COVID-19 Science Update

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Intended for use by public health professionals responding to the COVID-19 pandemic.

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Facemasks

PEER-REVIEWED

Community use of face masks and COVID-19: Evidence from a natural experiment of state mandates in the US. Lyu *et al.* Health Affairs (June 16, 2020).

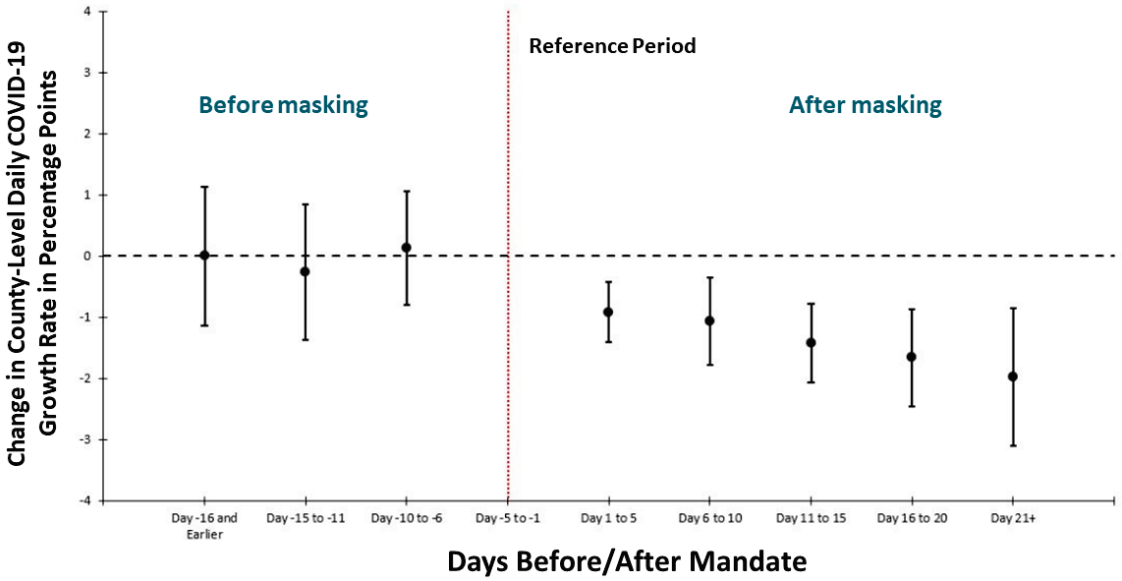
Key findings:

- Daily COVID-19 growth rates declined following mandated state-level public face coverings (Figure).
- Mandated public face coverings may have averted 230,000–450,000 COVID-19 cases.

Methods: Event study examining changes in the daily county-level COVID-19 growth rates in 15 states plus DC that issued facemask mandates, between March 31 and May 22, 2020. The effects are shown over five-day periods before and the reference period of five days before signing the mandate. *Limitations*: Did not measure facemask use in the community (compliance with mandate); county-level mandates not included.

Implications: Mandated public face covering may reduce COVID-19 spread and be a useful mitigation measure.

Figure:



Note: Adapted from Lyu *et al.* Mandating facemasks is associated with subsequent declines in daily county-level COVID-19 growth rates (•) and 95% CIs. Growth rates (as percentage points) = log of cumulative cases on given day – log of cumulative cases on prior day. Vertical **red** line indicates the reference period of 5 days before the signing of the mandate. The model controls for major COVID-19 mitigation policies as time-varying (closure of K-12 schools, county-level or statewide shelter-in-place orders, non-essential business closure, closure of restaurant for dining in, closure of gyms or movies theaters), COVID-19 tests per 100,000, county fixed effects and day fixed effects. Used by permission from publisher.

Visualizing the effectiveness of face masks in obstructing respiratory jets. Verma *et al.* Physics of Fluids (June 30, 2020).

