogs from households in Italy. *Nature Communications* **2020,** *11* (1), 6231. https://doi.org/10.1038/s41467-020-20097-0
565. Pau, A. K.; Aberg, J.; Baker, J.; Belperio, P. S.; Coopersmith, C. M.; Crew, P.; Glidden, D. V.; Grund, B.; Gulick, R. M.; Harrison, C.; Kim, A.; Lane, H. C.; Masur, H.; Sheikh, V.; Singh, K.; Yazdany, J.; Tebas, P., Convalescent Plasma for the Treatment of COVID-19: Perspectives of the National Institutes of Health COVID-19 Treatment Guidelines Panel. *Annals of Internal Medicine* **2020,** *0* (0), null. https://www.acpjournals.org/doi/abs/10.7326/M20-6448
566. Pawlowski, C.; Lenehan, P.; Puranik, A.; Agarwal, V.; Venkatakrishnan, A.; Niesen, M. J. M.; O'Horo, J. C.; Badley, A. D.; Halamka, J.; Soundararajan, V., FDA-authorized COVID-19 vaccines are effective per real-world evidence synthesized across a multi-state health system. *medRxiv* **2021**, 2021.02.15.21251623. https://www.medrxiv.org/content/medrxiv/early/2021/02/18/2021.02.15.21251623.full.pdf
567. Payne, D. C., SARS-CoV-2 Infections and Serologic Responses from a Sample of US Navy Service Members—USS Theodore Roosevelt, April 2020. *MMWR. Morbidity and Mortality Weekly Report* **2020,** *69*.

568. Peccia, J.; Zulli, A.; Brackney, D. E.; Grubaugh, N. D.; Kaplan, E. H.; Casanovas-Massana, A.; Ko, A. I.; Malik, A. A.; Wang, D.; Wang, M.; Warren, J. L.; Weinberger, D. M.; Arnold, W.; Omer, S. B., Measurement of SARS-CoV-2 RNA in wastewater tracks community infection dynamics. *Nature Biotechnology* **2020**. https://doi.org/10.1038/s41587-020-0684-z
569. Peirlinck, M.; Linka, K.; Sahli Costabal, F.; Bhattacharya, J.; Bendavid, E.; Ioannidis, J. P. A.; Kuhl, E., Visualizing the invisible: The effect of asymptomatic transmission on the outbreak dynamics of COVID-19. *Computer Methods in Applied Mechanics and Engineering* **2020,** *372*, 113410. https://www.sciencedirect.com/science/article/pii/S0045782520305958
570. Peltier, R. E.; Wang, J.; Hollenbeck, B. L.; Lanza, J.; Furtado, R. M.; Cyr, J.; Ellison, R.; Kobayashi, K. J., Addressing Decontaminated Respirators: Some Methods Appear to Damage Mask Integrity and Protective Function. *Infection Control & Hospital Epidemiology* **2020**, 1-9.
571. Perchetti, G. A.; Huang, M.-L.; Peddu, V.; Jerome, K. R.; Greninger, A. L., Stability of SARS-CoV-2 in PBS for Molecular Detection. *Journal of Clinical Microbiology* **2020**.
572. Perkins, A.; Espana, G., NotreDame-FRED COVID-19 forecasts. https://github.com/confunguido/covid19_ND_forecasting/blob/master/README.md.
573. Perry, R. J.; Smith, C. J.; Roffe, C.; Simister, R. J.; Narayanamoorthi, S.; Marigold, R.; Willmot, M.; Dixit, A.; Hassan, A.; Quinn, T.; Ankolekar, S.; Zhang, L.; Banerjee, S.; Ahmed, U.; Padmanabhan, N.; Ferdinand, P.; McGrane, F.; Banaras, A.; Marks, I. H.; Werring, D. J., Characteristics and outcomes of COVID-19-associated stroke: a UK multicentre case-control study. *Journal of Neurology, Neurosurgery & Psychiatry* **2020**, jnnp-2020-324927. https://jnnp.bmj.com/content/jnnp/early/2020/11/03/jnnp-2020-324927.full.pdf
574. Peto, L.; Rodger, G.; Carter, D. P.; Osman, K. L.; Yavuz, M.; Johnson, K.; Raza, M.; Parker, M. D.; Wyles, M. D.; Andersson, M.; Justice, A.; Vaughan, A.; Hoosdally, S.; Stoesser, N.; Matthews, P. C.; Eyre, D. W.; Peto, T. E.; Carroll, M. W.; de Silva, T. I.; Crook, D. W.; Evans, C. M.; Pullan, S. T., Diagnosis of SARS-CoV-2 infection with LamPORE, a high-throughput platform combining loop-mediated isothermal amplification and nanopore sequencing. *medRxiv* **2020**, 2020.09.18.20195370. https://www.medrxiv.org/content/medrxiv/early/2020/09/25/2020.09.18.20195370.full.pdf
575. Petrakis, D.; Margină, D.; Tsarouhas, K.; Tekos, F.; Stan, M.; Nikitovic, D.; Kouretas, D.; Spandidos, D. A.; Tsatsakis, A., Obesity - a risk factor for increased COVID-19 prevalence, severity and lethality (Review). *Mol Med Rep* **2020,** *22* (1), 9-19. https://doi.org/10.3892/mmr.2020.11127
576. Pfizer, PFIZER AND BIONTECH ANNOUNCE VACCINE CANDIDATE AGAINST COVID-19 ACHIEVED SUCCESS IN FIRST INTERIM ANALYSIS FROM PHASE 3 STUDY. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-announce-vaccine-candidate-against.
577. Pfizer, PFIZER AND BIONTECH SUBMIT COVID-19 VACCINE STABILITY DATA AT STANDARD FREEZER TEMPERATURE TO THE U.S. FDA. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-submit-covid-19-vaccine-stability-data.
578. Pfizer, PFIZER AND BIONTECH TO SUBMIT EMERGENCY USE AUTHORIZATION REQUEST TODAY TO THE U.S. FDA FOR COVID-19 VACCINE. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-submit-emergency-use-authorization.
579. PHE, *Investigation of novel SARS-CoV-2 variant, Variant of Concern 202012/01, Technical briefing 4*; Public Health England: 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/952490/Variant_of_Concern_VOC_202012_01_Technical_Briefing_4_England.pdf
580. Pickering, B.; Smith, G.; Pinette, M.; Embury-Hyatt, C.; Moffat, E.; Marszal, P.; Lewis, C. E., Susceptibility of domestic swine to experimental infection with SARS-CoV-2. *bioRxiv* **2020**, 2020.09.10.288548. http://biorxiv.org/content/early/2020/09/10/2020.09.10.288548.abstract
581. Pigoga, J. L.; Friedman, A.; Broccoli, M.; Hirner, S.; Naidoo, A. V.; Singh, S.; Werner, K.; Wallis, L. A., Clinical and historical features associated with severe COVID-19 infection: a systematic review. *medRxiv*

2020, 2020.04.23.20076653.
https://www.medrxiv.org/content/medrxiv/early/2020/04/27/2020.04.23.20076653.full.pdf
582. Piroth, L.; Cottenet, J.; Mariet, A.-S.; Bonniaud, P.; Blot, M.; Tubert-Bitter, P.; Quantin, C., Comparison of the characteristics, morbidity, and mortality of COVID-19 and seasonal influenza: a nationwide, population-based retrospective cohort study. *The Lancet Respiratory Medicine* **2020**. https://doi.org/10.1016/S2213-2600(20)30527-0
583. Pitman-Hunt, C.; Leja, J.; Jiwani, Z. M.; Rondot, D.; Ang, J.; Kannikeswaran, N., SARS-CoV-2 Transmission in an Urban Community: The Role of Children and Household Contacts. *Journal of the Pediatric Infectious Diseases Society* **2020**. https://doi.org/10.1093/jpids/piaa158
584. Plotkin, S. A.; Halsey, N., Accelerate COVID-19 Vaccine Rollout by Delaying the Second Dose of mRNA Vaccines. *Clinical Infectious Diseases* **2021**. https://doi.org/10.1093/cid/ciab068
585. Polack, F. P.; Thomas, S. J.; Kitchin, N.; Absalon, J.; Gurtman, A.; Lockhart, S.; Perez, J. L.; Pérez Marc, G.; Moreira, E. D.; Zerbini, C.; Bailey, R.; Swanson, K. A.; Roychoudhury, S.; Koury, K.; Li, P.; Kalina, W. V.; Cooper, D.; Frenck, R. W.; Hammitt, L. L.; Türeci, Ö.; Nell, H.; Schaefer, A.; Ünal, S.; Tresnan, D. B.; Mather, S.; Dormitzer, P. R.; Şahin, U.; Jansen, K. U.; Gruber, W. C., Safety and Efficacy of the BNT162b2 mRNA Covid-19 Vaccine. *New England Journal of Medicine* **2020,** *383* (27), 2603-2615. https://www.nejm.org/doi/full/10.1056/NEJMoa2034577
586. Pollán, M.; Pérez-Gómez, B.; Pastor-Barriuso, R.; al., e., Prevalence of SARS-CoV-2 in Spain (ENE-COVID): a nationwide, population-based seroepidemiological study. *The Lancet* **2020**. https://doi.org/10.1016/S0140-6736(20)31483-5
587. Popa, A.; Genger, J.-W.; Nicholson, M. D.; Penz, T.; Schmid, D.; Aberle, S. W.; Agerer, B.; Lercher, A.; Endler, L.; Colaço, H.; Smyth, M.; Schuster, M.; Grau, M. L.; Martínez-Jiménez, F.; Pich, O.; Borena, W.; Pawelka, E.; Keszei, Z.; Senekowitsch, M.; Laine, J.; Aberle, J. H.; Redlberger-Fritz, M.; Karolyi, M.; Zoufaly, A.; Maritschnik, S.; Borkovec, M.; Hufnagl, P.; Nairz, M.; Weiss, G.; Wolfinger, M. T.; von Laer, D.; Superti-Furga, G.; Lopez-Bigas, N.; Puchhammer-Stöckl, E.; Allerberger, F.; Michor, F.; Bock, C.; Bergthaler, A., Genomic epidemiology of superspreading events in Austria reveals mutational dynamics and transmission properties of SARS-CoV-2. *Science Translational Medicine* **2020**, eabe2555. https://stm.sciencemag.org/content/scitransmed/early/2020/11/20/scitranslmed.abe2555.full.pdf
588. Poston, D.; Weisblum, Y.; Wise, H.; Templeton, K.; Jenks, S.; Hatziioannou, T.; Bieniasz, P. D., Absence of SARS-CoV-2 neutralizing activity in pre-pandemic sera from individuals with recent seasonal coronavirus infection. *medRxiv* **2020**, 2020.10.08.20209650. https://www.medrxiv.org/content/medrxiv/early/2020/10/11/2020.10.08.20209650.full.pdf
589. Potter, D.; Riffon, M.; Kakamada, S.; Miller, R. S.; Komatsoulis, G. A., Disproportionate impact of COVID-19 disease among racial and ethnic minorities in the U.S. cancer population as seen in CancerLinQ Discovery data. *Journal of Clinical Oncology* **2020,** *38* (29_suppl), 84-84. https://ascopubs.org/doi/abs/10.1200/JCO.2020.38.29_suppl.84
590. Prentiss, M.; Chu, A.; Berggren, K. K., Superspreading Events Without Superspreaders: Using High Attack Rate Events to Estimate N_º for Airborne Transmission of COVID-19. *medRxiv* **2020**, 2020.10.21.20216895. https://www.medrxiv.org/content/medrxiv/early/2020/10/23/2020.10.21.20216895.full.pdf
591. Price-Haywood, E. G.; Burton, J.; Fort, D.; Seoane, L., Hospitalization and Mortality among Black Patients and White Patients with Covid-19. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMsa2011686
592. Qin, J.; You, C.; Lin, Q.; Hu, T.; Yu, S.; Zhou, X., Estimation of incubation period distribution of COVID-19 using disease onset forward time: a novel cross-sectional and forward follow-up study. *Science Advances* **2020,** *07 Aug 2020*. https://advances.sciencemag.org/content/early/2020/08/07/sciadv.abc1202

593. Qiu, H.; Wu, J.; Hong, L.; Luo, Y.; Song, Q.; Chen, D., Clinical and epidemiological features of 36 children with coronavirus disease 2019 (COVID-19) in Zhejiang, China: an observational cohort study. *The Lancet Infectious Diseases*. https://doi.org/10.1016/S1473-3099(20)30198-5
594. Quilty, B. J.; Clifford, S.; Hellewell, J.; Russell, T. W.; Kucharski, A. J.; Flasche, S.; Edmunds, W. J.; Atkins, K. E.; Foss, A. M.; Waterlow, N. R.; Abbas, K.; Lowe, R.; Pearson, C. A. B.; Funk, S.; Rosello, A.; Knight, G. M.; Bosse, N. I.; Procter, S. R.; Gore-Langton, G. R.; Showering, A.; Munday, J. D.; Sherratt, K.; Jombart, T.; Nightingale, E. S.; Liu, Y.; Jarvis, C. I.; Medley, G.; Brady, O.; Gibbs, H. P.; Simons, D.; Williams, J.; Tully, D. C.; Flasche, S.; Meakin, S. R.; Zandvoort, K.; Sun, F. Y.; Jit, M.; Klepac, P.; Quaife, M.; Eggo, R. M.; Sandmann, F. G.; Endo, A.; Prem, K.; Abbott, S.; Barnard, R.; Chan, Y.-W. D.; Auzenbergs, M.; Gimma, A.; Villabona-Arenas, C. J.; Davies, N. G., Quarantine and testing strategies in contact tracing for SARS-CoV-2: a modelling study. *The Lancet Public Health* **2021**. https://doi.org/10.1016/S2468-2667(20)30308-X
595. Rader, B.; White, L. F.; Burns, M. R.; Chen, J.; Brilliant, J.; Cohen, J.; Shaman, J.; Brilliant, L.; Kraemer, M. U. G.; Hawkins, J. B.; Scarpino, S. V.; Astley, C. M.; Brownstein, J. S., Mask-wearing and control of SARS-CoV-2 transmission in the USA: a cross-sectional study. *The Lancet Digital Health* **2021**. http://www.sciencedirect.com/science/article/pii/S2589750020302934
596. Rahimi, N. R.; Fouladi-Fard, R.; Aali, R.; Shahryari, A.; Rezaali, M.; Ghafouri, Y.; Ghalhari, M. R.; Ghalhari, M. A.; Farzinnia, B.; Fiore, M.; Gea, O. C., Bidirectional Association Between COVID-19 and the Environment: a Systematic Review. *Environmental Research* **2020**, 110692. http://www.sciencedirect.com/science/article/pii/S0013935120315917
597. Rai, B.; Shukla, A.; Dwivedi, L. K., Estimates of serial interval for COVID-19: A systematic review and meta-analysis. *Clinical Epidemiology and Global Health* **2020**. http://www.sciencedirect.com/science/article/pii/S2213398420301895
598. Rajasingham, R.; Bangdiwala, A. S.; Nicol, M. R.; Skipper, C. P.; Pastick, K. A.; Axelrod, M. L.; Pullen, M. F.; Nascene, A. A.; Williams, D. A.; Engen, N. W.; Okafor, E. C.; Rini, B. I.; Mayer, I. A.; McDonald, E. G.; Lee, T. C.; Li, P.; MacKenzie, L. J.; Balko, J. M.; Dunlop, S. J.; Hullsiek, K. H.; Boulware, D. R.; Lofgren, S. M.; team, o. b. o. t. C. P., Hydroxychloroquine as pre-exposure prophylaxis for COVID-19 in healthcare workers: a randomized trial. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa1571
599. Rambaut, A., Phylodynamic analysis of nCoV-2019 genomes - 27-Jan-2020. http://virological.org/t/phylodynamic-analysis-of-ncov-2019-genomes-27-jan-2020/353.
600. Rambaut, A.; Loman, N.; Pybus, O.; Barclay, W.; Barrett, J.; Carabelli, A.; Connor, T.; Peacock, T.; Robertson, D. L.; Volz, E.; (CoG-UK), C.-G. C. U., Preliminary genomic characterisation of an emergent SARS-CoV-2 lineage in the UK defined by a novel set of spike mutations. https://virological.org/t/preliminary-genomic-characterisation-of-an-emergent-sars-cov-2-lineage-in-the-uk-defined-by-a-novel-set-of-spike-mutations/563.
601. Rapid Expert Consultation, *Rapid Expert Consultation Update on SARS-CoV-2 Surface Stability and Incubation for the COVID-19 Pandemic (March 27, 2020)*. The National Academies Press: Washington, DC, 2020. https://www.nap.edu/read/25763/chapter/1
602. Rapkiewicz, A. V.; Mai, X.; Carsons, S. E.; Pittaluga, S.; Kleiner, D. E.; Berger, J. S.; Thomas, S.; Adler, N. M.; Charytan, D. M.; Gasmi, B.; Hochman, J. S.; Reynolds, H. R., Megakaryocytes and platelet-fibrin thrombi characterize multi-organ thrombosis at autopsy in COVID-19: A case series. *EClinicalMedicine* **2020**, 100434. http://www.sciencedirect.com/science/article/pii/S2589537020301784
603. Rasheed, A. M.; Fatak, D. F.; Hashim, H. A.; Maulood, M. F.; Kabah, K. K.; Almusawi, Y. A.; Abdulamir, A. S., The therapeutic potential of convalescent plasma therapy on treating critically-ill COVID-19 patients residing in respiratory care units in hospitals in Baghdad, Iraq. *Infez Med* **2020,** *28* (3), 357-366.
604. Ratnesar-Shumate, S.; Williams, G.; Green, B.; Krause, M.; Holland, B.; Wood, S.; Bohannon, J.; Boydston, J.; Freeburger, D.; Hooper, I.; Beck, K.; Yeager, J.; Altamura, L. A.; Biryukov, J.; Yolitz, J.; Schuit,

