

COVID-19 Updates: May 13, 2020

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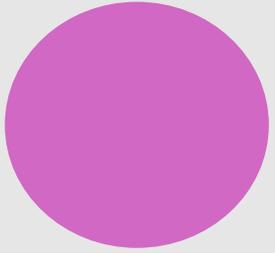
TREATMENT

EPIDEMIOLOGY

INFECTION CONTROL

DIAGNOSIS

DISEASE



CDC COVID-19 Screening Guidelines

CNHS Screening at Facility Entry

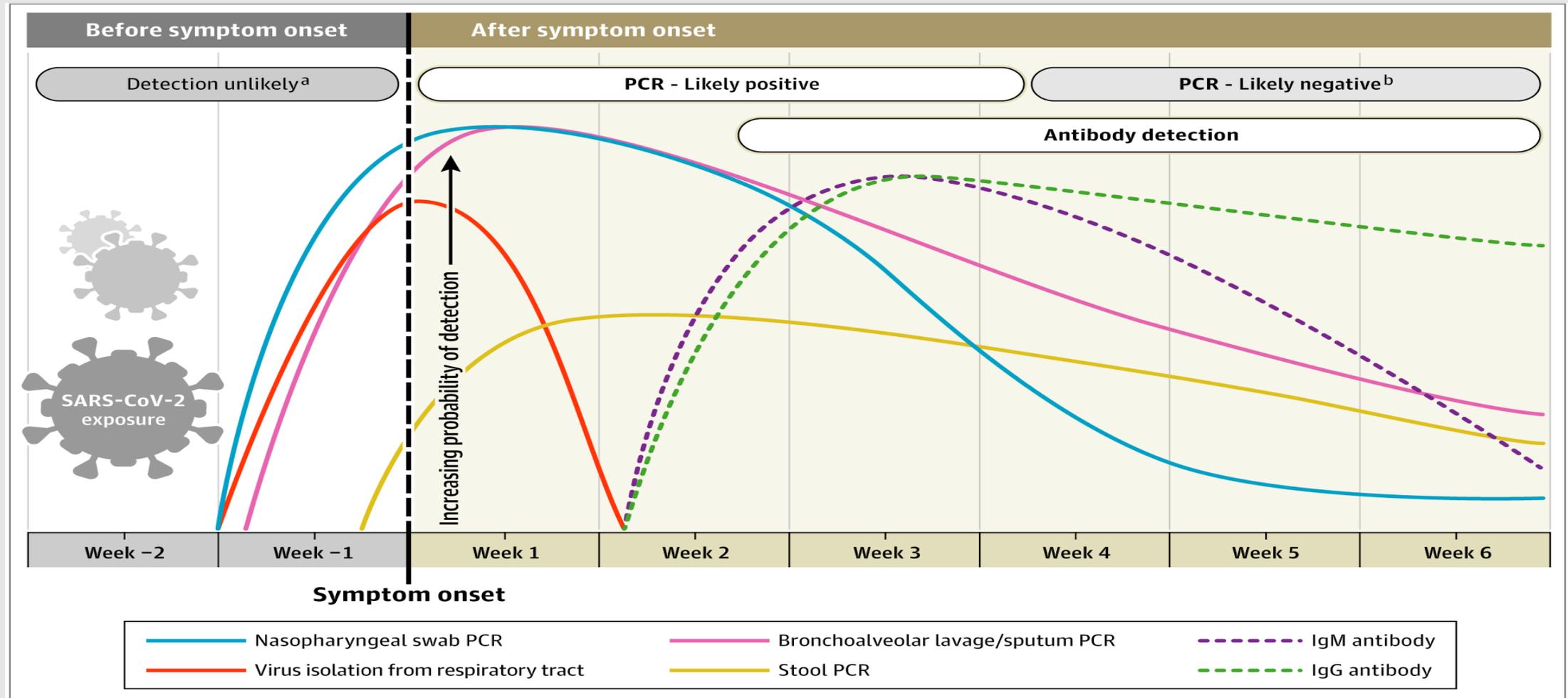
- Cough
- Shortness of breath or difficulty breathing
- Fever
- Chills
- Muscle pain
- Headache
- Sore throat
- New loss of taste or smell

Interpreting Diagnostic Tests for SARS-CoV-2

- **In most individuals with symptomatic COVID-19 infection, Nasopharyngeal viral RNA becomes detectable as early as day 1 of symptoms and peaks within the first week of symptom onset.**
 - This positivity starts to decline by week 3 and subsequently becomes undetectable.
 - Patients with severe infection may have higher and prolonged viral load shedding but does not necessarily indicate presence of viable virus
- **In a study of 9 patients, attempts to isolate the virus in culture were not successful beyond day 8 of illness onset, which correlates with the decline of infectivity beyond the first week.**
 - That is in part why the “symptom-based strategy” of the CDC indicates that health care workers can return to work
- **The timeline of PCR positivity is different in specimens other than nasopharyngeal swab.**
 - PCR positivity declines more slowly in sputum and may still be positive after nasopharyngeal swabs are negative.
 - PCR positivity in stool was observed in 55 of 96 (57%) infected patients and remained positive in stool beyond nasopharyngeal swab by a median of 4 to 11 days
- **RT-PCR positivity is highest in bronchoalveolar lavage specimens (93%), followed by sputum (72%), nasal swab (63%), and pharyngeal swab (32%)**
 - False-negative results mainly occurred due to inappropriate timing of sample collection in relation to illness onset and deficiency in sampling technique, especially of nasopharyngeal swabs
- **Specificity of most of the RT-PCR tests is 100%**
 - Occasional false-positive results may occur due to technical errors and reagent contamination.