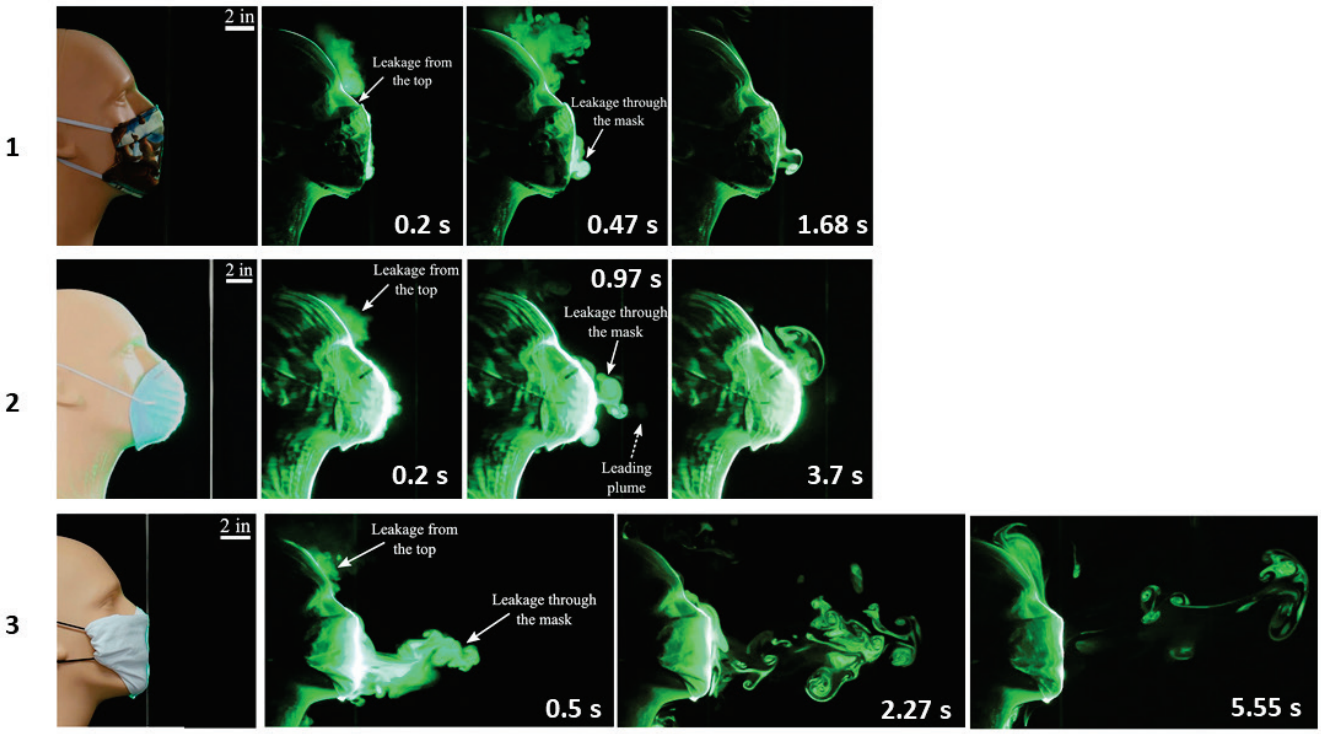
Key findings:

- Simulated heavy cough from a manikin produced particles that traveled on average ~8 feet (~96 inches)
- Homemade (2-layer) cotton masks, off-the-shelf CVS® cone masks and folded handkerchiefs limited droplet spread to 2.5 inches, 8 inches and 15 inches, respectively (Figures 1-3).
- A single layer bandana-style covering of elastic T-shirt material reduced droplet spread to 43 inches.

Methods: Assessment and visualizations of a manikin's artificial coughs and sneezes to examine how face coverings blocked particle-laden respiratory jets ("fog") in which particles were ~1 µm to 10 µm. *Limitations*: Small sample size; artificial environment; unclear number of experiments and result variability.

Implications: Two-layer cotton homemade face coverings effectively limited droplet spread; folded handkerchiefs and bandanas did not.