M.; Wahl, V.; Hevey, M.; Dabisch, P., Simulated Sunlight Rapidly Inactivates SARS-CoV-2 on Surfaces. *The Journal of Infectious Diseases* **2020**. https://doi.org/10.1093/infdis/jiaa274
605. Regeneron, REGN-COV2 INDEPENDENT DATA MONITORING COMMITTEE RECOMMENDS HOLDING ENROLLMENT IN HOSPITALIZED PATIENTS WITH HIGH OXYGEN REQUIREMENTS AND CONTINUING ENROLLMENT IN PATIENTS WITH LOW OR NO OXYGEN REQUIREMENTS. Regeneron: 2020. https://investor.regeneron.com/news-releases/news-release-details/regn-cov2-independent-data-monitoring-committee-recommends
606. Regeneron Pharmaceuticals, I., REGENERON'S CASIRIVIMAB AND IMDEVIMAB ANTIBODY COCKTAIL FOR COVID-19 IS FIRST COMBINATION THERAPY TO RECEIVE FDA EMERGENCY USE AUTHORIZATION. 2020. https://investor.regeneron.com/news-releases/news-release-details/regenerons-regen-cov2-first-antibody-cocktail-covid-19-receive
607. Ren, X.; Li, Y.; Yang, X.; Li, Z.; Cui, J.; Zhu, A.; Zhao, H.; Yu, J.; Nie, T.; Ren, M.; Dong, S.; Cheng, Y.; Chen, Q.; Chang, Z.; Sun, J.; Wang, L.; Feng, L.; Gao, G. F.; Feng, Z.; Li, Z., Evidence for pre-symptomatic transmission of coronavirus disease 2019 (COVID-19) in China. *Influenza and Other Respiratory Viruses* **2020,** *n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1111/irv.12787
608. Resende, P. C.; Bezerra, J. F.; Vasconcelos, R. H. T. d.; Arantes, I.; Appolinario, L.; Mendonça, A. C.; Paixao, A. C.; Rodrigues, A. C. D.; Silva, T.; Rocha, A. S.; Pauvolid-Corrêa, A.; Motta, F. C.; Teixeira, D. L. F.; Carneiro, T. F. d. O.; Neto, F. P. F.; Herbster, I. D.; Leite, A. B.; Riediger, I. N.; Debur, M. d. C.; Naveca, F. G.; Almeida, W.; Livorati, M.; Bello, G.; Siqueira, M. M., *Spike E484K mutation in the first SARS-CoV-2 reinfection case confirmed in Brazil*; 2021. https://virological.org/t/spike-e484k-mutation-in-the-first-sars-cov-2-reinfection-case-confirmed-in-brazil-2020/584
609. Reuters, Frozen food package polluted by living coronavirus could cause infection, China's CDC says. https://www.reuters.com/article/us-health-coronavirus-china-packaging-idUKKBN2720MD (accessed 01 Nov 2020).
610. Reuters, WHO looks at mink farm biosecurity globally after Danish coronavirus cases. Farge, E.; Kelland, K., Eds. 2020. https://in.reuters.com/article/health-coronavirus-who/who-looking-at-biosecurity-in-other-countries-after-danish-covid-19-mink-outbreak-idINKBN27M1F4?il=0
611. RIBSP, Immunogenicity, Efficacy and Safety of QazCovid-in® COVID-19 Vaccine. https://clinicaltrials.gov/ct2/show/NCT04691908.
612. Richard, M.; Kok, A.; de Meulder, D.; Bestebroer, T. M.; Lamers, M. M.; Okba, N. M. A.; Fentener van Vlissingen, M.; Rockx, B.; Haagmans, B. L.; Koopmans, M. P. G.; Fouchier, R. A. M.; Herfst, S., SARS-CoV-2 is transmitted via contact and via the air between ferrets. *Nature Communications* **2020,** *11* (1), 3496. https://doi.org/10.1038/s41467-020-17367-2
613. Richter, W.; Hofacre, K.; Willenberg, Z., *Final Report for the Bioquell Hydrogen Peroxide Vapor (HPV) Decontamination for Reuse of N95 Respirators*; Battelle Memorial Institute: 2016. http://wayback.archive-it.org/7993/20170113034232/http://www.fda.gov/downloads/EmergencyPreparedness/Counterterrorism/MedicalCountermeasures/MCMRegulatoryScience/UCM516998.pdf
614. Rickman, H. M.; Rampling, T.; Shaw, K.; Martinez-Garcia, G.; Hail, L.; Coen, P.; Shahmanesh, M.; Shin, G. Y.; Nastouli, E.; Houlihan, C. F., Nosocomial transmission of COVID-19: a retrospective study of 66 hospital-acquired cases in a London teaching hospital. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa816
615. Riddell, S.; Goldie, S.; Hill, A.; Eagles, D.; Drew, T. W., The effect of temperature on persistence of SARS-CoV-2 on common surfaces. *Virology Journal* **2020,** *17* (1), 145. https://doi.org/10.1186/s12985-020-01418-7
616. Riou, J.; Althaus, C. L., Pattern of early human-to-human transmission of Wuhan 2019 novel coronavirus (2019-nCoV), December 2019 to January 2020. *Eurosurveillance* **2020,** *25* (4), 2000058. https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.4.2000058

617. Riphagen, S.; Gomez, X.; Gonzalez-Martinez, C.; Wilkinson, N.; Theocharis, P., Hyperinflammatory shock in children during COVID-19 pandemic. *The Lancet*. https://doi.org/10.1016/S0140-6736(20)31094-1
618. Robertson, L. J.; Moore, J. S.; Blighe, K.; Ng, K. Y.; Quinn, N.; Jennings, F.; Warnock, G.; Sharpe, P.; Clarke, M.; Maguire, K.; Rainey, S.; Price, R.; Burns, W.; Kowalczyk, A.; Awuah, A.; McNamee, S.; Wallace, G.; Sager, S.; Chao Shern, C.; Nesbit, M. A.; McLaughlin, J.; Moore, T., SARS-CoV-2 antibody testing in a UK population: detectable IgG for up to 20 weeks post infection. *medRxiv* **2020**, 2020.09.29.20201509. https://www.medrxiv.org/content/medrxiv/early/2020/10/01/2020.09.29.20201509.full.pdf
619. Rockx, B.; Kuiken, T.; Herfst, S.; Bestebroer, T.; Lamers, M. M.; Oude Munnink, B. B.; de Meulder, D.; van Amerongen, G.; van den Brand, J.; Okba, N. M. A.; Schipper, D.; van Run, P.; Leijten, L.; Sikkema, R.; Verschoor, E.; Verstrepen, B.; Bogers, W.; Langermans, J.; Drosten, C.; Fentener van Vlissingen, M.; Fouchier, R.; de Swart, R.; Koopmans, M.; Haagmans, B. L., Comparative pathogenesis of COVID-19, MERS, and SARS in a nonhuman primate model. *Science* **2020**, eabb7314. https://science.sciencemag.org/content/sci/early/2020/04/16/science.abb7314.full.pdf
620. Rodda, L. B.; Netland, J.; Shehata, L.; Pruner, K. B.; Morawski, P. M.; Thouvenel, C.; Takehara, K. K.; Eggenberger, J.; Hemann, E. A.; Waterman, H. R.; Fahning, M. L.; Chen, Y.; Rathe, J.; Stokes, C.; Wrenn, S.; Fiala, B.; Carter, L. P.; Hamerman, J. A.; King, N. P.; Gale, M.; Campbell, D. J.; Rawlings, D.; Pepper, M., Functional SARS-CoV-2-specific immune memory persists after mild COVID-19. *medRxiv* **2020**, 2020.08.11.20171843. https://www.medrxiv.org/content/medrxiv/early/2020/08/15/2020.08.11.20171843.full.pdf
621. Rokkas, T., Gastrointestinal involvement in COVID-19: a systematic review and meta-analysis. *Annals of Gastroenterology* **2020,** *33* (4), 355-365. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7315709/
622. Rolfes, M. A.; Grijalva, C. G.; Zhu, Y.; al., e., Implications of Shortened Quarantine Among Household Contacts of Index Patients with Confirmed SARS-CoV-2 Infection — Tennessee and Wisconsin, April–September 2020. *Morbidity and Mortality Weekly Report* **2021,** *2021* (69), 1633-1637. https://www.cdc.gov/mmwr/volumes/69/wr/mm695152a1.htm
623. Rosenke, K.; Meade-White, K.; Letko, M.; Clancy, C.; Hansen, F.; Liu, Y.; Okumura, A.; Tang-Huau, T.-L.; Li, R.; Saturday, G.; Feldmann, F.; Scott, D.; Wang, Z.; Munster, V.; Jarvis, M. A.; Feldmann, H., Defining the Syrian hamster as a highly susceptible preclinical model for SARS-CoV-2 infection. *Emerging Microbes & Infections* **2020**, 1-36. https://doi.org/10.1080/22221751.2020.1858177
624. Rothe, C.; Schunk, M.; Sothmann, P.; Bretzel, G.; Froeschl, G.; Wallrauch, C.; Zimmer, T.; Thiel, V.; Janke, C.; Guggemos, W.; Seilmaier, M.; Drosten, C.; Vollmar, P.; Zwirglmaier, K.; Zange, S.; Wölfel, R.; Hoelscher, M., Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMc2001468 https://www.nejm.org/doi/10.1056/NEJMc2001468
625. Ruktanonchai, N. W.; Floyd, J. R.; Lai, S.; Ruktanonchai, C. W.; Sadilek, A.; Rente-Lourenco, P.; Ben, X.; Carioli, A.; Gwinn, J.; Steele, J. E.; Prosper, O.; Schneider, A.; Oplinger, A.; Eastham, P.; Tatem, A. J., Assessing the impact of coordinated COVID-19 exit strategies across Europe. *Science* **2020**, eabc5096. https://science.sciencemag.org/content/sci/early/2020/07/16/science.abc5096.full.pdf
626. Rundle, A., Severe COVID-19 Risk Mapping. https://columbia.maps.arcgis.com/apps/webappviewer/index.html?id=ade6ba85450c4325a12a5b9c09ba796c.
627. Russell, T. W.; Wu, J. T.; Clifford, S.; Edmunds, W. J.; Kucharski, A. J.; Jit, M., Effect of internationally imported cases on internal spread of COVID-19: a mathematical modelling study. *The Lancet Public Health* **2020**. https://doi.org/10.1016/S2468-2667(20)30263-2
628. RUSSO, R.; Levine, C.; Veilleux, C.; Peixoto, B.; McCormick-Ell, J.; Block, T.; Gresko, A.; Delmas, G.; Chitale, P.; Frees, A.; Ruiz, A.; Alland, D., Decontaminating N95 respirators during the Covid-19