Interpreting Diagnostic Tests for SARS-CoV-2

JAMA. Published online May 06, 2020. doi:10.1001/jama.2020.8259



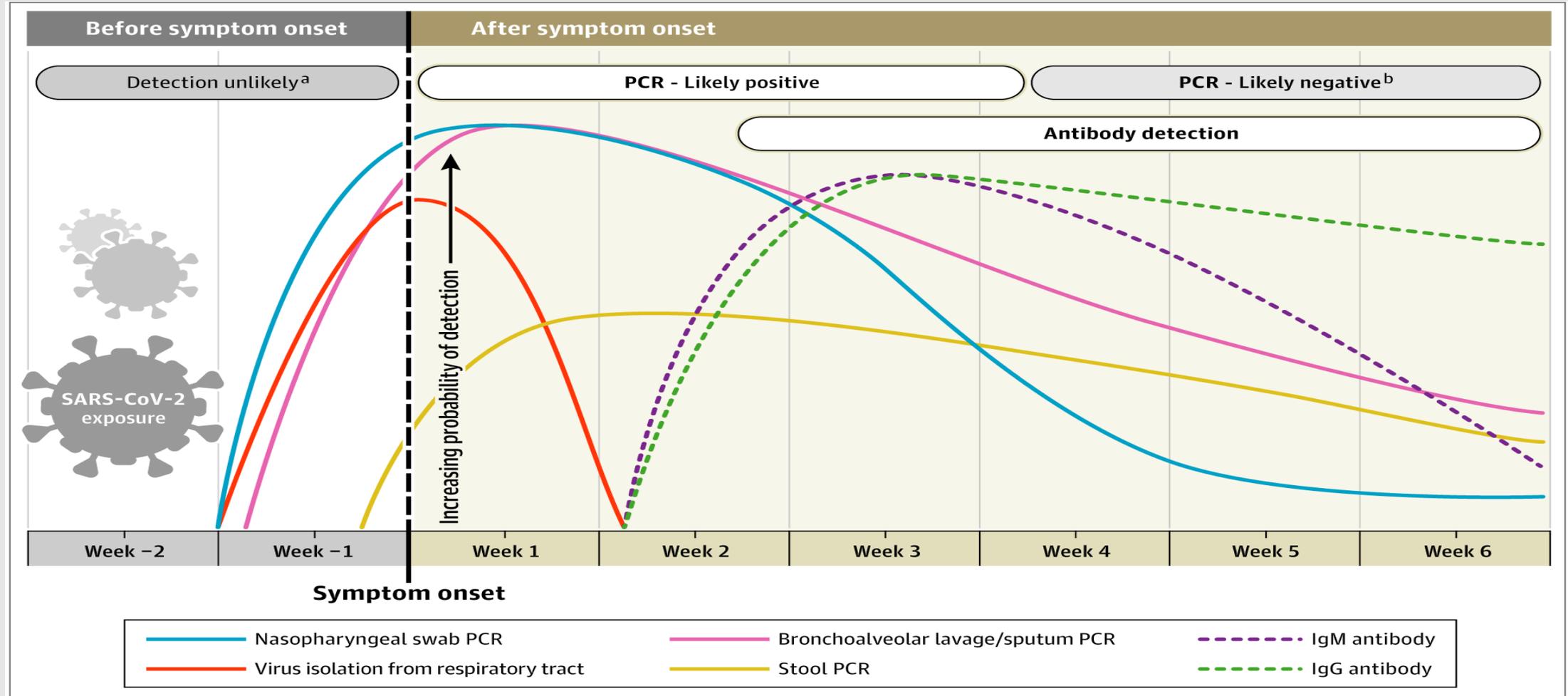
Estimated Variation Over Time in Diagnostic Tests for Detection of SARS-CoV-2 Infection Relative to Symptom Onset Estimated time intervals and rates of viral detection are based on data from several published reports. Because of variability in values among studies, estimated time intervals should be considered approximations and the probability of detection of SARS-CoV-2 infection is presented qualitatively. SARS-CoV-2 indicates severe acute respiratory syndrome coronavirus 2; PCR, polymerase chain reaction. ^aDetection only occurs if patients are followed up proactively from the time of exposure. ^bMore likely to register a negative than a positive result by PCR of a nasopharyngeal swab.