Figure:



Note: Adapted from Verma *et al.* Visualization of respiratory jets after artificial coughs using three different face coverings. **(1)** A homemade two-layer cotton quilting fabric facemask at 0.2 s, 0.47 s, and 1.68 s. **(2)** An off-the-shelf cone style mask at 0.2 s, 0.97 s, and 3.7 s. **(3)** A folded handkerchief face mask at 0.5 s, 2.27 s, and 5.55 s.

Children

PEER-REVIEWED

Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland (SEROCoV-POP): a population-based study. Stringhini *et al.* Lancet (June 30, 2020).

Key findings:

- Among 2,766 participants from 1,339 households in Geneva, weekly estimated SARS-CoV-2 seroprevalence increased from 4.8% (95% CI 2.4–8.0%) to 10.8% (8.2–13.9%) (Figure 1).
    - Seroprevalences estimated 11.6 infections for every 1 reported confirmed case.
- Individuals aged 5–9 years and ≥ 65 years had lower risks of being seropositive than those 10–64 years of age (Figure 2).

Methods: Five consecutive weekly serosurveys (IgG by ELISA) of participants of annual representative study and their households, Geneva, between April 6 and May 9, 2020. Prevalence rates adjusted for sampling, test performance. *Limitations*: Relatively low response rate (30–40%); possible that those with COVID-19 were more likely to participate.

Implications: Young children appear to have been less often infected than adults in Geneva during the SARS-CoV-2 outbreak.

Figure 1

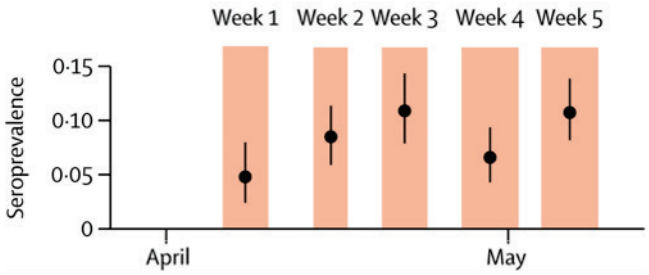
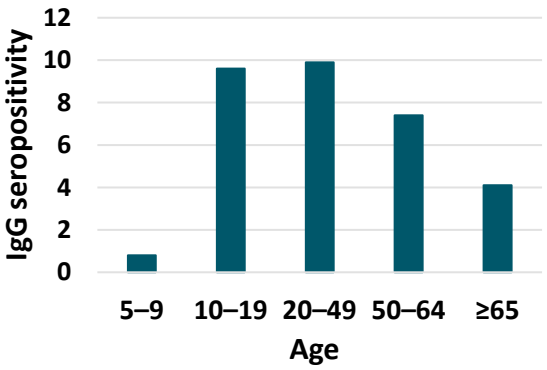


Figure 2



Note: Adapted from Stringhini *et al.* **Figure 1.** IgG seroprevalence estimates (black dots) and 95% CIs (black lines) for each week of the survey. **Orange** shading indicates each survey week. **Figure 2.** IgG seroprevalence by age group. This article was published in Lancet, Vol 396, Stringhini *et al.*, Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland (SEROCoV-POP): a population-based study, Page 313-319, Copyright Elsevier 2020. This article is currently available at the Elsevier COVID-19 resource center: https://www.elsevier.com/connect/coronavirus-information-center.

COVID-19 in children and adolescents in Europe: a multinational, multicentre cohort study. Götzinger. *et al*. Lancet Child & Adolescent Health (June 25, 2020).

Key findings:

- Of 582 children and adolescents with SARS-CoV-2 infections, 490 (84%) were symptomatic.
    - 379 (65%) had fever, 313 (54%) had mild URI symptoms.
- 363 (62%) were hospitalized; 48 (8%) required intensive care; 4 died.
    - ICU admission was more common among children age < 1 month (aOR 5.1, 95% CI 1.7–14.9) and with pre-existing conditions (aOR 3.3, 95% 1.7–6.4).

- 5 (1%) were co-infected with influenza (outcome data on these children not reported).