pandemic: simple and practical approaches to increase decontamination capacity, speed, safety and ease of use. *medRxiv* **2020**, 2020.08.17.20177022.
https://www.medrxiv.org/content/medrxiv/early/2020/08/21/2020.08.17.20177022.full.pdf
629. Ryan, D. J.; Toomey, S.; Madden, S. F.; Casey, M.; Breathnach, O. S.; Morris, P. G.; Grogan, L.; Branagan, P.; Costello, R. W.; De Barra, E.; Hurley, K.; Gunaratnam, C.; McElvaney, N. G.; OBrien, M. E.; Sulaiman, I.; Morgan, R. K.; Hennessy, B. T., Use of exhaled breath condensate (EBC) in the diagnosis of SARS-COV-2 (COVID-19). *Thorax* **2020**, thoraxjnl-2020-215705.
https://thorax.bmj.com/content/thoraxjnl/early/2020/10/23/thoraxjnl-2020-215705.full.pdf
630. Ryan, K. A.; Bewley, K. R.; Fotheringham, S. A.; Brown, P.; Hall, Y.; Marriott, A. C.; Tree, J. A.; Allen, L.; Aram, M. J.; Brunt, E.; Buttigieg, K. R.; Cavell, B. E.; Carter, D. P.; Cobb, R.; Coombes, N. S.; Godwin, K. J.; Gooch, K. E.; Gouriet, J.; Halkerston, R.; Harris, D. J.; Humphries, H. E.; Hunter, L.; Ho, C. M. K.; Kennard, C. L.; Leung, S.; Ngabo, D.; Osman, K. L.; Paterson, J.; Penn, E. J.; Pullan, S. T.; Rayner, E.; Slack, G. S.; Steeds, K.; Taylor, I.; Tipton, T.; Thomas, S.; Wand, N. I.; Watson, R. J.; Wiblin, N. R.; Charlton, S.; Hallis, B.; Hiscox, J. A.; Funnell, S.; Dennis, M. J.; Whittaker, C. J.; Catton, M. G.; Druce, J.; Salguero, F. J.; Carroll, M. W., Dose-dependent response to infection with SARS-CoV-2 in the ferret model: evidence of protection to re-challenge. *bioRxiv* **2020**, 2020.05.29.123810.
https://www.biorxiv.org/content/biorxiv/early/2020/05/29/2020.05.29.123810.full.pdf
631. Sabino, E. C.; Buss, L. F.; Carvalho, M. P. S.; Prete, C. A., Jr.; Crispim, M. A. E.; Fraiji, N. A.; Pereira, R. H. M.; Parag, K. V.; da Silva Peixoto, P.; Kraemer, M. U. G.; Oikawa, M. K.; Salomon, T.; Cucunuba, Z. M.; Castro, M. C.; de Souza Santos, A. A.; Nascimento, V. H.; Pereira, H. S.; Ferguson, N. M.; Pybus, O. G.; Kucharski, A.; Busch, M. P.; Dye, C.; Faria, N. R., Resurgence of COVID-19 in Manaus, Brazil, despite high seroprevalence. *The Lancet* **2021**. https://doi.org/10.1016/S0140-6736(21)00183-5
632. Saeed, O.; Castagna, F.; Agalliu, I.; Xue, X.; Patel, S. R.; Rochlani, Y.; Kataria, R.; Vukelic, S.; Sims, D. B.; Alvarez, C.; Rivas-Lasarte, M.; Garcia, M. J.; Jorde, U. P., Statin Use and In-Hospital Mortality in Diabetics with COVID-19. *J Am Heart Assoc* **2020**, e018475.
633. Safewell, SafeSpace. https://www.safewellsolutions.co.uk/products/safespace/ (accessed 10 Oct 2020).
634. Salama, C.; Han, J.; Yau, L.; Reiss, W. G.; Kramer, B.; Neidhart, J. D.; Criner, G. J.; Kaplan-Lewis, E.; Baden, R.; Pandit, L.; Cameron, M. L.; Garcia-Diaz, J.; Chávez, V.; Mekebeb-Reuter, M.; Lima de Menezes, F.; Shah, R.; González-Lara, M. F.; Assman, B.; Freedman, J.; Mohan, S. V., Tocilizumab in Patients Hospitalized with Covid-19 Pneumonia. *New England Journal of Medicine* **2020**.
https://doi.org/10.1056/NEJMoa2030340
635. Samanovic, M. I.; Cornelius, A. R.; Wilson, J. P.; Karmacharya, T.; Gray-Gaillard, S. L.; Allen, J. R.; Hyman, S. W.; Moritz, G.; Ali, M.; Koralov, S. B.; Mulligan, M. J.; Herati, R. S., Poor antigen-specific responses to the second BNT162b2 mRNA vaccine dose in SARS-CoV-2-experienced individuals. *medRxiv* **2021**, 2021.02.07.21251311.
https://www.medrxiv.org/content/medrxiv/early/2021/02/09/2021.02.07.21251311.full.pdf
636. Sanchez, G. V.; Biedron, C.; Fink, L. R.; al., e., Initial and Repeated Point Prevalence Surveys to Inform SARS-CoV-2 Infection Prevention in 26 Skilled Nursing Facilities — Detroit, Michigan, March–May 2020. *Morbidity and Mortality Weekly Report* **2020,** *ePub: 1 July 2020*.
https://www.cdc.gov/mmwr/volumes/69/wr/mm6927e1.htm?s_cid=mm6927e1_w#suggestedcitation
637. Sanchez, R., Oxford University extends COVID-19 vaccine study to children, some as young as 6. https://abcnews.go.com/Health/oxford-university-extends-covid-19-vaccine-study-children/story?id=75870155.
638. Santarpia, J. L.; Rivera, D. N.; Herrera, V.; Morwitzer, M. J.; Creager, H.; Santarpia, G. W.; Crown, K. K.; Brett-Major, D.; Schnaubelt, E.; Broadhurst, M. J.; Lawler, J. V.; Reid, S. P.; Lowe, J. J., Transmission Potential of SARS-CoV-2 in Viral Shedding Observed at the University of Nebraska Medical Center.

medRxiv **2020**, 2020.03.23.20039446.
https://www.medrxiv.org/content/medrxiv/early/2020/03/26/2020.03.23.20039446.1.full.pdf
639. Schlottau, K.; Rissmann, M.; Graaf, A.; Schön, J.; Sehl, J.; Wylezich, C.; Höper, D.; Mettenleiter, T. C.; Balkema-Buschmann, A.; Harder, T.; Grund, C.; Hoffmann, D.; Breithaupt, A.; Beer, M., SARS-CoV-2 in fruit bats, ferrets, pigs, and chickens: an experimental transmission study. *The Lancet Microbe* **2020**. https://doi.org/10.1016/S2666-5247(20)30089-6
640. Schuit, M.; Ratnesar-Shumate, S.; Yolitz, J.; Williams, G.; Weaver, W.; Green, B.; Miller, D.; Krause, M.; Beck, K.; Wood, S.; Holland, B.; Bohannon, J.; Freeburger, D.; Hooper, I.; Biryukov, J.; Altamura, L. A.; Wahl, V.; Hevey, M.; Dabisch, P., Airborne SARS-CoV-2 is Rapidly Inactivated by Simulated Sunlight. *The Journal of Infectious Diseases* **2020**. https://doi.org/10.1093/infdis/jiaa334
641. Sciences, C. A. o. M., The Efficacy, Safety and Immunogenicity Study of Inactivated SARS-CoV-2 Vaccine for Preventing Against COVID-19. https://clinicaltrials.gov/ct2/show/NCT04659239.
642. Self, W. H.; Semler, M. W.; Leither, L. M.; Casey, J. D.; Angus, D. C.; Brower, R. G.; Chang, S. Y.; Collins, S. P.; Eppensteiner, J. C.; Filbin, M. R.; Files, D. C.; Gibbs, K. W.; Ginde, A. A.; Gong, M. N.; Harrell, F. E., Jr; Hayden, D. L.; Hough, C. L.; Johnson, N. J.; Khan, A.; Lindsell, C. J.; Matthay, M. A.; Moss, M.; Park, P. K.; Rice, T. W.; Robinson, B. R. H.; Schoenfeld, D. A.; Shapiro, N. I.; Steingrub, J. S.; Ulysse, C. A.; Weissman, A.; Yealy, D. M.; Thompson, B. T.; Brown, S. M.; National Heart, L.; Network, B. I. P. C. T., Effect of Hydroxychloroquine on Clinical Status at 14 Days in Hospitalized Patients With COVID-19: A Randomized Clinical Trial. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.22240
643. Self, W. H.; Tenforde, M. W.; Stubblefield, W. B.; Feldstein, L. R.; Steingrub, J. S.; Shapiro, N. I.; Ginde, A. A.; Prekker, M. E.; Brown, S. M.; Peltan, I. D.; Gong, M. N.; Aboodi, M. S.; Khan, A.; Exline, M. C.; Files, D. C.; Gibbs, K. W.; Lindsell, C. J.; Rice, T. W.; Jones, I. D.; Halasa, N.; Talbot, H. K.; Grijalva, C. G.; Casey, J. D.; Hager, D. N.; Qadir, N.; Henning, D. J.; Coughlin, M. M.; Schiffer, J.; Semenova, V.; Li, H.; Thornburg, N. J.; Patel, M. M., Decline in SARS-CoV-2 Antibodies After Mild Infection Among Frontline Health Care Personnel in a Multistate Hospital Network — 12 States, April–August 2020. https://www.cdc.gov/mmwr/volumes/69/wr/mm6947a2.htm?s_cid=mm6947a2_w.
644. Seow, J.; Graham, C.; Merrick, B.; Acors, S.; Steel, K. J. A.; Hemmings, O.; O'Bryne, A.; Kouphou, N.; Pickering, S.; Galao, R.; Betancor, G.; Wilson, H. D.; Signell, A. W.; Winstone, H.; Kerridge, C.; Temperton, N.; Snell, L.; Bisnauthsing, K.; Moore, A.; Green, A.; Martinez, L.; Stokes, B.; Honey, J.; Izquierdo-Barras, A.; Arbane, G.; Patel, A.; OConnell, L.; O Hara, G.; MacMahon, E.; Douthwaite, S.; Nebbia, G.; Batra, R.; Martinez-Nunez, R.; Edgeworth, J. D.; Neil, S. J. D.; Malim, M. H.; Doores, K., Longitudinal evaluation and decline of antibody responses in SARS-CoV-2 infection. *medRxiv* **2020**, 2020.07.09.20148429. https://www.medrxiv.org/content/medrxiv/early/2020/07/11/2020.07.09.20148429.full.pdf
645. sermet, i.; temmam, s.; huon, c.; behillil, s.; gadjos, v.; bigot, t.; lurier, t.; chretien, d.; backovick, m.; Moisan-Delaunay, A.; donati, f.; albert, m.; foucaud, e.; Mesplees, B.; benoist, g.; fayes, a.; duval-arnould, m.; cretolle, c.; charbit, m.; aubart, m.; Auriau, J.; lorrot, m.; Kariyawasam, D.; fertita, l.; Orliaguet, G.; pigneur, b.; Bader-Meunier, B.; briand, c.; toubiana, j.; Guilleminot, T.; van der werf, s.; leruez-ville, m.; eloit, m., Prior infection by seasonal coronaviruses does not prevent SARS-CoV-2 infection and associated Multisystem Inflammatory Syndrome in children. *medRxiv* **2020**, 2020.06.29.20142596.
https://www.medrxiv.org/content/medrxiv/early/2020/06/30/2020.06.29.20142596.full.pdf
646. Services, I. o. M. a. L., REALM Project Releases Results from Latest Tests of Coronavirus on Leather, Summary of Research. https://www.imls.gov/news/realm-project-releases-results-latest-tests-coronavirus-leather-summary-research.
647. Shacham, E.; Scroggins, S.; Ellis, M.; Garza, A., Association of County-Wide Mask Ordinances with Reductions in Daily CoVID-19 Incident Case Growth in a Midwestern Region Over 12 Weeks. *medRxiv* **2020**, 2020.10.28.20221705.
https://www.medrxiv.org/content/medrxiv/early/2020/10/30/2020.10.28.20221705.full.pdf

648. Shan, B.; Broza, Y. Y.; Li, W.; Wang, Y.; Wu, S.; Liu, Z.; Wang, J.; Gui, S.; Wang, L.; Zhang, Z.; Liu, W.; Zhou, S.; Jin, W.; Zhang, Q.; Hu, D.; Lin, L.; Zhang, Q.; Li, W.; Wang, J.; Liu, H.; Pan, Y.; Haick, H., Multiplexed Nanomaterial-Based Sensor Array for Detection of COVID-19 in Exhaled Breath. *ACS Nano* **2020**. https://doi.org/10.1021/acsnano.0c05657
649. Shekerdemian, L. S.; Mahmood, N. R.; Wolfe, K. K.; Riggs, B. J.; Ross, C. E.; McKiernan, C. A.; Heidemann, S. M.; Kleinman, L. C.; Sen, A. I.; Hall, M. W.; Priestley, M. A.; McGuire, J. K.; Boukas, K.; Sharron, M. P.; Burns, J. P.; Collaborative, f. t. I. C.-P., Characteristics and Outcomes of Children With Coronavirus Disease 2019 (COVID-19) Infection Admitted to US and Canadian Pediatric Intensive Care Units. *JAMA Pediatrics* **2020**. https://doi.org/10.1001/jamapediatrics.2020.1948
650. Shen, M.; Zu, J.; Fairley, C. K.; Pagán, J. A.; An, L.; Du, Z.; Guo, Y.; Rong, L.; Xiao, Y.; Zhuang, G.; Li, Y.; Zhang, L., Projected COVID-19 epidemic in the United States in the context of the effectiveness of a potential vaccine and implications for social distancing and face mask use. *medRxiv* **2020**, 2020.10.28.20221234.
https://www.medrxiv.org/content/medrxiv/early/2020/10/30/2020.10.28.20221234.full.pdf
651. Sherina, N.; Piralla, A.; Du, L.; Wan, H.; Kumagai-Braesh, M.; Andrell, J.; Braesch-Andersen, S.; Cassaniti, I.; Percivalle, E.; Sarasini, A.; Bergami, F.; Di Martino, R.; Colaneri, M.; Vecchia, M.; Sambo, M.; Zuccaro, V.; Bruno, R.; Oggionni, T.; Meloni, F.; Abolhassani, H.; Bertoglio, F.; Schubert, M.; Byrne-Steele, M.; Han, J.; Hust, M.; Xue, Y.; Hammarstrom, L.; Baldanti, F.; Marcotte, H.; Pan-Hammarstrom, Q., Persistence of SARS-CoV-2 specific B- and T-cell responses in convalescent COVID-19 patients 6-8 months after the infection. *bioRxiv* **2020**, 2020.11.06.371617.
https://www.biorxiv.org/content/biorxiv/early/2020/11/06/2020.11.06.371617.full.pdf
652. Shi, J.; Wen, Z.; Zhong, G.; Yang, H.; Wang, C.; Huang, B.; Liu, R.; He, X.; Shuai, L.; Sun, Z.; Zhao, Y.; Liu, P.; Liang, L.; Cui, P.; Wang, J.; Zhang, X.; Guan, Y.; Tan, W.; Wu, G.; Chen, H.; Bu, Z., Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS–coronavirus 2. *Science* **2020**, eabb7015.
https://science.sciencemag.org/content/sci/early/2020/04/07/science.abb7015.full.pdf
653. Shi, Q.; Hu, Y.; Peng, B.; Tang, X.-J.; Wang, W.; Su, K.; Luo, C.; Wu, B.; Zhang, F.; Zhang, Y.; Anderson, B.; Zhong, X.-N.; Qiu, J.-F.; Yang, C. Y.; Huang, A.-L., Effective control of SARS-CoV-2 transmission in Wanzhou, China. *Nature Medicine* **2020**. https://doi.org/10.1038/s41591-020-01178-5
654. Shi, S.; Qin, M.; Shen, B.; Cai, Y.; Liu, T.; Yang, F.; Gong, W.; Liu, X.; Liang, J.; Zhao, Q.; Huang, H.; Yang, B.; Huang, C., Association of Cardiac Injury With Mortality in Hospitalized Patients With COVID-19 in Wuhan, China. *JAMA Cardiology* **2020**. https://doi.org/10.1001/jamacardio.2020.0950
655. Shimabukuro, T. T.; Cole, M.; Su, J. R., Reports of Anaphylaxis After Receipt of mRNA COVID-19 Vaccines in the US—December 14, 2020-January 18, 2021. *JAMA* **2021**.
https://doi.org/10.1001/jama.2021.1967
656. Sia, S. F.; Yan, L. M.; Chin, A. W. H.; Fung, K.; Choy, K. T.; Wong, A. Y. L.; Kaewpreedee, P.; Perera, R.; Poon, L. L. M.; Nicholls, J. M.; Peiris, M.; Yen, H. L., Pathogenesis and transmission of SARS-CoV-2 in golden hamsters. *Nature* **2020**.
657. Silcott, D.; Kinahan, S.; Santarpia, J.; Silcott, B.; Silcott, R.; Silcott, P.; Silcott, B.; Distelhorst, S.; Herrera, V.; Rivera, D.; Crown, K.; Lucero, G.; Bryden, W.; McLoughlin, M.; Cetta, M.; Accardi, R., *TRANSCOM/AMC Commercial Aircraft Cabin Aerosol Dispersion Tests*; USATRANSCOM and AMC: 2020.
https://www.ustranscom.mil/cmd/docs/TRANSCOM%20Report%20Final.pdf
658. Simmons, S.; Carrion, R.; Alfson, K.; Staples, H.; Jinadatha, C.; Jarvis, W.; Sampathkumar, P.; Chemaly, R. F.; Khawaja, F.; Povroznik, M.; Jackson, S.; Kaye, K. S.; Rodriguez, R. M.; Stibich, M., Deactivation of SARS-CoV-2 with Pulsed Xenon Ultraviolet: implications for environmental COVID-19 control. *Infection Control & Hospital Epidemiology* **2020**, 1-19.
https://www.cambridge.org/core/article/deactivation-of-sarscov2-with-pulsed-xenon-ultraviolet-implications-for-environmental-covid19-control/AD5CF52419E27E86E0114059FBA78D4C