Interpreting Diagnostic Tests for SARS-CoV-2

- Serology may be important for 1) patients who may present late, beyond the first 2 weeks of illness onset, 2) to understand the extent of COVID-19 in the community and 3) to identify individuals who are immune and potentially “protected” from reinfection
- **The most sensitive and earliest serological marker (second week after symptom onset) is total antibodies (Ab)**
 - IgM and IgG can be positive as early as the 4th day after symptom onset but higher levels can be detected in most patients by the 4th week
- **Paired serum samples testing** with the initial PCR and the second 2 weeks later can increase diagnostic accuracy
- The majority of Ab are against Nucleo Capcid (NC) (the most abundant). **NC Ab would be the most sensitive**
- **Ab against the receptor-binding domain of S protein** would be **more specific** and are expected to be neutralizing.
- Many manufacturers of **PCT** do not reveal the nature of antigens used these **are purely qualitative in nature**
- The presence of **neutralizing Ab can only be confirmed** by a plaque reduction neutralization test
 - However, **high titers** of IgG Ab detected by ELISA have been shown to positively correlate with neutralizing Ab.
- The long-term persistence and duration of protection conferred by the neutralizing Ab remains unknown.

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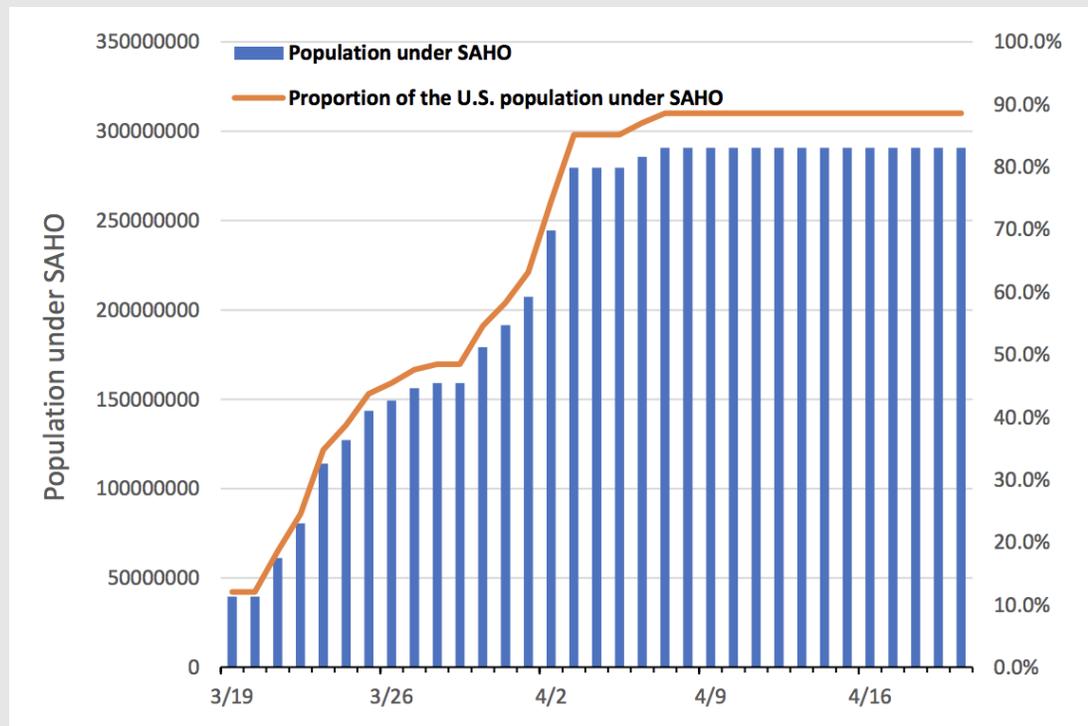


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Associations of stay-at-home order and face-masking recommendation with trends in daily new cases and deaths of laboratory-confirmed COVID-19 in the United States

- OBJECTIVE:
 - To examine the associations of **Stay at Home Orders** (SAHO) and **face-masking** recommendation with trends in **daily new cases and deaths** of COVID-19 in the United States
- PARTICIPANTS:
 - Residents in the U.S., who were affected by the SAHO and face-masking policies
- MAIN OUTCOME MEASURES:
 - **Turning-points of the daily new cases and deaths** of COVID-19, and COVID-19 **time-varying reproduction numbers (R_t)** in the U.S.