Methods: Description of children and adolescents with SARS-CoV-2 infection, 77 institutions in 21 European countries, between April 1 and 24, 2020. *Limitations*: SARS-CoV-2 testing criteria differed by country; symptomatic disease might be overestimated as study captured data from children and adolescents who were seen or managed in a hospital setting.

Implications: SARS-CoV-2 infection was relatively mild in these European children and adolescents. Severe disease was associated with very young age (<1 month of age) and pre-existing medical conditions.

Epidemiology

PEER-REVIEWED

Risk for severe COVID-19 illness among health care workers who work directly with patients. Gibson *et al.* Journal of General Internal Medicine (June 24, 2020).

Key findings:

- Among a sample of US healthcare workers (HCWs), 38.6% were deemed at high risk for poor outcomes if infected with SARS-CoV-2 (age ≥65 years or medical comorbidities).
    - 54.0% worked in hospitals or nursing homes.
- 42.6% of health aides/medical assistants (HA/MAs) were deemed at high risk.
    - Many HA/MAs were also financially vulnerable: 36.9% had an income <200% of federal poverty line; 26.6% were worried about food running out.

Methods: Analysis of 1,184 HCWs from nationally representative survey of 52,159 adults, National Health Interview Survey, 2017–2018. *Limitations*: Assumes 2017–2018 data still applicable.

Implications: A large proportion of HCWs are vulnerable to severe illness from SARS-CoV-2 infection, including many working in high-exposure risk settings. Healthcare institutions should consider HCWs with at-risk chronic conditions when developing health protection approaches and assigning duties.

Disparities in COVID-19 testing and positivity in New York City. Lieberman-Cribbin *et al.* American Journal of Preventive Medicine (June 25, 2020).

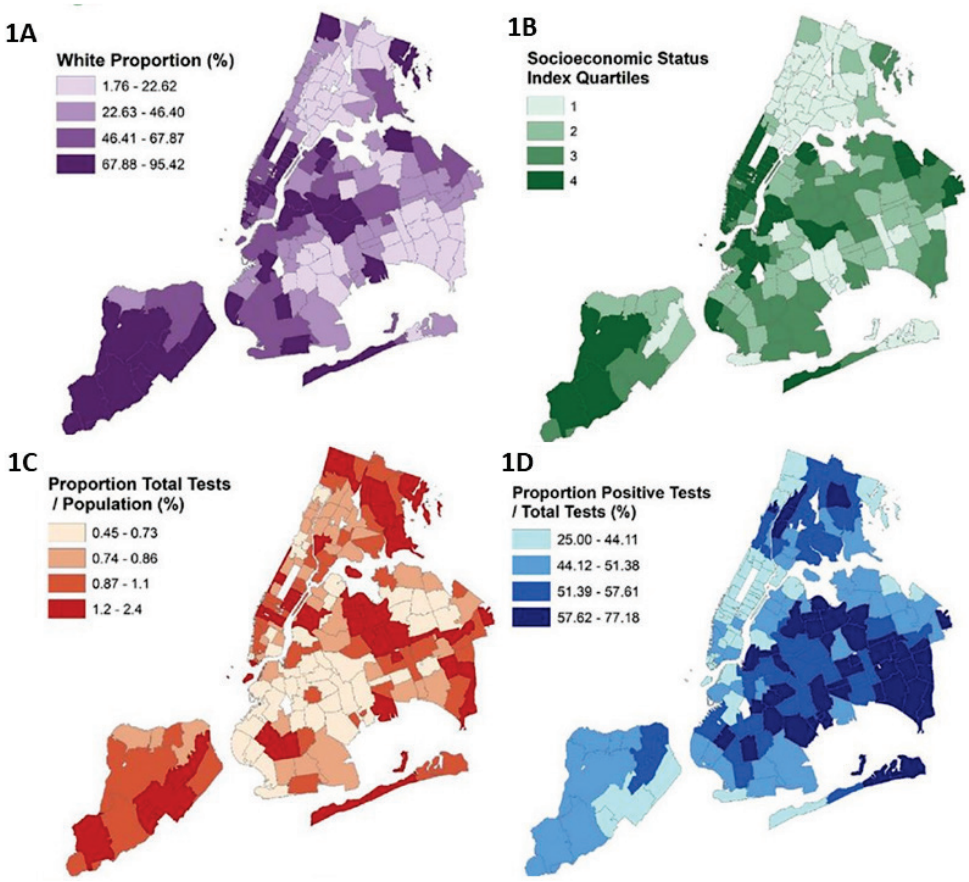
Key findings:

- In areas of New York City with higher proportions of non-white residents (1A) and with lower socioeconomic status (SES) (1B)
    - Rates of testing were lower (Figure 1C), but
    - Test positivity was higher (Figure 1D).

Methods: Ecological spatial analysis of testing volume and 2018 sociodemographic data, NYC, March 2–April 6, 2020. Associations adjusted for zip code, racial/ethnic composition, and SES. *Limitations*: Non-citizens likely under-represented in census data; individual-level factors not examined.

Implications: SARS-CoV-2 testing access has not been evenly distributed in NYC. Limited testing access in some communities may compound racial/ethnic disparities.

Figure:



Note: Adapted from Lieberman-Cribbin *et al*. Spatial distribution of testing and sociodemographic data mapped according to zip code area, NYC. Maps display the (A) proportion of **white race**, (B) **socioeconomic status (SES) index**, (C) proportion of **total tests to population** (%) and (D) **positive tests to total tests** (%). Proportion of total tests to population (%) is displayed in hundreds of residents. Darker shading indicates a greater percentage or a higher quartile (for SES index). This article was published in American Journal of Preventive Medicine, Vol 59, Lieberman-Cribbin *et al*., Disparities in COVID-19 testing and positivity in New York City, Page 326-332, Copyright American Journal of Preventive Medicine 2020. This article is currently available at the Elsevier COVID-19 resource center: https://www.elsevier.com/connect/coronavirus-information-center.

COVID-19 outcomes among people with intellectual and developmental disability living in residential group homes in New York State. Landes *et al.* Disability and Health Journal (June 30, 2020).

Key findings:

- Rates of COVID-19 infection and mortality were more than 4 times higher among people with intellectual and developmental disabilities (IDD) living in group homes than in the New York State general population.
    - Cases - 7,841 vs 1,901 cases per 100,000 population.
    - Deaths - 1,175 vs 151 cases per 100,000 population.
- Rates of COVID-19 infection among IDD were highest in NYC and Mid-Hudson area of New York: 12,760 and 12,898 per 100,000, respectively.

Methods: Analysis of COVID-19 case rates and mortality among people with IDD living in NY residential group homes and among New York State general population through May 28, 2020. *Limitations*: Asymptomatic cases likely not well captured; ~half of group homes reported.

Implications: People with IDD living in congregate settings are at high risk of COVID-19 and poor outcomes.

Effect of environmental conditions on SARS-CoV-2 stability in human nasal mucus and sputum.
Matson *et al.* Emerging Infectious Diseases (June 8, 2020).