659. Simonovich, V. A.; Burgos Pratx, L. D.; Scibona, P.; Beruto, M. V.; Vallone, M. G.; Vázquez, C.; Savoy, N.; Giunta, D. H.; Pérez, L. G.; Sánchez, M. D. L.; Gamarnik, A. V.; Ojeda, D. S.; Santoro, D. M.; Camino, P. J.; Antelo, S.; Rainero, K.; Vidiella, G. P.; Miyazaki, E. A.; Cornistein, W.; Trabadelo, O. A.; Ross, F. M.; Spotti, M.; Funtowicz, G.; Scordo, W. E.; Losso, M. H.; Ferniot, I.; Pardo, P. E.; Rodriguez, E.; Rucci, P.; Pasquali, J.; Fuentes, N. A.; Esperatti, M.; Speroni, G. A.; Nannini, E. C.; Matteaccio, A.; Michelangelo, H. G.; Follmann, D.; Lane, H. C.; Belloso, W. H., A Randomized Trial of Convalescent Plasma in Covid-19 Severe Pneumonia. *N Engl J Med* **2020**.
660. Simpson, J. N.; Goyal, M. K.; Cohen, J. S.; Badolato, G. M.; McGuire, M.; Ralph, A.; Boyle, M. D.; Hamburger, E. K.; Gorman, K. C.; Cora-Bramble, D.; Delaney, M., Results of Testing Children for SARS-CoV-2 through a Community-based Testing Site. *The Journal of Pediatrics* **2020**. http://www.sciencedirect.com/science/article/pii/S0022347620315122
661. Singh, K.; Mittal, S.; Gollapudi, S.; Butzmann, A.; Kumar, J.; Ohgami, R. S., A meta-analysis of SARS-CoV-2 patients identifies the combinatorial significance of D-dimer, C-reactive protein, lymphocyte, and neutrophil values as a predictor of disease severity. *International Journal of Laboratory Hematology n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1111/ijlh.13354
662. Sit, T. H. C.; Brackman, C. J.; Ip, S. M.; Tam, K. W. S.; Law, P. Y. T.; To, E. M. W.; Yu, V. Y. T.; Sims, L. D.; Tsang, D. N. C.; Chu, D. K. W.; Perera, R.; Poon, L. L. M.; Peiris, M., Infection of dogs with SARS-CoV-2. *Nature* **2020**.
663. Skalina, K. A.; Goldstein, D. Y.; Sulail, J.; Hahm, E.; Narlieva, M.; Szymczak, W.; Fox, A. S., Extended Storage of SARS-CoV2 Nasopharyngeal Swabs Does Not Negatively Impact Results of Molecular-Based Testing. *medRxiv* **2020**, 2020.05.16.20104158. https://www.medrxiv.org/content/medrxiv/early/2020/05/20/2020.05.16.20104158.full.pdf
664. Smarr, B. L.; Aschbacher, K.; Fisher, S. M.; Chowdhary, A.; Dilchert, S.; Puldon, K.; Rao, A.; Hecht, F. M.; Mason, A. E., Feasibility of continuous fever monitoring using wearable devices. *Scientific Reports* **2020,** *10* (1), 21640. https://doi.org/10.1038/s41598-020-78355-6
665. Smiths, Smiths Detection's BioFlash shown to detect airborne COVID-19. Businesswire: 2021. https://www.businesswire.com/news/home/20210217005084/en/?account=battelle
666. Sobel Leonard, A.; Weissman, D. B.; Greenbaum, B.; Ghedin, E.; Koelle, K., Transmission Bottleneck Size Estimation from Pathogen Deep-Sequencing Data, with an Application to Human Influenza A Virus. *Journal of Virology* **2017,** *91* (14), e00171-17. https://jvi.asm.org/content/jvi/91/14/e00171-17.full.pdf
667. Song, J.-Y.; Yun, J.-G.; Noh, J.-Y.; Cheong, H.-J.; Kim, W.-J., Covid-19 in South Korea — Challenges of Subclinical Manifestations. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMc2001801
668. Soni, M., Evaluation of eosinopenia as a diagnostic and prognostic indicator in COVID-19 infection. *International Journal of Laboratory Hematology* **2020,** *n/a* (n/a). https://onlinelibrary.wiley.com/doi/abs/10.1111/ijlh.13425
669. Stadnytskyi, V.; Bax, C. E.; Bax, A.; Anfinrud, P., The airborne lifetime of small speech droplets and their potential importance in SARS-CoV-2 transmission. *Proceedings of the National Academy of Sciences* **2020**, 202006874. https://www.pnas.org/content/pnas/early/2020/05/12/2006874117.full.pdf
670. Staff, G. B., Originally Built for Bioterrorism Agents, This Decontamination System Now Clears SARS-CoV-2 from Military Aircraft. *Global Biodefense* 2020. https://globalbiodefense.com/2020/11/05/military-aircraft-sars-cov-2-sanitization-with-hot-air-system/
671. Starr, T. N.; Greaney, A. J.; Addetia, A.; Hannon, W. W.; Choudhary, M. C.; Dingens, A. S.; Li, J. Z.; Bloom, J. D., Prospective mapping of viral mutations that escape antibodies used to treat COVID-19. *Science* **2021**, eabf9302. https://science.sciencemag.org/content/sci/early/2021/01/22/science.abf9302.full.pdf
672. Steel, K.; Davies, B., Coronavirus (COVID-19) Infection Survey: characteristics of people testing positive for COVID-19 in England, 27 January 2021.

https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19infectionsinthecommunityinengland/characteristicsofpeopletestingpositiveforcovid19inengland27january2021#symptoms-profile-by-cases-compatible-with-the-new-uk-variant-and-other-positive-cases.
673. Sterne, J. A. C.; Murthy, S.; Diaz, J. V.; Slutsky, A. S.; Villar, J.; Angus, D. C.; Annane, D.; Azevedo, L. C. P.; Berwanger, O.; Cavalcanti, A. B.; Dequin, P. F.; Du, B.; Emberson, J.; Fisher, D.; Giraudeau, B.; Gordon, A. C.; Granholm, A.; Green, C.; Haynes, R.; Heming, N.; Higgins, J. P. T.; Horby, P.; Jüni, P.; Landray, M. J.; Le Gouge, A.; Leclerc, M.; Lim, W. S.; Machado, F. R.; McArthur, C.; Meziani, F.; Møller, M. H.; Perner, A.; Petersen, M. W.; Savovic, J.; Tomazini, B.; Veiga, V. C.; Webb, S.; Marshall, J. C., Association Between Administration of Systemic Corticosteroids and Mortality Among Critically Ill Patients With COVID-19: A Meta-analysis. *Jama* **2020**. https://jamanetwork.com/journals/jama/fullarticle/2770279
674. Stowe, J.; Smith, H.; Thurland, K.; Ramsay, M. E.; Andrews, N.; Ladhani, S. N., Stillbirths During the COVID-19 Pandemic in England, April-June 2020. *Jama* **2021,** *325* (1), 86-87.
675. Strohbehn, G. W.; Heiss, B. L.; Rouhani, S. J.; Trujillo, J. A.; Yu, J.; Kacew, A. J.; Higgs, E. F.; Bloodworth, J. C.; Cabanov, A.; Wright, R. C.; Koziol, A. K.; Weiss, A.; Danahey, K.; Karrison, T. G.; Edens, C. C.; Ventura, I. B.; Pettit, N. N.; Patel, B. K.; Pisano, J.; Strek, M. E.; Gajewski, T. F.; Ratain, M. J.; Reid, P. D., COVIDOSE: A phase 2 clinical trial of low-dose tocilizumab in the treatment of non-critical COVID-19 pneumonia. *Clin Pharmacol Ther* **2020**.
676. Su, H.; Yang, M.; Wan, C.; Yi, L.-X.; Tang, F.; Zhu, H.-Y.; Yi, F.; Yang, H.-C.; Fogo, A. B.; Nie, X.; Zhang, C., Renal histopathological analysis of 26 postmortem findings of patients with COVID-19 in China. *Kidney International*. https://doi.org/10.1016/j.kint.2020.04.003
677. Suarez, D. L.; Pantin-Jackwood, M. J.; Swayne, D. E.; Lee, S. A.; DeBlois, S. M.; Spackman, E., Lack of susceptibility of poultry to SARS-CoV-2 and MERS-CoV. *bioRxiv* **2020**, 2020.06.16.154658. http://biorxiv.org/content/early/2020/06/16/2020.06.16.154658.abstract
678. Subramanian, R.; He, Q.; Pascual, M., Quantifying asymptomatic infection and transmission of COVID-19 in New York City using observed cases, serology, and testing capacity. *Proceedings of the National Academy of Sciences* **2021,** *118* (9), e2019716118. https://www.pnas.org/content/pnas/118/9/e2019716118.full.pdf
679. Sudre, C. H.; Murray, B.; Varsavsky, T.; Graham, M. S.; Penfold, R. S.; Bowyer, R. C.; Pujol, J. C.; Klaser, K.; Antonelli, M.; Canas, L. S.; Molteni, E.; Modat, M.; Cardoso, M. J.; May, A.; Ganesh, S.; Davies, R.; Nguyen, L. H.; Drew, D. A.; Astley, C. M.; Joshi, A. D.; Merino, J.; Tsereteli, N.; Fall, T.; Gomez, M. F.; Duncan, E. L.; Menni, C.; Williams, F. M. K.; Franks, P. W.; Chan, A. T.; Wolf, J.; Ourselin, S.; Spector, T.; Steves, C. J., Attributes and predictors of Long-COVID: analysis of COVID cases and their symptoms collected by the Covid Symptoms Study App. *medRxiv* **2020**, 2020.10.19.20214494. https://www.medrxiv.org/content/medrxiv/early/2020/12/19/2020.10.19.20214494.full.pdf
680. Sugano, N.; Ando, W.; Fukushima, W., Cluster of SARS-CoV-2 infections linked to music clubs in Osaka, Japan: asymptomatically infected persons can transmit the virus as soon as 2 days after infection. *The Journal of Infectious Diseases* **2020**. https://doi.org/10.1093/infdis/jiaa542
681. Sukhyun, R.; Seikh Taslim, A.; Cheolsun, J.; Baekjin, K.; Benjamin, J. C., Effect of Nonpharmaceutical Interventions on Transmission of Severe Acute Respiratory Syndrome Coronavirus 2, South Korea, 2020. *Emerging Infectious Disease journal* **2020,** *26* (10). https://wwwnc.cdc.gov/eid/article/26/10/20-1886_article
682. Sun, K.; Wang, W.; Gao, L.; Wang, Y.; Luo, K.; Ren, L.; Zhan, Z.; Chen, X.; Zhao, S.; Huang, Y.; Sun, Q.; Liu, Z.; Litvinova, M.; Vespignani, A.; Ajelli, M.; Viboud, C.; Yu, H., Transmission heterogeneities, kinetics, and controllability of SARS-CoV-2. *Science* **2020**, eabe2424. https://science.sciencemag.org/content/sci/early/2020/11/23/science.abe2424.full.pdf

683. Sun, S.; Cai, X.; Wang, H.; He, G.; Lin, Y.; Lu, B.; Chen, C.; Pan, Y.; Hu, X., Abnormalities of peripheral blood system in patients with COVID-19 in Wenzhou, China. *Clinica Chimica Acta* **2020,** *507*, 174-180. http://www.sciencedirect.com/science/article/pii/S0009898120301790
684. Suthar, M. S.; Zimmerman, M. G.; Kauffman, R. C.; Mantus, G.; Linderman, S. L.; Hudson, W. H.; Vanderheiden, A.; Nyhoff, L.; Davis, C. W.; Adekunle, S.; Affer, M.; Sherman, M.; Reynolds, S.; Verkerke, H. P.; Alter, D. N.; Guarner, J.; Bryksin, J.; Horwath, M.; Arthur, C. M.; Saakadze, N.; Smith, G. H.; Edupuganti, S.; Scherer, E. M.; Hellmeister, K.; Cheng, A.; Morales, J. A.; Neish, A. S.; Stowell, S. R.; Frank, F.; Ortlund, E.; Anderson, E.; Menachery, V. D.; Rouphael, N.; Mehta, A.; Stephens, D. S.; Ahmed, R.; Roback, J. D.; Wrammert, J., Rapid generation of neutralizing antibody responses in COVID-19 patients. *Cell Reports Medicine* **2020**. https://doi.org/10.1016/j.xcrm.2020.100040
685. Taji, L.; Thomas, D.; Oliver, M. J.; Ip, J.; Tang, Y.; Yeung, A.; Cooper, R.; House, A. A.; McFarlane, P.; Blake, P. G., COVID-19 in patients undergoing long-term dialysis in Ontario. *Canadian Medical Association Journal* **2021**, cmaj.202601. https://www.cmaj.ca/content/cmaj/early/2021/02/03/cmaj.202601.full.pdf
686. Takahashi, T.; Ellingson, M. K.; Wong, P.; Israelow, B.; Lucas, C.; Klein, J.; Silva, J.; Mao, T.; Oh, J. E.; Tokuyama, M.; Lu, P.; Venkataraman, A.; Park, A.; Liu, F.; Meir, A.; Sun, J.; Wang, E. Y.; Casanovas-Massana, A.; Wyllie, A. L.; Vogels, C. B. F.; Earnest, R.; Lapidus, S.; Ott, I. M.; Moore, A. J.; Anastasio, K.; Askenase, M. H.; Batsu, M.; Beatty, H.; Bermejo, S.; Bickerton, S.; Brower, K.; Bucklin, M. L.; Cahill, S.; Campbell, M.; Cao, Y.; Courchaine, E.; Datta, R.; DeIuliis, G.; Geng, B.; Glick, L.; Handoko, R.; Kalinich, C.; Khoury-Hanold, W.; Kim, D.; Knaggs, L.; Kuang, M.; Kudo, E.; Lim, J.; Linehan, M.; Lu-Culligan, A.; Malik, A. A.; Martin, A.; Matos, I.; McDonald, D.; Minasyan, M.; Mohanty, S.; Muenker, M. C.; Naushad, N.; Nelson, A.; Nouws, J.; Nunez-Smith, M.; Obaid, A.; Ott, I.; Park, H.-J.; Peng, X.; Petrone, M.; Prophet, S.; Rahming, H.; Rice, T.; Rose, K.-A.; Sewanan, L.; Sharma, L.; Shepard, D.; Silva, E.; Simonov, M.; Smolgovsky, M.; Song, E.; Sonnert, N.; Strong, Y.; Todeasa, C.; Valdez, J.; Velazquez, S.; Vijayakumar, P.; Wang, H.; Watkins, A.; White, E. B.; Yang, Y.; Shaw, A.; Fournier, J. B.; Odio, C. D.; Farhadian, S.; Dela Cruz, C.; Grubaugh, N. D.; Schulz, W. L.; Ring, A. M.; Ko, A. I.; Omer, S. B.; Iwasaki, A.; Yale, I. r. t., Sex differences in immune responses that underlie COVID-19 disease outcomes. *Nature* **2020**. https://doi.org/10.1038/s41586-020-2700-3
687. Tan, F.; Wang, K.; Liu, J.; Liu, D.; Luo, J.; Zhou, R., Viral Transmission and Clinical Features in Asymptomatic Carriers of SARS-CoV-2 in Wuhan, China. *Frontiers in Medicine* **2020,** *7* (547). https://www.frontiersin.org/article/10.3389/fmed.2020.00547
688. Tang, X.; Feng, Y. M.; Ni, J. X.; Zhang, J. Y.; Liu, L. M.; Hu, K.; Wu, X. Z.; Zhang, J. X.; Chen, J. W.; Zhang, J. C.; Su, J.; Li, Y. L.; Zhao, Y.; Xie, J.; Ding, Z.; He, X. L.; Wang, W.; Jin, R. H.; Shi, H. Z.; Sun, B., Early Use of Corticosteroid May Prolong SARS-CoV-2 Shedding in Non-Intensive Care Unit Patients with COVID-19 Pneumonia: A Multicenter, Single-Blind, Randomized Control Trial. *Respiration* **2021**. https://www.karger.com/DOI/10.1159/000512063
689. Tegally, H.; Wilkinson, E.; Giovanetti, M.; Iranzadeh, A.; Fonseca, V.; Giandhari, J.; Doolabh, D.; Pillay, S.; San, E. J.; Msomi, N.; Mlisana, K.; von Gottberg, A.; Walaza, S.; Allam, M.; Ismail, A.; Mohale, T.; Glass, A. J.; Engelbrecht, S.; Van Zyl, G.; Preiser, W.; Petruccione, F.; Sigal, A.; Hardie, D.; Marais, G.; Hsiao, M.; Korsman, S.; Davies, M.-A.; Tyers, L.; Mudau, I.; York, D.; Maslo, C.; Goedhals, D.; Abrahams, S.; Laguda-Akingba, O.; Alisoltani-Dehkordi, A.; Godzik, A.; Wibmer, C. K.; Sewell, B. T.; Lourenço, J.; Alcantara, L. C. J.; Pond, S. L. K.; Weaver, S.; Martin, D.; Lessells, R. J.; Bhiman, J. N.; Williamson, C.; de Oliveira, T., Emergence and rapid spread of a new severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) lineage with multiple spike mutations in South Africa. *medRxiv* **2020**, 2020.12.21.20248640. https://www.medrxiv.org/content/medrxiv/early/2020/12/22/2020.12.21.20248640.full.pdf