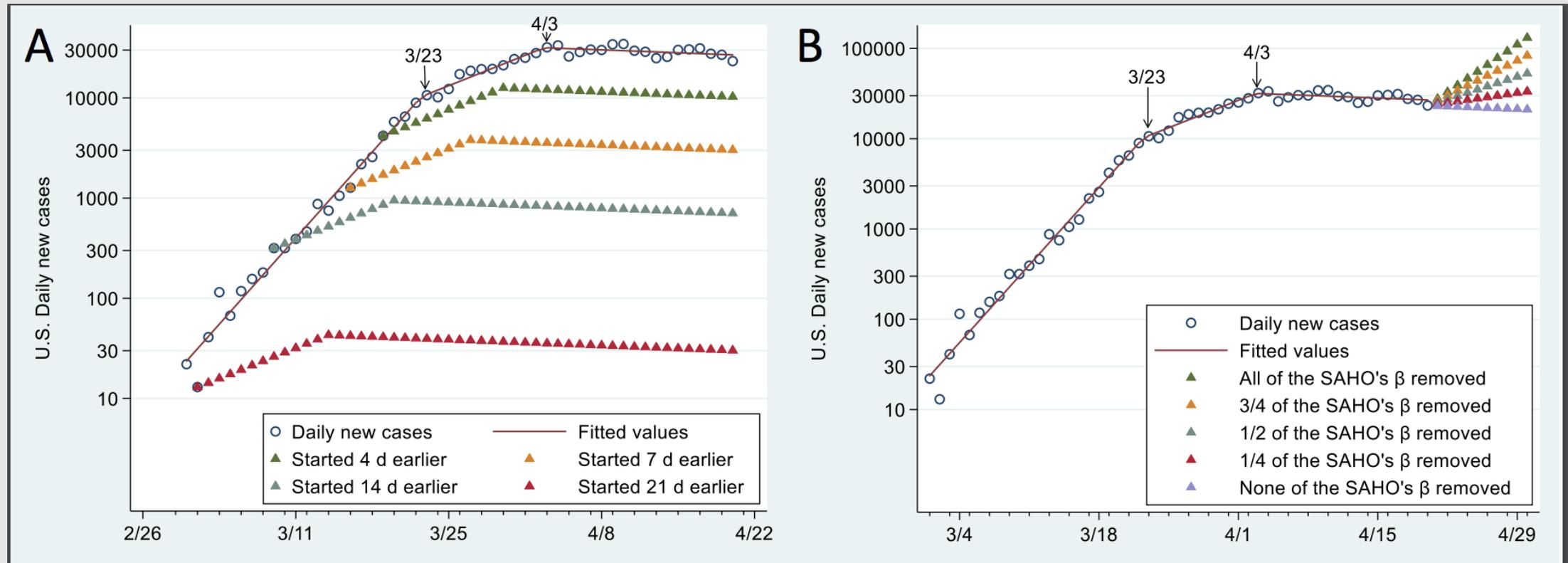
Associations of stay-at-home order and face-masking recommendation with trends in daily new cases and deaths of laboratory-confirmed COVID-19 in the United States



The population under a stay-at home (SAHO) order owing to the COVID-19 in the United States Since March 19, 2020 when the State of California started a SAHO, the number and proportion of the U.S. residents under SAHO have increased until April 7 and plateaued afterwards.

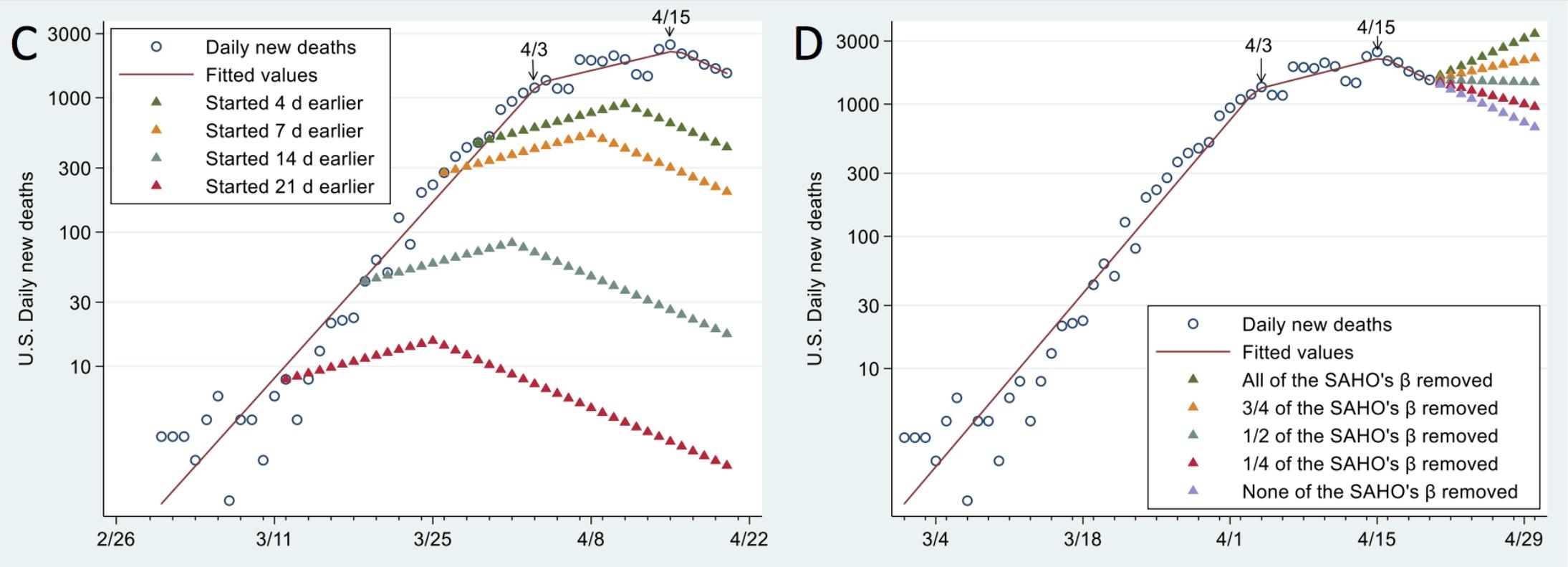
The number and the proportion of U.S. residents under SAHO increased between March 19 and April 7 and then plateaued

Associations of stay-at-home order and face-masking recommendation with trends in daily new cases and deaths of laboratory-confirmed COVID-19 in the United States



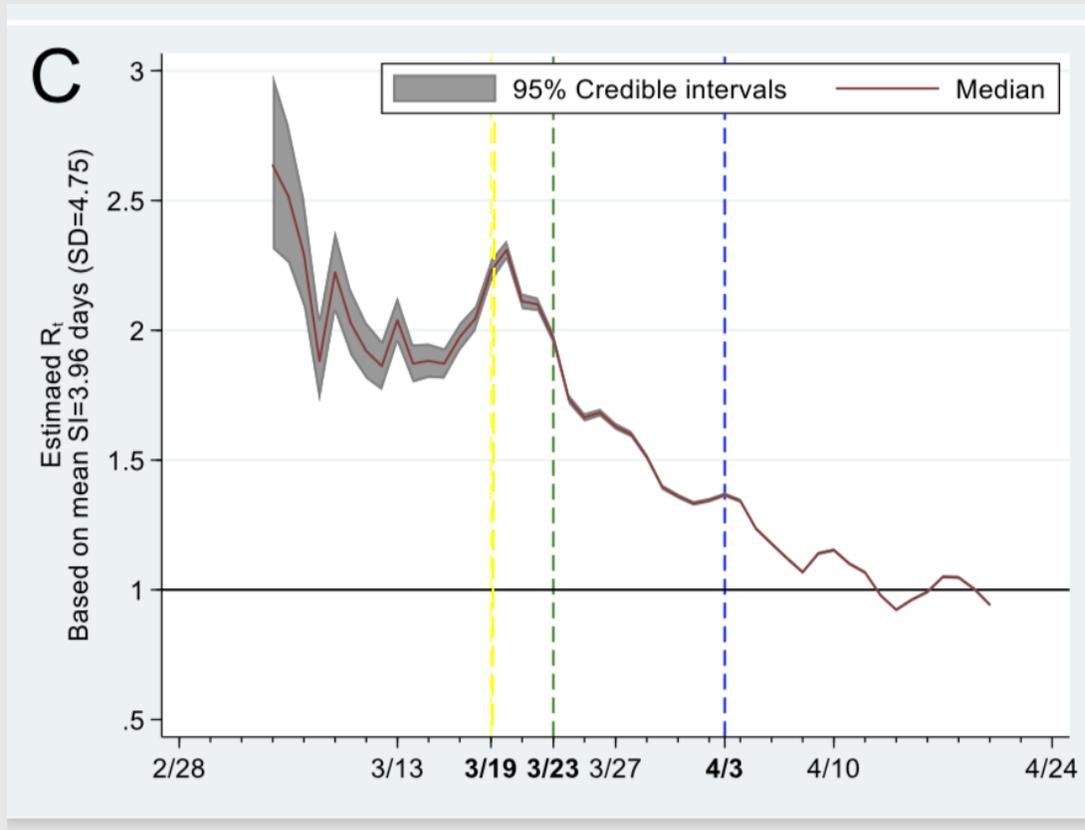
The trend in COVID-19 daily cases reduced after March 23 ($P < 0.001$) and further reduced on April 3 ($P < 0.001$), which was associated with implementation of SAHO by 10 states and the CDC recommendation of face-masking, respectively.

Associations of stay-at-home order and face-masking recommendation with trends in daily new cases and deaths of laboratory-confirmed COVID-19 in the United States



Observed and Simulated Trends in Daily New Cases and Deaths of Laboratory confirmed Coronavirus Disease 2019 (COVID-19) in the United States between March 1 and April 30, 2020. The Join point analyses with Poisson variance model show that the 2 turning points of March 23 and April 3 divided the trends in U.S. COVID-19 daily new cases into 3 segments, with the coefficients of 31.69 (95% CI, 26.82 to 36.75, $P < 0.001$), 9.75 (95% CI, 7.54 to 12.01, $P < 0.001$), -0.90 (95% CI, -1.62 to -0.17, $P = 0.02$), respectively. These turning points appeared to link to implementing a stay-at-home order (SAHO) by 10 states on March 23, and the CDC's face-masking recommendation on April 3. Similarly, the 2 turning points of April 3 and April 15 divided the trends in U.S. COVID-19 daily new deaths into 3 segments, with the coefficients of 25.06 (95% CI, 21.44 to 28.79, $P < 0.001$), 5.22 (95% CI, 3.36 to 7.11, $P < 0.001$), -7.90 (95% CI, -13.45 to -1.99, $P = 0.01$), respectively. The simulated results on early-announcements of SAHO and face masking recommendation and early-removals of SAHO are shown in A and C, and B and D, respectively. The partial removals of SAHO's coefficients (β) may reflex the situations when some of the U.S. states lift the SAHO.