690. Tenforde, M. W.; Kim, S. S.; Lindsell, C. J.; al., e., Symptom Duration and Risk Factors for Delayed Return to Usual Health Among Outpatients with COVID-19 in a Multistate Health Care Systems Network — United States, March–June 2020. *Morbidity and Mortality Weekly Report* **2020,** *ePub: 24 July 2020*.
691. The Novel Coronavirus Pneumonia Emergency Response Epidemiology, T., The Epidemiological Characteristics of an Outbreak of 2019 Novel Coronavirus Diseases (COVID-19) — China, 2020. *China CDC Weekly* **2020,** *2*, 1-10. http://weekly.chinacdc.cn//article/id/e53946e2-c6c4-41e9-9a9b-fea8db1a8f51
692. Thomas, P.; Alexander, P. E.; Ahmed, U.; Elderhorst, E.; El-Khechen, H.; Mammen, M. J.; Debono, V. B.; Aponte Torres, Z.; Aryal, K.; Brocard, E.; Sagastuy, B.; Alhazzani, W., Vertical transmission risk of SARS-CoV-2 infection in the third trimester: a systematic scoping review. *The Journal of Maternal-Fetal & Neonatal Medicine* **2020**, 1-8. https://doi.org/10.1080/14767058.2020.1786055
693. Thompson, H. A.; Mousa, A.; Dighe, A.; Fu, H.; Arnedo-Pena, A.; Barrett, P.; Bellido-Blasco, J.; Bi, Q.; Caputi, A.; Chaw, L.; De Maria, L.; Hoffmann, M.; Mahapure, K.; Ng, K.; Raghuram, J.; Singh, G.; Soman, B.; Soriano, V.; Valent, F.; Vimercati, L.; Wee, L. E.; Wong, J.; Ghani, A. C.; Ferguson, N. M., SARS-CoV-2 setting-specific transmission rates: a systematic review and meta-analysis. *Clinical Infectious Diseases* **2021**. https://doi.org/10.1093/cid/ciab100
694. Thomson, E. C.; Rosen, L. E.; Shepherd, J. G.; Spreafico, R.; da Silva Filipe, A.; Wojcechowskyj, J. A.; Davis, C.; Piccoli, L.; Pascall, D. J.; Dillen, J.; Lytras, S.; Czudnochowski, N.; Shah, R.; Meury, M.; Jesudason, N.; De Marco, A.; Li, K.; Bassi, J.; O'Toole, A.; Pinto, D.; Colquhoun, R. M.; Culap, K.; Jackson, B.; Zatta, F.; Rambaut, A.; Jaconi, S.; Sreenu, V. B.; Nix, J.; Zhang, I.; Jarrett, R. F.; Glass, W. G.; Beltramello, M.; Nomikou, K.; Pizzuto, M.; Tong, L.; Cameroni, E.; Croll, T. I.; Johnson, N.; Di Iulio, J.; Wickenhagen, A.; Ceschi, A.; Harbison, A. M.; Mair, D.; Ferrari, P.; Smollett, K.; Sallusto, F.; Carmichael, S.; Garzoni, C.; Nichols, J.; Galli, M.; Hughes, J.; Riva, A.; Ho, A.; Schiuma, M.; Semple, M. G.; Openshaw, P. J. M.; Fadda, E.; Baillie, J. K.; Chodera, J. D.; Rihn, S. J.; Lycett, S. J.; Virgin, H. W.; Telenti, A.; Corti, D.; Robertson, D. L.; Snell, G., Circulating SARS-CoV-2 spike N439K variants maintain fitness while evading antibody-mediated immunity. *Cell* **2021**. https://doi.org/10.1016/j.cell.2021.01.037
695. Thorpe, A.; Scherer, A. M.; Han, P. K. J.; Burpo, N.; Shaffer, V.; Scherer, L.; Fagerlin, A., Exposure to Common Geographic COVID-19 Prevalence Maps and Public Knowledge, Risk Perceptions, and Behavioral Intentions. *JAMA Network Open* **2021,** *4* (1), e2033538-e2033538. https://doi.org/10.1001/jamanetworkopen.2020.33538
696. Tian, L.; Li, X.; Qi, F.; Tang, Q.-Y.; Tang, V.; Liu, J.; Li, Z.; Cheng, X.; Li, X.; Shi, Y.; Liu, H.; Tang, L.-H., Harnessing peak transmission around symptom onset for non-pharmaceutical intervention and containment of the COVID-19 pandemic. *Nature Communications* **2021,** *12* (1), 1147. https://doi.org/10.1038/s41467-021-21385-z
697. TILLETT, R.; SEVINSKY, J.; HARTLEY, P.; KERWIN, H.; CRAWFORD, N.; GORZALSKI, A.; LAVERDURE, C.; VERMA, S.; ROSSETTO, C.; FARRELL, M.; JACKSON, D.; Pandori, M.; VAN HOOSER, S., Genomic Evidence for a Case of Reinfection with SARS-CoV-2. *The Lancet* **2020**. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3681489
698. Tortajada, C.; Colomer, E.; Andreu-Ballester, J. C.; Esparcia, A.; Oltra, C.; Flores, J., Corticosteroids for COVID-19 patients requiring oxygen support? Yes, but not for everyone: Effect of corticosteroids on mortality and Intensive Care Unit admission in patients with COVID-19 according to patients' oxygen requirements. *J Med Virol* **2020**.
699. Tosif, S.; Neeland, M. R.; Sutton, P.; Licciardi, P. V.; Sarkar, S.; Selva, K. J.; Do, L. A. H.; Donato, C.; Quan Toh, Z.; Higgins, R.; Van de Sandt, C.; Lemke, M. M.; Lee, C. Y.; Shoffner, S. K.; Flanagan, K. L.; Arnold, K. B.; Mordant, F. L.; Mulholland, K.; Bines, J.; Dohle, K.; Pellicci, D. G.; Curtis, N.; McNab, S.; Steer, A.; Saffery, R.; Subbarao, K.; Chung, A. W.; Kedzierska, K.; Burgner, D. P.; Crawford, N. W., Immune responses to SARS-CoV-2 in three children of parents with symptomatic COVID-19. *Nature Communications* **2020,** *11* (1), 5703. https://doi.org/10.1038/s41467-020-19545-8

700. Toubiana, J.; Levy, C.; Allali, S.; Jung, C.; Leruez-Ville, M.; Varon, E.; Bajolle, F.; Ouldali, N.; Chareyre, J.; Béchet, S.; Elbez, A.; Casanova, J.-L.; Chalumeau, M.; Cohen, R.; Cohen, J. F., Association between SARS-CoV-2 infection and Kawasaki-like multisystem inflammatory syndrome: a retrospective matched case–control study, Paris, France, April to May 2020. *Eurosurveillance* **2020,** *25* (48), 2001813. https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.48.2001813
701. Townsend, L.; Dowds, J.; O'Brien, K.; Sheill, G.; Dyer, A. H.; O'Kelly, B.; Hynes, J. P.; Mooney, A.; Dunne, J.; Ni Cheallaigh, C.; O'Farrelly, C.; Bourke, N. M.; Conlon, N.; Martin-Loeches, I.; Bergin, C.; Nadarajan, P.; Bannan, C., Persistent Poor Health Post-COVID-19 Is Not Associated with Respiratory Complications or Initial Disease Severity. *Ann Am Thorac Soc* **2021**.
702. Tsay, C.; Lejarza, F.; Stadtherr, M. A.; Baldea, M., Modeling, state estimation, and optimal control for the US COVID-19 outbreak. *Scientific Reports* **2020,** *10* (1), 10711. https://doi.org/10.1038/s41598-020-67459-8
703. Tso, F. Y.; Lidenge, S. J.; Peña, P. B.; Clegg, A. A.; Ngowi, J. R.; Mwaiselage, J.; Ngalamika, O.; Julius, P.; West, J. T.; Wood, C., High prevalence of pre-existing serological cross-reactivity against SARS-CoV-2 in sub-Sahara Africa. *International Journal of Infectious Diseases* **2020**. https://doi.org/10.1016/j.ijid.2020.10.104
704. Tu, H.; Avenarius, M. R.; Kubatko, L.; Hunt, M.; Pan, X.; Ru, P.; Garee, J.; Thomas, K.; Mohler, P.; Pancholi, P.; Jones, D., Distinct Patterns of Emergence of SARS-CoV-2 Spike Variants including N501Y in Clinical Samples in Columbus Ohio. *bioRxiv* **2021**, 2021.01.12.426407. http://biorxiv.org/content/early/2021/01/15/2021.01.12.426407.abstract
705. Turner, P., The Military's Latest Wearables Can Detect Illness Two Days Before You Get Sick. *Nextgov* 2020. https://www.nextgov.com/emerging-tech/2020/09/militarys-latest-wearables-can-detect-illness-two-days-you-get-sick/168712/
706. Twin FM, NHS Trials "Unique" New Decontamination Tech to Reduce COVID Transmission Indoors. https://www.twinfm.com/article/nhs-trials-unique-new-decontamination-tech-to-reduce-covid-transmission-indoors (accessed 19 Oct 2020).
707. U.S. Food and Drug Administration (FDA), Enforcement Policy for Bioburden Reduction Systems Using Dry Heat to Support Single-User Resuse of Certain Filtering Facepiece Respirators During the Coronavirus Disease 2019 (COVID-19) Public Health Emergency. Guidance for Industry, Healthcare Organizations, Healthcare Personnel, and Food and Drug Administration Staff. https://www.fda.gov/media/143985/download (accessed 30 No 2020).
708. UCLA, COVID-19 Cases in the United States. https://covid19.uclaml.org/model.html.
709. Ueki, H.; Furusawa, Y.; Iwatsuki-Horimoto, K.; Imai, M.; Kabata, H.; Nishimura, H.; Kawaoka, Y., Effectiveness of Face Masks in Preventing Airborne Transmission of SARS-CoV-2. *mSphere* **2020,** *5* (5), e00637-20. https://msphere.asm.org/content/msph/5/5/e00637-20.full.pdf
710. Ulrich, L.; Michelitsch, A.; Halwe, N.; Wernike, K.; Hoffmann, D.; Beer, M., Experimental SARS-CoV-2 infection of bank voles - general susceptibility but lack of direct transmission. *bioRxiv* **2020**, 2020.12.24.424203. http://biorxiv.org/content/early/2020/12/24/2020.12.24.424203.abstract
711. Ulrich, L.; Wernike, K.; Hoffmann, D.; Mettenleiter, T. C.; Beer, M., Experimental infection of cattle with SARS-CoV-2. *bioRxiv* **2020**, 2020.08.25.254474. http://biorxiv.org/content/early/2020/08/25/2020.08.25.254474.abstract
712. Urigo, C.; Soin, S.; Sahu, A., Spontaneous pneumomediastinum as a complication of a COVID-19 related pneumonia: case report and review of literature. *Radiology Case Reports* **2020,** *15* (12), 2577-2581. http://www.sciencedirect.com/science/article/pii/S1930043320305148
713. van der Sande, M.; Teunis, P.; Sabel, R., Professional and Home-Made Face Masks Reduce Exposure to Respiratory Infections among the General Population. *Plos One* **2008,** *3* (7). <Go to ISI>://WOS:000264065800020

714. van Doremalen, N.; Bushmaker, T.; Morris, D. H.; Holbrook, M. G.; Gamble, A.; Williamson, B. N.; Tamin, A.; Harcourt, J. L.; Thornburg, N. J.; Gerber, S. I.; Lloyd-Smith, J. O.; de Wit, E.; Munster, V. J., Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. *New England Journal of Medicine* **2020**. https://doi.org/10.1056/NEJMc2004973
715. van Dorp, L.; Acman, M.; Richard, D.; Shaw, L. P.; Ford, C. E.; Ormond, L.; Owen, C. J.; Pang, J.; Tan, C. C. S.; Boshier, F. A. T.; Ortiz, A. T.; Balloux, F., Emergence of genomic diversity and recurrent mutations in SARS-CoV-2. *Infection, Genetics and Evolution* **2020**, 104351. http://www.sciencedirect.com/science/article/pii/S1567134820301829
716. Varga, Z.; Flammer, A. J.; Steiger, P.; Haberecker, M.; Andermatt, R.; Zinkernagel, A. S.; Mehra, M. R.; Schuepbach, R. A.; Ruschitzka, F.; Moch, H., Endothelial cell infection and endotheliitis in COVID-19. *The Lancet* **2020,** *395* (10234), 1417-1418. https://doi.org/10.1016/S0140-6736(20)30937-5
717. Veiga, V. C.; Prats, J. A. G. G.; Farias, D. L. C.; Rosa, R. G.; Dourado, L. K.; Zampieri, F. G.; Machado, F. R.; Lopes, R. D.; Berwanger, O.; Azevedo, L. C. P.; Avezum, Á.; Lisboa, T. C.; Rojas, S. S. O.; Coelho, J. C.; Leite, R. T.; Carvalho, J. C.; Andrade, L. E. C.; Sandes, A. F.; Pintão, M. C. T.; Castro, C. G.; Santos, S. V.; de Almeida, T. M. L.; Costa, A. N.; Gebara, O. C. E.; de Freitas, F. G. R.; Pacheco, E. S.; Machado, D. J. B.; Martin, J.; Conceição, F. G.; Siqueira, S. R. R.; Damiani, L. P.; Ishihara, L. M.; Schneider, D.; de Souza, D.; Cavalcanti, A. B.; Scheinberg, P., Effect of tocilizumab on clinical outcomes at 15 days in patients with severe or critical coronavirus disease 2019: randomised controlled trial. *BMJ* **2021,** *372*, n84. http://www.bmj.com/content/372/bmj.n84.abstract
718. Verma, S.; Dhanak, M.; Frankenfield, J., Visualizing droplet dispersal for face shields and masks with exhalation valves. *arXiv preprint arXiv:2008.00125* **2020**.
719. Vietzen, H.; Zoufaly, A.; Traugott, M.; Aberle, J.; Aberle, S. W.; Puchhammer-Stöckl, E., Deletion of the NKG2C receptor encoding KLRC2 gene and HLA-E variants are risk factors for severe COVID-19. *Genetics in Medicine* **2021**. https://doi.org/10.1038/s41436-020-01077-7
720. Vilke, G. M.; Brennan, J. J.; Cronin, A. O.; Castillo, E. M., Clinical features of covid-19 patients: is temperature screening useful? *The Journal of Emergency Medicine* **2020**. http://www.sciencedirect.com/science/article/pii/S073646792030977X
721. Viola, I. M.; Peterson, B.; Pisetta, G.; Pavar, G.; Akhtar, H.; Menolascina, F.; Mangano, E.; Dunn, K.; Gabl, R.; Nila, A.; Molinari, E.; Cummins, C.; Thompson, G.; Lo, M.; Denison, F.; Digard, P.; Malik, O.; Dunn, M. J. G.; Mehendale, F., Face Coverings, Aerosol Dispersion and Mitigation of Virus Transmission Risk. arXiv.org: 2020.
722. Vivanti, A. J.; Vauloup-Fellous, C.; Prevot, S.; Zupan, V.; Suffee, C.; Do Cao, J.; Benachi, A.; De Luca, D., Transplacental transmission of SARS-CoV-2 infection. *Nature Communications* **2020,** *11* (1), 3572. https://doi.org/10.1038/s41467-020-17436-6
723. Volz, E.; Swapnil, M.; Chand, M.; Barrett, J. C.; Johnson, R.; Geidelberg, L.; Hinsley, W.; Laydon, D. J.; Dabrera, G.; O'Toole, A.; Amato, R.; Ragonnet-Cronin, M.; Harrison, I.; Jackson, B.; Ariani, C. V.; Boyd, O.; Loman, N.; McCrone, J. T.; Goncalves, S.; Jorgensen, D.; Myers, R.; Hill, V.; Jackson, D. K.; Gaythorpe, K.; Groves, N.; Sillitoe, J.; Kwiatkowski, D. P.; COG-UK; Flaxman, S.; Ratmann, O.; Bhatt, S.; Hopkins, S.; Gandy, A.; Rambaut, A.; Ferguson, N. M., *Report 42 - Transmission of SARS-CoV-2 Lineage B.1.1.7 in England: insights from linking epidemiological and genetic data*; Imperial College London: 2020. https://www.imperial.ac.uk/media/imperial-college/medicine/mrc-gida/2020-12-31-COVID19-Report-42-Preprint-VOC.pdf
724. Voysey, M.; Ann, S.; Clemens, C.; Madhi, S. A.; Weckx, L. Y.; Folegatti, P. M.; Aley, P. K.; Angus, B.; Baillie, V. L.; Barnabas, S. L.; Bhorat, Q. E.; Bibi, S.; Briner, C.; Cicconi, P.; Clutterbuck, E. A.; Collins, A. M.; Cutland, C. L.; Darton, T. C.; Dheda, K.; Douglas, A. D.; Duncan, C. J. A.; Emary, K. R. W.; Ewer, K. J.; Flaxman, A.; Fairlie, L.; Faust, S. N.; Feng, S.; Ferreira, D. M.; Finn, A.; Galiza, E.; Goodman, A. L.; Green, C. M.; Green, C. A.; Greenland, M.; Hill, C.; Hill, H. C.; Hirsch, I.; Izu, A.; Jenkin, D.; Kerridge, S.; Koen, A.; Kwatra, G.; Lazarus, R.; Libri, V.; Lillie, P. J.; Marchevsky, N. G.; Marshall, R. P.; Mendes, A. V. A.; Milan, E.