Associations of stay-at-home order and face-masking recommendation with trends in daily new cases and deaths of laboratory-confirmed COVID-19 in the United States



Estimated Effective Reproduction Number (R_t) Based on Laboratory- Confirmed COVID-19 Cases in the United States and the Reported Serial Intervals.

- The effective reproduction number (R_t) was estimated using the previously-reported COVID-19 mean serial intervals (SI) of 7.5, 4.7 and 3.96 days, as well as the corresponding standard deviations (SD).
- The state-wide stay- at-home-order was first implemented by the state of California on March 19, 2020 (yellow dash line). Ten states had implemented a stay- at-home order by March 23, 2020 (green dash line), affecting 114,047,753 residents (37.45% of the U.S. population).
- The CDC recommended face- masking on April 3, 2020 (blue dash line). These dates were linked to the declines of R_t 's at the times of an increase or plateau of the R_t .

The estimates of R_t started to decline on March 19, when SAHO was first implemented and declined faster after March 23. After a short plateau, R_t continued to decline after April 3 and fell below/around 1.0 on April 13.

Associations of stay-at-home order and face-masking recommendation with trends in daily new cases and deaths of laboratory-confirmed COVID-19 in the United States

- There were 2 turning points of COVID-19 daily new cases or deaths in the U.S., which appeared to associate with implementation of SAHO and the CDC's face-masking recommendation.
- Simulation on early-implementation and removal of SAHO reveals considerable impact on COVID-19 daily new cases and deaths.
- These findings may inform decision-making of lifting SAHO and face

Impact of policy interventions and social distancing on SARS-CoV-2 transmission in the United States

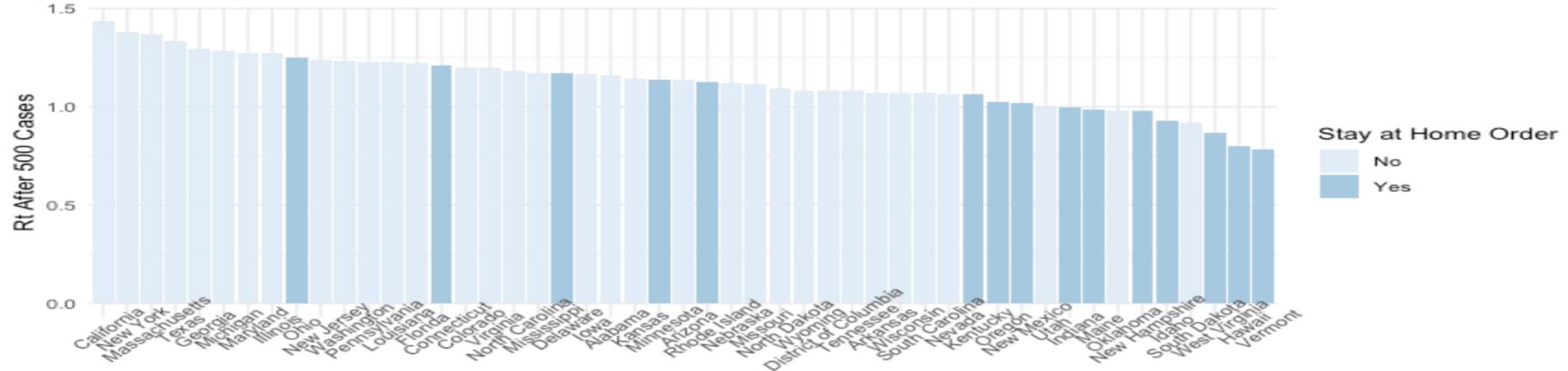
- AIMS: Measure the impact of **NPIs on the Rt** and other COVID-19 outcomes in U.S. states.
- Methods: Weeks immediately after each state reached 500 cases were measured
- Outcomes:
 - Average R_t in the week following 500 cases and doubling time from 500 to 1000 **cases**.
 - Adjusted for population density, GDP, and certain health metrics.
 - This analysis was repeated for deaths with doubling time from 50 to 100 **deaths**.
- Results:
 - **States that had SAHO** in place at the time of their 500th case are associated with **lower average R_t** the following week **compared to states without SAHO** ($p < 0.001$) and are significantly less likely to have an $R_t > 1$ (OR 0.07, 95% CI 0.01 to 0.37, $p = 0.004$).
 - These states also experienced a **significantly longer doubling time from 500 to 1000 cases** (HR 0.35, 95% CI 0.17 to 0.72, $p = 0.004$).
 - States in the highest quartile of average time spent at home were also slower to reach 1000 cases than those in the lowest quartile (HR 0.18, 95% CI 0.06 to 0.53, $p = 0.002$).

States with SAHO have a 93% decrease in the odds of having a positive R_t
States that plan to scale back such measures should carefully monitor transmission metrics.