P.; Minassian, A. M.; McGregor, A.; Mujadidi, Y. F.; Nana, A.; Padayachee, S. D.; Phillips, D. J.; Pittella, A.; Plested, E.; Pollock, K. M.; Ramasamy, M. N.; Robinson, H.; Schwarzbold, A. V.; Smith, A.; Song, R.; Snape, M. D.; Sprinz, E.; Sutherland, R. K.; Thomson, E. C.; Török, M. E.; Toshner, M.; Turner, D. P. J.; Vekemans, J.; Villafana, T. L.; White, T.; Williams, C. J.; Hill, A. V. S.; Lambe, T.; Gilbert, S. C.; Pollard, A. J.; Group, O. C. V. T., Single dose administration, and the influence of the timing of the booster dose on immunogenicity and efficacy of ChAdOx1 nCoV-19 (AZD1222) vaccine. *Lancet* **2021**. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3777268

725. Wajnberg, A.; Amanat, F.; Firpo, A.; Altman, D. R.; Bailey, M. J.; Mansour, M.; McMahon, M.; Meade, P.; Mendu, D. R.; Muellers, K.; Stadlbauer, D.; Stone, K.; Strohmeier, S.; Simon, V.; Aberg, J.; Reich, D. L.; Krammer, F.; Cordon-Cardo, C., Robust neutralizing antibodies to SARS-CoV-2 infection persist for months. *Science* **2020**, eabd7728. https://science.sciencemag.org/content/sci/early/2020/10/27/science.abd7728.full.pdf

726. Walsh, K. A.; Jordan, K.; Clyne, B.; Rohde, D.; Drummond, L.; Byrne, P.; Ahern, S.; Carty, P. G.; O'Brien, K. K.; O'Murchu, E.; O'Neill, M.; Smith, S. M.; Ryan, M.; Harrington, P., SARS-CoV-2 Detection, Viral Load and Infectivity over the Course of an Infection: SARS-CoV-2 Detection, Viral Load and Infectivity. *The Journal of infection* **2020**, S0163-4453(20)30449-7. https://pubmed.ncbi.nlm.nih.gov/32615199 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7323671/

727. Walsh, K. A.; Spillane, S.; Comber, L.; Cardwell, K.; Harrington, P.; Connell, J.; Teljeur, C.; Broderick, N.; de Gascun, C. F.; Smith, S. M.; Ryan, M.; O'Neill, M., The duration of infectiousness of individuals infected with SARS-CoV-2. *Journal of Infection*. https://doi.org/10.1016/j.jinf.2020.10.009

728. Wang, D.; Hu, B.; Hu, C.; Zhu, F.; Liu, X.; Zhang, J.; Wang, B.; Xiang, H.; Cheng, Z.; Xiong, Y.; Zhao, Y.; Li, Y.; Wang, X.; Peng, Z., Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.1585 https://jamanetwork.com/journals/jama/articlepdf/2761044/jama_wang_2020_oi_200019.pdf

729. Wang, D.; Li, R.; Wang, J.; Jiang, Q.; Gao, C.; Yang, J.; Ge, L.; Hu, Q., Correlation analysis between disease severity and clinical and biochemical characteristics of 143 cases of COVID-19 in Wuhan, China: a descriptive study. *BMC Infectious Diseases* **2020,** *20* (1), 519. https://doi.org/10.1186/s12879-020-05242-w

730. Wang, D.; You, Y.; Zhou, X.; Zong, Z.; Huang, H.; Zhang, H.; Yong, X.; Cheng, Y.; Yang, L.; Guo, Q.; Long, Y.; Liu, Y.; Huang, J.; Du, L., Selection of homemade mask materials for preventing transmission of COVID-19: a laboratory study. *medRxiv* **2020**.

731. Wang, K.; Zhao, S.; Li, H.; Song, Y.; Wang, L.; Wang, M. H.; Peng, Z.; Li, H.; He, D., Real-time estimation of the reproduction number of the novel coronavirus disease (COVID-19) in China in 2020 based on incidence data. *Annals of Translational Medicine* **2020,** *8* (11), 689. http://atm.amegroups.com/article/view/43447

732. Wang, L.; Didelot, X.; Yang, J.; Wong, G.; Shi, Y.; Liu, W.; Gao, G. F.; Bi, Y., Inference of person-to-person transmission of COVID-19 reveals hidden super-spreading events during the early outbreak phase. *Nature Communications* **2020,** *11* (1), 5006. https://doi.org/10.1038/s41467-020-18836-4

733. Wang, Q.; Berger, N. A.; Xu, R., Analyses of Risk, Racial Disparity, and Outcomes Among US Patients With Cancer and COVID-19 Infection. *JAMA Oncology* **2020**. https://doi.org/10.1001/jamaoncol.2020.6178

734. Wang, S.; Ma, P.; Zhang, S.; Song, S.; Wang, Z.; Ma, Y.; Xu, J.; Wu, F.; Duan, L.; Yin, Z.; Luo, H.; Xiong, N.; Xu, M.; Zeng, T.; Jin, Y., Fasting blood glucose at admission is an independent predictor for 28-day mortality in patients with COVID-19 without previous diagnosis of diabetes: a multi-centre retrospective study. *Diabetologia* **2020**. https://doi.org/10.1007/s00125-020-05209-1

735. Wang, X.; Ferro, E. G.; Zhou, G.; Hashimoto, D.; Bhatt, D. L., Association Between Universal Masking in a Health Care System and SARS-CoV-2 Positivity Among Health Care Workers. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.12897
736. Wang, X.; Pan, Y.; Zhang, D.; Chen, L.; Jia, L.; Li, X.; Yang, P.; Wang, Q.; Macintyre, C. R., Basic epidemiological parameter values from data of real-world in mega-cities: the characteristics of COVID-19 in Beijing, China. *BMC Infectious Diseases* **2020,** *20* (1), 526. https://doi.org/10.1186/s12879-020-05251-9
737. Wang, Y.; Chen, B.; Li, Y.; Zhang, L.; Wang, Y.; Yang, S.; Xiao, X.; Qin, Q., The Use of Renin-Angiotensin-Aldosterone System (RAAS) Inhibitors is Associated with a Lower Risk of Mortality in Hypertensive COVID-19 Patients: A Systematic Review and Meta-analysis. *J Med Virol* **2020**.
738. Wang, Y.; Tian, H.; Zhang, L.; Zhang, M.; Guo, D.; Wu, W.; Zhang, X.; Kan, G. L.; Jia, L.; Huo, D.; Liu, B.; Wang, X.; Sun, Y.; Wang, Q.; Yang, P.; MacIntyre, C. R., Reduction of secondary transmission of SARS-CoV-2 in households by face mask use, disinfection and social distancing: a cohort study in Beijing, China. *BMJ Global Health* **2020,** *5* (5), e002794. https://gh.bmj.com/content/bmjgh/5/5/e002794.full.pdf
739. Wang, Y.; Zhang, D.; Du, G.; Du, R.; Zhao, J.; Jin, Y.; Fu, S.; Gao, L.; Cheng, Z.; Lu, Q.; Hu, Y.; Luo, G.; Wang, K.; Lu, Y.; Li, H.; Wang, S.; Ruan, S.; Yang, C.; Mei, C.; Wang, Y.; Ding, D.; Wu, F.; Tang, X.; Ye, X.; Ye, Y.; Liu, B.; Yang, J.; Yin, W.; Wang, A.; Fan, G.; Zhou, F.; Liu, Z.; Gu, X.; Xu, J.; Shang, L.; Zhang, Y.; Cao, L.; Guo, T.; Wan, Y.; Qin, H.; Jiang, Y.; Jaki, T.; Hayden, F. G.; Horby, P. W.; Cao, B.; Wang, C., Remdesivir in adults with severe COVID-19: a randomised, double-blind, placebo-controlled, multicentre trial. *The Lancet* **2020,** *395* (10236), 1569-1578. http://www.sciencedirect.com/science/article/pii/S0140673620310229
740. Wang, Z.; Schmidt, F.; Weisblum, Y.; Muecksch, F.; Barnes, C. O.; Finkin, S.; Schaefer-Babajew, D.; Cipolla, M.; Gaebler, C.; Lieberman, J. A.; Yang, Z.; Abernathy, M. E.; Huey-Tubman, K. E.; Hurley, A.; Turroja, M.; West, K. A.; Gordon, K.; Millard, K. G.; Ramos, V.; Da Silva, J.; Xu, J.; Colbert, R. A.; Patel, R.; Dizon, J.; Unson-O'Brien, C.; Shimeliovich, I.; Gazumyan, A.; Caskey, M.; Bjorkman, P. J.; Casellas, R.; Hatziioannou, T.; Bieniasz, P. D.; Nussenzweig, M. C., mRNA vaccine-elicited antibodies to SARS-CoV-2 and circulating variants. *bioRxiv* **2021**, 2021.01.15.426911. https://www.biorxiv.org/content/biorxiv/early/2021/01/19/2021.01.15.426911.full.pdf
741. Washington, N. L.; Gangavarapu, K.; Zeller, M.; Bolze, A.; Cirulli, E. T.; Schiabor Barrett, K. M.; Larsen, B. B.; Anderson, C.; White, S.; Cassens, T.; Jacobs, S.; Levan, G.; Nguyen, J.; Ramirez, J. M.; Rivera-Garcia, C.; Sandoval, E.; Wang, X.; Wong, D.; Spencer, E.; Robles-Sikisaka, R.; Kurzban, E.; Hughes, L. D.; Deng, X.; Wang, C.; Servellita, V.; Valentine, H.; De Hoff, P.; Seaver, P.; Sathe, S.; Gietzen, K.; Sickler, B.; Antico, J.; Hoon, K.; Liu, J.; Harding, A.; Bakhtar, O.; Basler, T.; Austin, B.; Isaksson, M.; Febbo, P.; Becker, D.; Laurent, M.; McDonald, E.; Yeo, G. W.; Knight, R.; Laurent, L. C.; de Feo, E.; Worobey, M.; Chiu, C.; Suchard, M. A.; Lu, J. T.; Lee, W.; Andersen, K. G., Genomic epidemiology identifies emergence and rapid transmission of SARS-CoV-2 B.1.1.7 in the United States. *medRxiv* **2021**, 2021.02.06.21251159. https://www.medrxiv.org/content/medrxiv/early/2021/02/07/2021.02.06.21251159.full.pdf
742. Watanabe, T.; Bartrand, T. A.; Weir, M. H.; Omura, T.; Haas, C. N., Development of a Dose-Response Model for SARS Coronavirus. *Risk Analysis* **2010,** *30* (7), 1129-1138. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1539-6924.2010.01427.x
743. WCS, A Tiger at Bronx Zoo Tests Positive for COVID-19; The Tiger and the Zoo's Other Cats Are Doing Well at This Time. https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/14010/A-Tiger-at-Bronx-Zoo-Tests-Positive-for-COVID-19-The-Tiger-and-the-Zoos-Other-Cats-Are-Doing-Well-at-This-Time.aspx (accessed April 6, 2020).
744. Wee, S.-L.; Londoño, E., Disappointing Chinese Vaccine Results Pose Setback for Developing World. https://www.nytimes.com/2021/01/13/business/chinese-vaccine-brazil-sinovac.html.