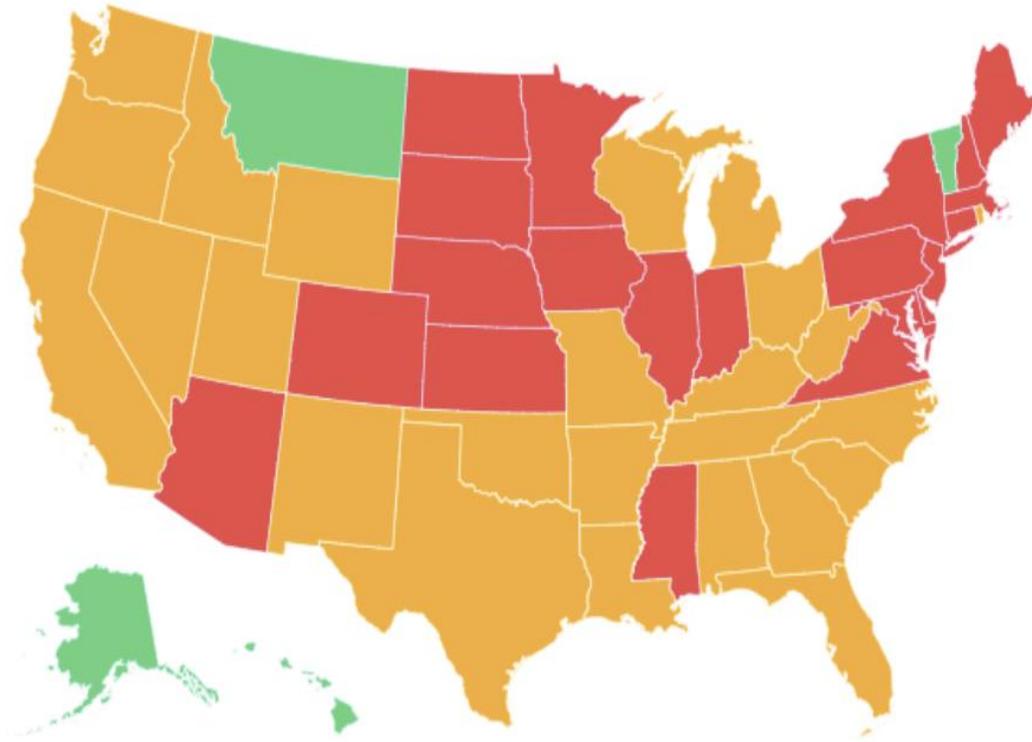
R_t : Effective Reproductive Number, NPI: Non Pharmaceutical Interventions, SAHO: Stay at Home Orders

Impact of policy interventions and social distancing on SARS-CoV-2 transmission in the United States

Figure 1: Average R_t during the week following the 500th case by each state.



In Kaplan Meier analyses, implementation of a stay-at-home order prior to the date of 500 cases was associated with a decreased probability of reaching 1000 cases within 5 days (log rank sum, $p = 0.02$). Similarly, in cox proportional hazards regression, stay-at-home orders correlated with an increase in time to reach 1000 cases (OR = 0.35, CI 0.17 to 0.92, $p = 0.004$, **Table 3, Figure 2**). States in the highest quartile of average percent time spent at home were also less likely to reach 1000 cases (log rank sum, $p < 0.001$, HR 0.18, 95% CI 0.06 to 0.53, $p = 0.002$). Other distancing measures did not affect the time from 500 to 1000 cases.



COVID Reopening Risk:

- Elevated
- Moderate
- Reduced

U.S. Vitals (covidly.com)

- **Cases: 1,386,632 (+13,442 / 24h)**
- **Deaths: 82,369 (+1,249 / 24h)**
- **Tests: 9,603,195**