745. Wee, S.-L.; Qin, A., China Approves Covid-19 Vaccine as It Moves to Inoculate Millions. https://www.nytimes.com/2020/12/30/business/china-vaccine.html.
746. Wei, W. E.; Li, Z.; Chiew, C. J.; Yong, S. E.; Toh, M. P.; Lee, V. J., Presymptomatic transmission of SARS-CoV-2 - Singapore, January 23 - March 16, 2020. *Morbidity and Mortality Weekly Report* **2020,** *ePub* (1 April 2020). https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e1.htm
747. Wei, Y.; Wei, L.; Liu, Y.; Huang, L.; Shen, S.; Zhang, R.; Chen, J.; Zhao, Y.; Shen, H.; Chen, F., A systematic review and meta-analysis reveals long and dispersive incubation period of COVID-19. *medRxiv* **2020**, 2020.06.20.20134387. https://www.medrxiv.org/content/medrxiv/early/2020/06/22/2020.06.20.20134387.full.pdf
748. Weisberg, S. P.; Connors, T. J.; Zhu, Y.; Baldwin, M. R.; Lin, W.-H.; Wontakal, S.; Szabo, P. A.; Wells, S. B.; Dogra, P.; Gray, J.; Idzikowski, E.; Stelitano, D.; Bovier, F. T.; Davis-Porada, J.; Matsumoto, R.; Poon, M. M. L.; Chait, M.; Mathieu, C.; Horvat, B.; Decimo, D.; Hudson, K. E.; Zotti, F. D.; Bitan, Z. C.; La Carpia, F.; Ferrara, S. A.; Mace, E.; Milner, J.; Moscona, A.; Hod, E.; Porotto, M.; Farber, D. L., Distinct antibody responses to SARS-CoV-2 in children and adults across the COVID-19 clinical spectrum. *Nature Immunology* **2020**. https://doi.org/10.1038/s41590-020-00826-9
749. Weissman, D. N.; de Perio, M. A.; Radonovich, L. J., Jr, COVID-19 and Risks Posed to Personnel During Endotracheal Intubation. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.6627
750. Westblade, L. F.; Brar, G.; Pinheiro, L. C.; Paidoussis, D.; Rajan, M.; Martin, P.; Goyal, P.; Sepulveda, J. L.; Zhang, L.; George, G.; Liu, D.; Whittier, S.; Plate, M.; Small, C. B.; Rand, J. H.; Cushing, M. M.; Walsh, T. J.; Cooke, J.; Safford, M. M.; Loda, M.; Satlin, M. J., SARS-CoV-2 Viral Load Predicts Mortality in Patients with and Without Cancer Who Are Hospitalized with COVID-19. *Cancer Cell* **2020**. http://www.sciencedirect.com/science/article/pii/S1535610820304815
751. Whitman, J. D.; Hiatt, J.; Mowrey, C. T.; al., e., Test performance evaluation of SARS-CoV-2 serological assays. *Unpublished Preprint* **2020**. https://www.dropbox.com/s/cd1628cau09288a/SARS-CoV-2_Serology_Manuscript.pdf?dl=0
752. Whittaker, E.; Bamford, A.; Kenny, J.; Kaforou, M.; Jones, C. E.; Shah, P.; Ramnarayan, P.; Fraisse, A.; Miller, O.; Davies, P.; Kucera, F.; Brierley, J.; McDougall, M.; Carter, M.; Tremoulet, A.; Shimizu, C.; Herberg, J.; Burns, J. C.; Lyall, H.; Levin, M.; Group, f. t. P.-T. S.; EUCLIDS; Consortia, P., Clinical Characteristics of 58 Children With a Pediatric Inflammatory Multisystem Syndrome Temporally Associated With SARS-CoV-2. *JAMA* **2020,** *324* (3), 259-269. https://doi.org/10.1001/jama.2020.10369
753. Whitworth, C.; Mu, Y.; Houston, H.; Martinez-Smith, M.; Noble-Wang, J.; Coulliette-Salmond, A.; Rose, L., Persistence of Bacteriophage Phi 6 on Porous and Nonporous Surfaces and the Potential for Its Use as an Ebola Virus or Coronavirus Surrogate. *Applied and Environmental Microbiology* **2020,** *86* (17), e01482-20. https://aem.asm.org/content/aem/86/17/e01482-20.full.pdf
754. Whitworth, J., U.S. FDA 'aware' of China testing food for coronavirus. https://www.foodsafetynews.com/2020/06/u-s-fda-aware-of-china-testing-food-for-coronavirus/ (accessed 06/22/2020).
755. WHO, *COVID-19 Clinical management: living guidance*; World Health Organization: 2021. https://www.who.int/publications/i/item/WHO-2019-nCoV-clinical-2021-1
756. WHO, *Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected*; 2020. https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125
757. WHO, International Nonproprietary Names for Pharmaceutical Substances (INN). https://www.who.int/medicines/publications/druginformation/issues/WHO_DI_34-3_PL124-SpecialEdition.pdf.
758. WHO, Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases.
759. WHO, *Mask use in the context of COVID-19*; World Health Organization: 1 December 2020, 2020. https://apps.who.int/iris/rest/bitstreams/1319378/retrieve

760. WHO, Therapeutics and COVID-19. Living Guideline. https://apps.who.int/iris/bitstream/handle/10665/337876/WHO-2019-nCoV-therapeutics-2020.1-eng.pdf.
761. WHO, *Transmission of SARS-CoV-2: implications for infection prevention precautions*; World Health Organization: 2020. https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions
762. WHO, WHO issues its first emergency use validation for a COVID-19 vaccine and emphasizes need for equitable global access. https://www.who.int/news/item/31-12-2020-who-issues-its-first-emergency-use-validation-for-a-covid-19-vaccine-and-emphasizes-need-for-equitable-global-access.
763. WHO, WHO lists two additional COVID-19 vaccines for emergency use and COVAX roll-out. World Health Organization: 2021. https://www.who.int/news/item/15-02-2021-who-lists-two-additional-covid-19-vaccines-for-emergency-use-and-covax-roll-out
764. Wibmer, C. K.; Ayres, F.; Hermanus, T.; Madzivhandila, M.; Kgagudi, P.; Lambson, B. E.; Vermeulen, M.; van den Berg, K.; Rossouw, T.; Boswell, M.; Ueckermann, V.; Meiring, S.; von Gottberg, A.; Cohen, C.; Morris, L.; Bhiman, J. N.; Moore, P. L., SARS-CoV-2 501Y.V2 escapes neutralization by South African COVID-19 donor plasma. *bioRxiv* **2021**, 2021.01.18.427166. https://www.biorxiv.org/content/biorxiv/early/2021/01/19/2021.01.18.427166.full.pdf
765. Widge, A. T.; Rouphael, N. G.; Jackson, L. A.; Anderson, E. J.; Roberts, P. C.; Makhene, M.; Chappell, J. D.; Denison, M. R.; Stevens, L. J.; Pruijssers, A. J.; McDermott, A. B.; Flach, B.; Lin, B. C.; Doria-Rose, N. A.; O'Dell, S.; Schmidt, S. D.; Neuzil, K. M.; Bennett, H.; Leav, B.; Makowski, M.; Albert, J.; Cross, K.; Edara, V.-V.; Floyd, K.; Suthar, M. S.; Buchanan, W.; Luke, C. J.; Ledgerwood, J. E.; Mascola, J. R.; Graham, B. S.; Beigel, J. H., Durability of Responses after SARS-CoV-2 mRNA-1273 Vaccination. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMc2032195
766. Wiersinga, W. J.; Rhodes, A.; Cheng, A. C.; Peacock, S. J.; Prescott, H. C., Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.12839
767. Wise, J., Covid-19: The E484K mutation and the risks it poses. *BMJ* **2021,** *372*, n359. http://www.bmj.com/content/372/bmj.n359.abstract
768. Wong, F.; Collins, J. J., Evidence that coronavirus superspreading is fat-tailed. *Proceedings of the National Academy of Sciences* **2020**, 202018490. https://www.pnas.org/content/pnas/early/2020/10/30/2018490117.full.pdf
769. Wong, M. C.; Javornik Cregeen, S. J.; Ajami, N. J.; Petrosino, J. F., Evidence of recombination in coronaviruses implicating pangolin origins of nCoV-2019. *bioRxiv* **2020**, 2020.02.07.939207. https://www.biorxiv.org/content/biorxiv/early/2020/02/13/2020.02.07.939207.full.pdf
770. Wong, Y. C.; Lau, S. Y.; Wang To, K. K.; Mok, B. W. Y.; Li, X.; Wang, P.; Deng, S.; Woo, K. F.; Du, Z.; Li, C.; Zhou, J.; Woo Chan, J. F.; Yuen, K. Y.; Chen, H.; Chen, Z., Natural transmission of bat-like SARS-CoV-2PRRA variants in COVID-19 patients. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa953
771. Woolf, S. H.; Chapman, D. A.; Sabo, R. T.; Weinberger, D. M.; Hill, L., Excess Deaths From COVID-19 and Other Causes, March-April 2020. *JAMA* **2020**. https://doi.org/10.1001/jama.2020.11787
772. Woolsey, C. B.; Borisevich, V.; Prasad, A. N.; Agans, K. N.; Deer, D. J.; Dobias, N. S.; Heymann, J. C.; Foster, S. L.; Levine, C. B.; Medina, L.; Melody, K.; Geisbert, J. B.; Fenton, K. A.; Geisbert, T. W.; Cross, R. W., Establishment of an African green monkey model for COVID-19. *bioRxiv* **2020**, 2020.05.17.100289. http://biorxiv.org/content/early/2020/05/17/2020.05.17.100289.abstract
773. World Health Organization, Global COVID-19 Clinical Platgorm Case Report Form (CRF) for Post COVID condition (Post COVID-19 CRF). https://www.who.int/publications/i/item/global-covid-19-clinical-platform-case-report-form-(crf)-for-post-covid-conditions-(post-covid-19-crf-) (accessed 22 Feb 2021).

774. World Health Organization, SARS-CoV-2 Variants. https://www.who.int/csr/don/31-december-2020-sars-cov2-variants/en/ (accessed 02 Jan 2021).
775. Worthham, J. M.; Lee, J. T.; Althomsons, S.; al., e., Characteristics of Persons Who Died with COVID-19 — United States, February 12–May 18, 2020. *Morbidity and Mortality Weekly Report* **2020,** *ePub: July 10, 2020* (69). https://www.cdc.gov/mmwr/volumes/69/wr/mm6928e1.htm
776. Wrapp, D.; Wang, N.; Corbett, K. S.; Goldsmith, J. A.; Hsieh, C.-L.; Abiona, O.; Graham, B. S.; McLellan, J. S., Cryo-EM Structure of the 2019-nCoV Spike in the Prefusion Conformation. *bioRxiv* **2020**, 2020.02.11.944462. https://www.biorxiv.org/content/biorxiv/early/2020/02/15/2020.02.11.944462.full.pdf
777. Wu, C.; Hou, D.; Du, C.; Cai, Y.; Zheng, J.; Xu, J.; Chen, X.; Chen, C.; Hu, X.; Zhang, Y.; Song, J.; Wang, L.; Chao, Y. C.; Feng, Y.; Xiong, W.; Chen, D.; Zhong, M.; Hu, J.; Jiang, J.; Bai, C.; Zhou, X.; Xu, J.; Song, Y.; Gong, F., Corticosteroid therapy for coronavirus disease 2019-related acute respiratory distress syndrome: a cohort study with propensity score analysis. *Crit Care* **2020,** *24* (1), 643.
778. Wu, G.; Yang, P.; Xie, Y.; Woodruff, H. C.; Rao, X.; Guiot, J.; Frix, A.-N.; Louis, R.; Moutschen, M.; Li, J.; Li, J.; Yan, C.; Du, D.; Zhao, S.; Ding, Y.; Liu, B.; Sun, W.; Albarello, F.; D'Abramo, A.; Schininà, V.; Nicastri, E.; Occhipinti, M.; Barisione, G.; Barisione, E.; Halilaj, I.; Lovinfosse, P.; Wang, X.; Wu, J.; Lambin, P., Development of a Clinical Decision Support System for Severity Risk Prediction and Triage of COVID-19 Patients at Hospital Admission: an International Multicenter Study. *European Respiratory Journal* **2020**, 2001104. https://erj.ersjournals.com/content/erj/early/2020/06/25/13993003.01104-2020.full.pdf
779. Wu, J. T.; Leung, K.; Leung, G. M., Nowcasting and forecasting the potential domestic and international spread of the 2019-nCoV outbreak originating in Wuhan, China: a modelling study. *The Lancet* **2020**. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30260-9/fulltext
780. Wu, K.; Werner, A. P.; Koch, M.; Choi, A.; Narayanan, E.; Stewart-Jones, G. B. E.; Colpitts, T.; Bennett, H.; Boyoglu-Barnum, S.; Shi, W.; Moliva, J. I.; Sullivan, N. J.; Graham, B. S.; Carfi, A.; Corbett, K. S.; Seder, R. A.; Edwards, D. K., Serum Neutralizing Activity Elicited by mRNA-1273 Vaccine — Preliminary Report. *New England Journal of Medicine* **2021**. https://www.nejm.org/doi/full/10.1056/NEJMc2102179
781. Wu, K.; Werner, A. P.; Moliva, J. I.; Koch, M.; Choi, A.; Stewart-Jones, G. B. E.; Bennett, H.; Boyoglu-Barnum, S.; Shi, W.; Graham, B. S.; Carfi, A.; Corbett, K. S.; Seder, R. A.; Edwards, D. K., mRNA-1273 vaccine induces neutralizing antibodies against spike mutants from global SARS-CoV-2 variants. *bioRxiv* **2021**, 2021.01.25.427948. https://www.biorxiv.org/content/biorxiv/early/2021/01/25/2021.01.25.427948.full.pdf
782. Wu, L.-P.; Wang, N.-C.; Chang, Y.-H.; Tian, X.-Y.; Na, D.-Y.; Zhang, L.-Y.; Zheng, L.; Lan, T.; Wang, L.-F.; Liang, G.-D., Duration of antibody responses after severe acute respiratory syndrome. *Emerging infectious diseases* **2007,** *13* (10), 1562. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2851497/pdf/07-0576_finalD.pdf
783. Xiao, K.; Zhai, J.; Feng, Y.; Zhou, N.; Zhang, X.; Zou, J. J.; Li, N.; Guo, Y.; Li, X.; Shen, X.; Zhang, Z.; Shu, F.; Huang, W.; Li, Y.; Zhang, Z.; Chen, R. A.; Wu, Y. J.; Peng, S. M.; Huang, M.; Xie, W. J.; Cai, Q. H.; Hou, F. H.; Chen, W.; Xiao, L.; Shen, Y., Isolation of SARS-CoV-2-related coronavirus from Malayan pangolins. *Nature* **2020**.
784. Xie, X.; Zou, J.; Fontes-Garfias, C. R.; Xia, H.; Swanson, K. A.; Cutler, M.; Cooper, D.; Menachery, V. D.; Weaver, S.; Dormitzer, P. R.; Shi, P.-Y., Neutralization of N501Y mutant SARS-CoV-2 by BNT162b2 vaccine-elicited sera. *bioRxiv* **2021**, 2021.01.07.425740. https://www.biorxiv.org/content/biorxiv/early/2021/01/07/2021.01.07.425740.full.pdf
785. Xie, Y.; Bowe, B.; Maddukuri, G.; Al-Aly, Z., Comparative evaluation of clinical manifestations and risk of death in patients admitted to hospital with covid-19 and seasonal influenza: cohort study. *BMJ* **2020,** *371*, m4677. https://www.bmj.com/content/bmj/371/bmj.m4677.full.pdf