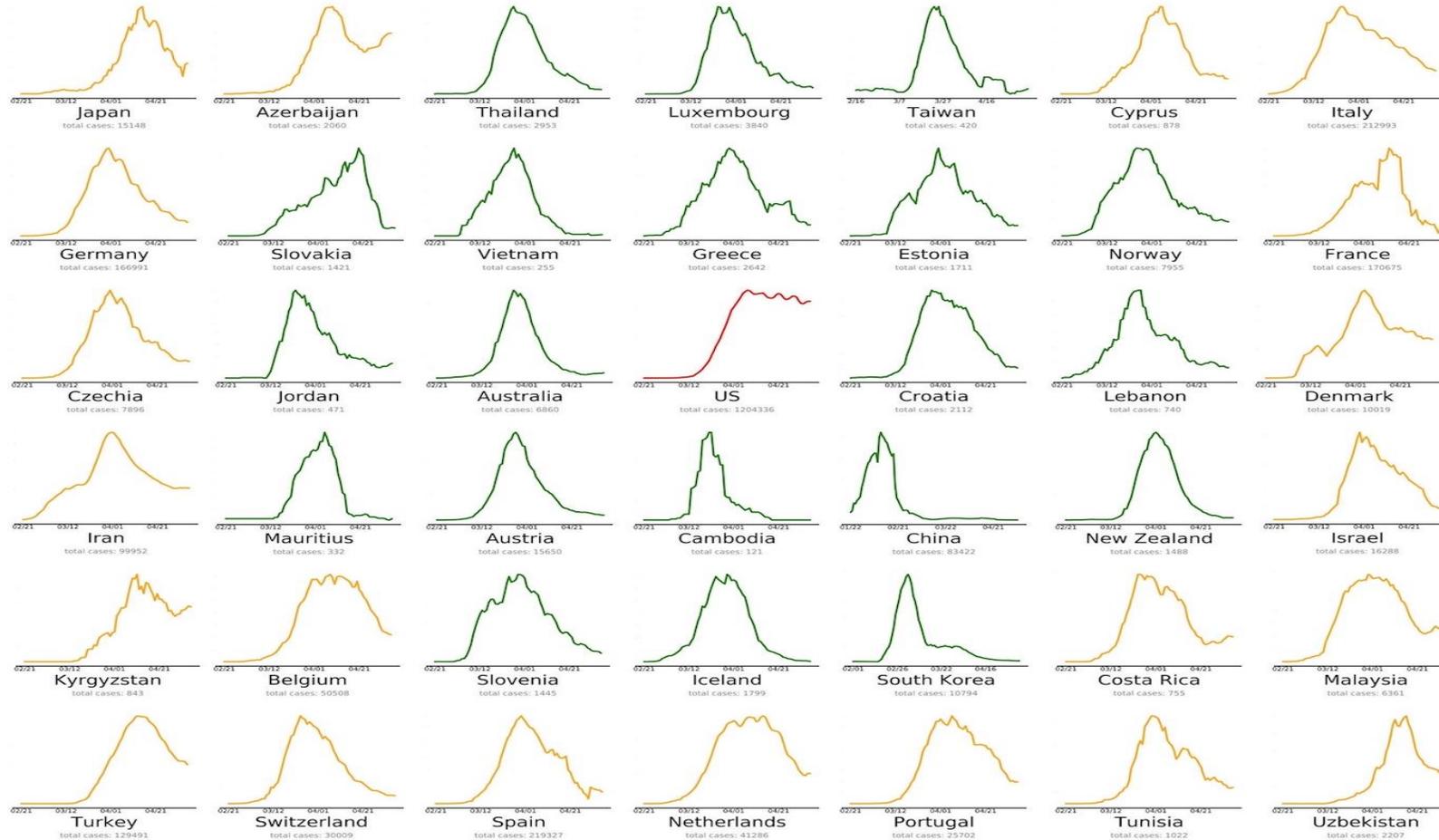
Covid ActNow

Containment is possible.

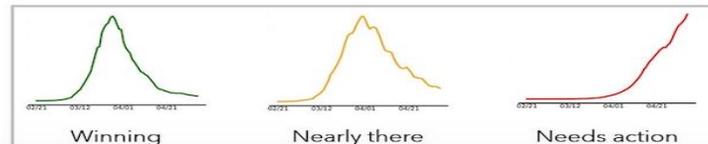
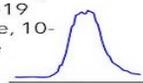
International efforts show that acting quickly, imposing travel restrictions, requiring face masks, improving testing, and isolating the sick away from home can bring new cases down near zero. There is no second wave if the virus is gone.



**END
CORONAVIRUS.org**



Normalized daily new COVID-19 cases vs time, 10-day average



Created by: Derrick VanGennep, Harvard University.
 Data last updated 5 May 2020. Data source: JHU, <https://github.com/CSSEGISandData/COVID-19>.
 Data source for Taiwan: <https://www.worldometers.info/coronavirus/>
 For more information about government measures taken to stop the spread of COVID-19, visit acaps.org.

**Pediatric
Multi-System
Inflammatory
Syndrome
Potentially
Associated with
COVID-19**

Fifteen cases compatible with multi-system inflammatory syndrome have been identified in children in New York City hospitals.

- Ages 2-15 years, hospitalized from April 17- May 1, 2020 with illnesses compatible with this syndrome (i.e., typical Kawasaki disease, incomplete Kawasaki disease, and/or shock)
- All patients had subjective or measured fever and more than half reported rash, abdominal pain, vomiting, or diarrhea
- Respiratory symptoms were reported in less than half of these patients. Polymerase chain reaction (PCR) testing for SARS-CoV-2 has been positive (4), negative (10), and initially indeterminate and then negative (1). Six patients with negative testing by PCR were positive by serology.
- More than half required blood pressure support and five required mechanical ventilation
- No fatalities have been reported

Early recognition and specialist referral are essential, including to critical care if warranted

Resources

- <https://www1.nyc.gov/assets/doh/downloads/pdf/han/alert/2020/covid-19-pediatric-multi-system-inflammatory-syndrome.pdf>
- https://www.idsociety.org/contentassets/9ba35522e0964d51a47ae3b22e59fb47/idsa-recommendations-for-reducing-covid-19-distancing_16apr2020_final-.pdf