786. Xinhua, China detects large quantity of novel coronavirus at Wuhan seafood market http://www.xinhuanet.com/english/2020-01/27/c_138735677.htm.
787. Xu, W.; Li, X.; Dozier, M.; He, Y.; Kirolos, A.; Lang, Z.; Mathews, C.; Siegfried, N.; Theodoratou, E., What is the evidence for transmission of COVID-19 by children in schools? A living systematic review. *Journal of Global Health* **2020,** *10* (2).
788. Xu, X. K.; Liu, X. F.; Wu, Y.; Ali, S. T.; Du, Z.; Bosetti, P.; Lau, E. H. Y.; Cowling, B. J.; Wang, L., Reconstruction of Transmission Pairs for novel Coronavirus Disease 2019 (COVID-19) in mainland China: Estimation of Super-spreading Events, Serial Interval, and Hazard of Infection. *Clin Infect Dis* **2020**.
789. Yan, L.; Shu, K.; Guan, J.; Shanchang, H., Unusual Features of the SARS-CoV-2 Genome Suggesting Sophisticated Laboratory Modification Rather Than Natural Evolution and Delineation of Its Probable Synthetic Route. *Zenodo* **2020**. https://zenodo.org/record/4028830#.X3JdatpKiUn
790. Yang, C.; Jiang, M.; Wang, X.; Tang, X.; Fang, S.; Li, H.; Zuo, L.; Jiang, Y.; Zhong, Y.; Chen, Q.; Zheng, C.; Wang, L.; Wu, S.; Wu, W.; Liu, H.; Yuan, J.; Liao, X.; Zhang, Z.; Shi, X.; Geng, Y.; Zhang, H.; Zheng, H.; Wan, M.; Lu, L.; Ren, X.; Cui, Y.; Zou, X.; Feng, T.; Xia, J.; Yang, R.; Liu, Y.; Mei, S.; Li, B.; Yang, Z.; Hu, Q., Viral RNA level, serum antibody responses, and transmission risk in recovered COVID-19 patients with recurrent positive SARS-CoV-2 RNA test results: a population-based observational cohort study. *Emerging Microbes & Infections* **2020,** *9* (1), 2368-2378. https://doi.org/10.1080/22221751.2020.1837018
791. Yang, J.; Marziano, V.; Deng, X.; Guzzetta, G.; Zhang, J.; Trentini, F.; Cai, J.; Poletti, P.; Zheng, W.; Wang, W.; Wu, Q.; Zhao, Z.; Dong, K.; Zhong, G.; Viboud, C.; Merler, S.; Ajelli, M.; Yu, H., Can a COVID-19 vaccination program guarantee the return to a pre-pandemic lifestyle? *medRxiv* **2021**, 2021.02.03.21251108. https://www.medrxiv.org/content/medrxiv/early/2021/02/05/2021.02.03.21251108.full.pdf
792. Yang, L.; Dai, J.; Zhao, J.; Wang, Y.; Deng, P.; Wang, J., Estimation of incubation period and serial interval of COVID-19: analysis of 178 cases and 131 transmission chains in Hubei province, China. *Epidemiology and Infection* **2020,** *148*, e117. https://www.cambridge.org/core/article/estimation-of-incubation-period-and-serial-interval-of-covid19-analysis-of-178-cases-and-131-transmission-chains-in-hubei-province-china/C1B194C01268F005AAFBE8D50CB5F945
793. Yang, P.; Qi, J.; Zhang, S.; Bi, G.; Wang, X.; Yang, Y.; Sheng, B.; Mao, X., Feasibility of Controlling COVID-19 Outbreaks in the UK by Rolling Interventions. *medRxiv* **2020**, 2020.04.05.20054429. https://www.medrxiv.org/content/medrxiv/early/2020/04/07/2020.04.05.20054429.full.pdf
794. Yap, T. F.; Liu, Z.; Shveda, R. A.; Preston, D. J., A predictive model of the temperature-dependent inactivation of coronaviruses. *Applied Physics Letters* **2020,** *117* (6), 060601. https://aip.scitation.org/doi/abs/10.1063/5.0020782
795. Yehya, N.; Venkataramani, A.; Harhay, M. O., Statewide Interventions and Covid-19 Mortality in the United States: An Observational Study. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa923
796. Yekta, R.; Vahid-Dastjerdi, L.; Norouzbeigi, S.; Mortazavian, A. M., Food Products as Potential Carriers of SARS-CoV-2. *Food Control* **2020**, 107754. http://www.sciencedirect.com/science/article/pii/S0956713520306708
797. Yonker, L. M.; Neilan, A. M.; Bartsch, Y.; Patel, A. B.; Regan, J.; Arya, P.; Gootkind, E.; Park, G.; Hardcastle, M.; St. John, A.; Appleman, L.; Chiu, M. L.; Fialkowski, A.; De la Flor, D.; Lima, R.; Bordt, E. A.; Yockey, L. J.; D'Avino, P.; Fischinger, S.; Shui, J. E.; Lerou, P. H.; Bonventre, J. V.; Yu, X. G.; Ryan, E. T.; Bassett, I. V.; Irimia, D.; Edlow, A. G.; Alter, G.; Li, J. Z.; Fasano, A., Pediatric SARS-CoV-2: Clinical Presentation, Infectivity, and Immune Responses. *The Journal of Pediatrics* **2020**. https://doi.org/10.1016/j.jpeds.2020.08.037
798. Yu, B.; Li, C.; Sun, Y.; Wang, D. W., Insulin Treatment Is Associated with Increased Mortality in Patients with COVID-19 and Type 2 Diabetes. *Cell Metab* **2020**.

799. Yu, W.-B.; Tang, G.-D.; Zhang, L.; Corlett, R. T., Decoding evolution and transmissions of novel pneumonia coronavirus using the whole genomic data. *ChinaXiv* **2020**. http://www.chinaxiv.org/abs/202002.00033
800. Yuki, F.; Eiichiro, S.; Naho, T.; Reiko, M.; Ikkoh, Y.; Yura, K. K.; Mayuko, S.; Konosuke, M.; Takeaki, I.; Yugo, S.; Shohei, N.; Kazuaki, J.; Tadatsugu, I.; Tomimasa, S.; Motoi, S.; Hiroshi, N.; Hitoshi, O., Clusters of Coronavirus Disease in Communities, Japan, January–April 2020. *Emerging Infectious Disease journal* **2020,** *26* (9). https://wwwnc.cdc.gov/eid/article/26/9/20-2272_article
801. Zangmeister, C. D.; Radney, J. G.; Vicenzi, E. P.; Weaver, J. L., Filtration Efficiencies of Nanoscale Aerosol by Cloth Mask Materials Used to Slow the Spread of SARS CoV-2. *ACS Nano* **2020**. https://doi.org/10.1021/acsnano.0c05025
802. Zeng, H.-L.; Lu, Q.-B.; Yang, Q.; Wang, X.; Yue, D.-Y.; Zhang, L.-K.; Li, H.; Liu, W.; Li, H.-J., Longitudinal Profile of Laboratory Parameters and Their Application in the Prediction for Fatal Outcome Among Patients Infected With SARS-CoV-2: A Retrospective Cohort Study. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa574
803. Zeng, W.; Qi, K.; Ye, M.; Zheng, L.; Liu, X.; Hu, S.; Zhang, W.; Tang, W.; Xu, J.; Yu, D.; Wei, Y., Gastrointestinal symptoms are associated with severity of coronavirus disease 2019: a systematic review and meta-analysis. *European Journal of Gastroenterology & Hepatology* **9000,** *Publish Ahead of Print*. https://journals.lww.com/eurojgh/Fulltext/9000/Gastrointestinal_symptoms_are_associated_with.97315.aspx
804. Zhang, J.; Wu, J.; Sun, X.; Xue, H.; Shao, J.; Cai, W.; Jing, Y.; Yue, M.; Dong, C., Associations of hypertension with the severity and fatality of SARS-CoV-2 infection: A meta-analysis. *Epidemiology and Infection* **2020**, 1-19. https://www.cambridge.org/core/article/associations-of-hypertension-with-the-severity-and-fatality-of-sarscov2-infection-a-metaanalysis/4116FAD7D866737099F976E7E7FAEB15
805. Zhang, Q.; Zhang, H.; Huang, K.; Yang, Y.; Hui, X.; Gao, J.; He, X.; Li, C.; Gong, W.; Zhang, Y.; Peng, C.; Gao, X.; Chen, H.; Zou, Z.; Shi, Z.; Jin, M., SARS-CoV-2 neutralizing serum antibodies in cats: a serological investigation. *bioRxiv* **2020**, 2020.04.01.021196. http://biorxiv.org/content/early/2020/04/03/2020.04.01.021196.abstract
806. Zhang, T.; Wu, Q.; Zhang, Z., Probable Pangolin Origin of SARS-CoV-2 Associated with the COVID-19 Outbreak. *Current Biology* **2020,** *30* (7), 1346-1351.e2. http://www.sciencedirect.com/science/article/pii/S0960982220303602
807. Zhang, W.; Davis, B. D.; Chen, S. S.; Sincuir Martinez, J. M.; Plummer, J. T.; Vail, E., Emergence of a Novel SARS-CoV-2 Variant in Southern California. *JAMA* **2021**. https://doi.org/10.1001/jama.2021.1612
808. Zhao; Musa; Lin; Ran; Yang; Wang; Lou; Yang; Gao; He; Wang, Estimating the Unreported Number of Novel Coronavirus (2019-nCoV) Cases in China in the First Half of January 2020: A Data-Driven Modelling Analysis of the Early Outbreak. *Journal of Clinical Medicine* **2020,** *9* (2), 388.
809. Zhao, G.; Jiang, Y.; Qiu, H.; Gao, T.; Zeng, Y.; Guo, Y.; Yu, H.; Li, J.; Kou, Z.; Du, L.; Tan, W.; Jiang, S.; Sun, S.; Zhou, Y., Multi-Organ Damage in Human Dipeptidyl Peptidase 4 Transgenic Mice Infected with Middle East Respiratory Syndrome-Coronavirus. *PLoS One* **2015,** *10* (12), e0145561. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4689477/pdf/pone.0145561.pdf
810. Zhao, L.; Qi, Y.; Luzzatto-Fegiz, P.; Cui, Y.; Zhu, Y., COVID-19: Effects of Environmental Conditions on the Propagation of Respiratory Droplets. *Nano Letters* **2020,** *20* (10), 7744-7750. https://doi.org/10.1021/acs.nanolett.0c03331
811. Zhao, S.; Shen, M.; Musa, S. S.; Guo, Z.; Ran, J.; Peng, Z.; Zhao, Y.; Chong, M. K. C.; He, D.; Wang, M. H., Inferencing superspreading potential using zero-truncated negative binomial model: exemplification with COVID-19. *BMC Medical Research Methodology* **2021,** *21* (1), 30. https://doi.org/10.1186/s12874-021-01225-w

812. Zhen-Dong, T.; An, T.; Ke-Feng, L.; Peng, L.; Hong-Ling, W.; Jing-Ping, Y.; Yong-Li, Z.; Jian-Bo, Y., Potential Presymptomatic Transmission of SARS-CoV-2, Zhejiang Province, China, 2020. *Emerging Infectious Disease journal* **2020,** *26* (5). https://wwwnc.cdc.gov/eid/article/26/5/20-0198_article
813. Zhifei, A., Vaccine to undergo 3rd phase of trials. http://en.nhc.gov.cn/2020-11/20/c_82209.htm.
814. Zhou, F.; Yu, T.; Du, R.; Fan, G.; Liu, Y.; Liu, Z.; Xiang, J.; Wang, Y.; Song, B.; Gu, X.; Guan, L.; Wei, Y.; Li, H.; Wu, X.; Xu, J.; Tu, S.; Zhang, Y.; Chen, H.; Cao, B., Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet*. https://doi.org/10.1016/S0140-6736(20)30566-3
815. Zhou, H.; Chen, X.; Hu, T.; Li, J.; Song, H.; Liu, Y.; Wang, P.; Liu, D.; Yang, J.; Holmes, E. C.; Hughes, A. C.; Bi, Y.; Shi, W., A novel bat coronavirus reveals natural insertions at the S1/S2 cleavage site of the Spike protein and a possible recombinant origin of HCoV-19. *bioRxiv* **2020**, 2020.03.02.974139. https://www.biorxiv.org/content/biorxiv/early/2020/03/11/2020.03.02.974139.full.pdf
816. Zhou, L.; Yao, M.; Zhang, X.; Hu, B.; Li, X.; Chen, H.; Zhang, L.; Liu, Y.; Du, M.; Sun, B.; Jiang, Y.; Zhou, K.; Hong, J.; Yu, N.; Ding, Z.; Xu, Y.; Hu, M.; Morawska, L.; Grinshpun, S. A.; Biswas, P.; Flagan, R. C.; Zhu, B.; Liu, W.; Zhang, Y., Breath-, air- and surface-borne SARS-CoV-2 in hospitals. *Journal of Aerosol Science* **2020**, 105693. http://www.sciencedirect.com/science/article/pii/S0021850220301786
817. Zhou, P.; Yang, X.-L.; Wang, X.-G.; Hu, B.; Zhang, L.; Zhang, W.; Si, H.-R.; Zhu, Y.; Li, B.; Huang, C.-L.; Chen, H.-D.; Chen, J.; Luo, Y.; Guo, H.; Jiang, R.-D.; Liu, M.-Q.; Chen, Y.; Shen, X.-R.; Wang, X.; Zheng, X.-S.; Zhao, K.; Chen, Q.-J.; Deng, F.; Liu, L.-L.; Yan, B.; Zhan, F.-X.; Wang, Y.-Y.; Xiao, G.; Shi, Z.-L., Discovery of a novel coronavirus associated with the recent pneumonia outbreak in humans and its potential bat origin. *bioRxiv* **2020**, 2020.01.22.914952. https://www.biorxiv.org/content/biorxiv/early/2020/01/23/2020.01.22.914952.1.full.pdf
818. Zhu, F.-C.; Guan, X.-H.; Li, Y.-H.; Huang, J.-Y.; Jiang, T.; Hou, L.-H.; Li, J.-X.; Yang, B.-F.; Wang, L.; Wang, W.-J.; Wu, S.-P.; Wang, Z.; Wu, X.-H.; Xu, J.-J.; Zhang, Z.; Jia, S.-Y.; Wang, B.-S.; Hu, Y.; Liu, J.-J.; Zhang, J.; Qian, X.-A.; Li, Q.; Pan, H.-X.; Jiang, H.-D.; Deng, P.; Gou, J.-B.; Wang, X.-W.; Wang, X.-H.; Chen, W., Immunogenicity and safety of a recombinant adenovirus type-5-vectored COVID-19 vaccine in healthy adults aged 18 years or older: a randomised, double-blind, placebo-controlled, phase 2 trial. *The Lancet* **2020**. https://doi.org/10.1016/S0140-6736(20)31605-6
819. Zhu, S.; Zong, Z., Why did so few healthcare workers in China get COVID-19 infection. *QJM: An International Journal of Medicine* **2020**.
820. Zhu, Y.; Bloxham, C. J.; Hulme, K. D.; Sinclair, J. E.; Tong, Z. W. M.; Steele, L. E.; Noye, E. C.; Lu, J.; Xia, Y.; Chew, K. Y.; Pickering, J.; Gilks, C.; Bowen, A. C.; Short, K. R., A meta-analysis on the role of children in SARS-CoV-2 in household transmission clusters. *Clinical Infectious Diseases* **2020**. https://doi.org/10.1093/cid/ciaa1825
821. Zietz, M.; Zucker, J.; Tatonetti, N. P., Associations between blood type and COVID-19 infection, intubation, and death. *Nature Communications* **2020,** *11* (1), 5761. https://doi.org/10.1038/s41467-020-19623-x
822. Zimmerman, K. O.; Akinboyo, I. C.; Brookhart, M. A.; Boutzoukas, A. E.; McGann, K.; Smith, M. J.; Maradiaga Panayotti, G.; Armstrong, S. C.; Bristow, H.; Parker, D.; Zadrozny, S.; Weber, D. J.; Benjamin, D. K., Incidence and Secondary Transmission of SARS-CoV-2 Infections in Schools. *Pediatrics* **2021**, e2020048090. https://pediatrics.aappublications.org/content/pediatrics/early/2021/01/06/peds.2020-048090.full.pdf
823. Zou, L.; Ruan, F.; Huang, M.; Liang, L.; Huang, H.; Hong, Z.; Yu, J.; Kang, M.; Song, Y.; Xia, J.; Guo, Q.; Song, T.; He, J.; Yen, H.-L.; Peiris, M.; Wu, J., SARS-CoV-2 Viral Load in Upper Respiratory Specimens of Infected Patients. *New England Journal of Medicine* **2020**. https://www.nejm.org/doi/full/10.1056/NEJMc2001737
824. Zuo, J.; Dowell, A.; Pearce, H.; Verma, K.; Long, H.; Begum, J.; Aiano, F.; Amin-Chowdhury, Z.; Hallis, B.; Stapley, L.; Borrow, R.; Linley, E.; Ahmad, S.; Parker, B.; Horsley, A.; Amirthalingam, G.; Brown, K.;

Ramsay, M. E.; Ladhani, S.; Moss, P., Robust SARS-CoV-2-specific T-cell immunity is maintained at 6 months following primary infection. *bioRxiv* **2020**, 2020.11.01.362319. https://www.biorxiv.org/content/biorxiv/early/2020/11/02/2020.11.01.362319.full.pdf