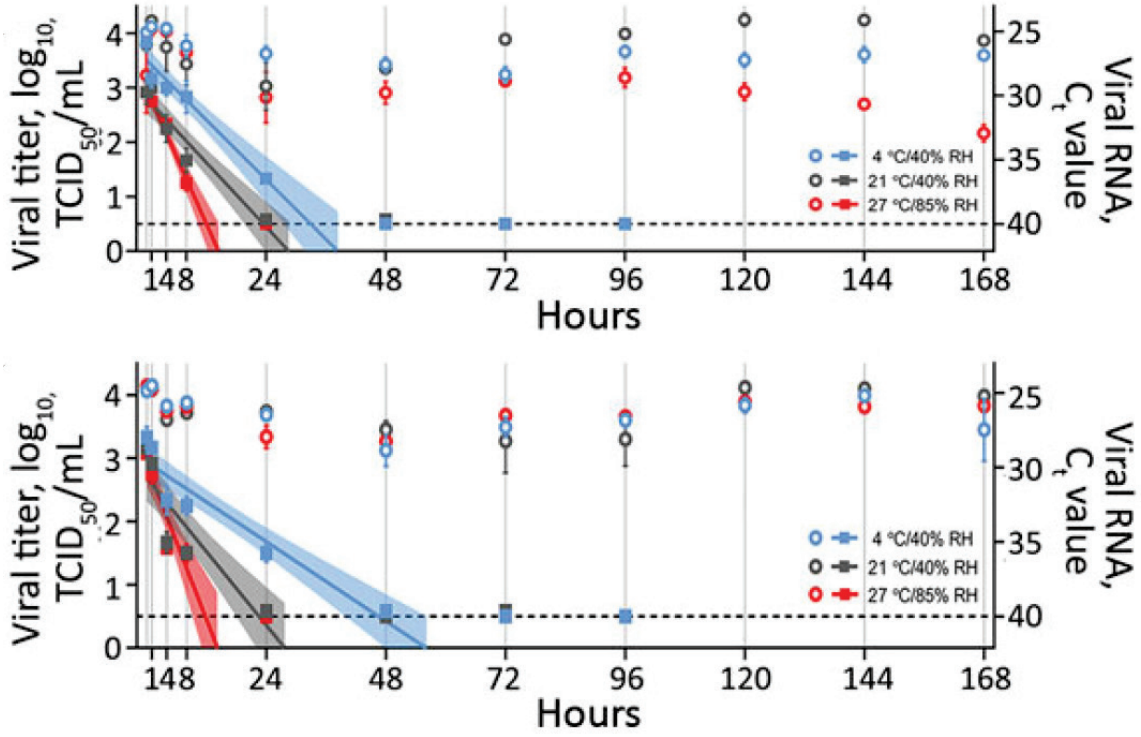
Key findings:

- Half-life ($t_{1/2}$) of SARS-CoV-2 RNA in upper respiratory secretions varied with temperature and humidity (Figure):
  - In nasal mucus on a surface, $t_{1/2}$ was 3.3 hours at 4°C/40% relative humidity (RH) vs. 1.5 hours at 27°C/85% RH.
  - In sputum on a surface, $t_{1/2}$ was 5.8 hours at 4°C/40% RH vs. 1.5 hours at 27°C/85% RH.

Methods: $t_{1/2}$ of SARS-CoV-2 RNA human nasal mucus and sputum was measured in liquid and after application on surface under three environmental conditions: 4°C/40% RH; 21°C/40% RH; and 27°C/85% RH. *Limitations*: Conducted under artificial laboratory conditions; detection of presence of SAR-CoV-2 RNA does not imply infectivity.

Implications: SARS-CoV-2 RNA decays faster on surfaces at warm temperatures with higher relative humidity. Culture studies might help discern the presence of infectious virus.

Figure:



Note: Adapted from Matson *et al*. $t_{1/2}$of SARS-CoV-RNA in spiked nasal secretions (top) and sputum (bottom) dispersed on a polypropylene disk at different temperatures and humidities (**4°C/40% RH**; **21°C/40% RH**; and **27°C/85% RH**). The squares correspond to viral titer on the left y-axis, and the circles correspond to viral RNA (Ct value) on the right y-axis. Samples were collected at 0, 1, 4, 8, and 24 hours, then daily for 7 days. Viral titers were fitted with linear regression models, including 95% CIs (shaded area around lines of best fit). For both viral titers and Ct values, plots show means of 3 replicates with standard errors. Ct, cycle threshold; RH, relative humidity; TCID50/mL, 50% tissue culture infective dose/mL. Open access journal; all content freely available.

PREPRINTS (NOT PEER-REVIEWED)

Seroconversion of a city: Longitudinal monitoring of SARS-CoV-2 seroprevalence in New York City. Stadlbauer *et al.* medRxiv (June 29, 2020).

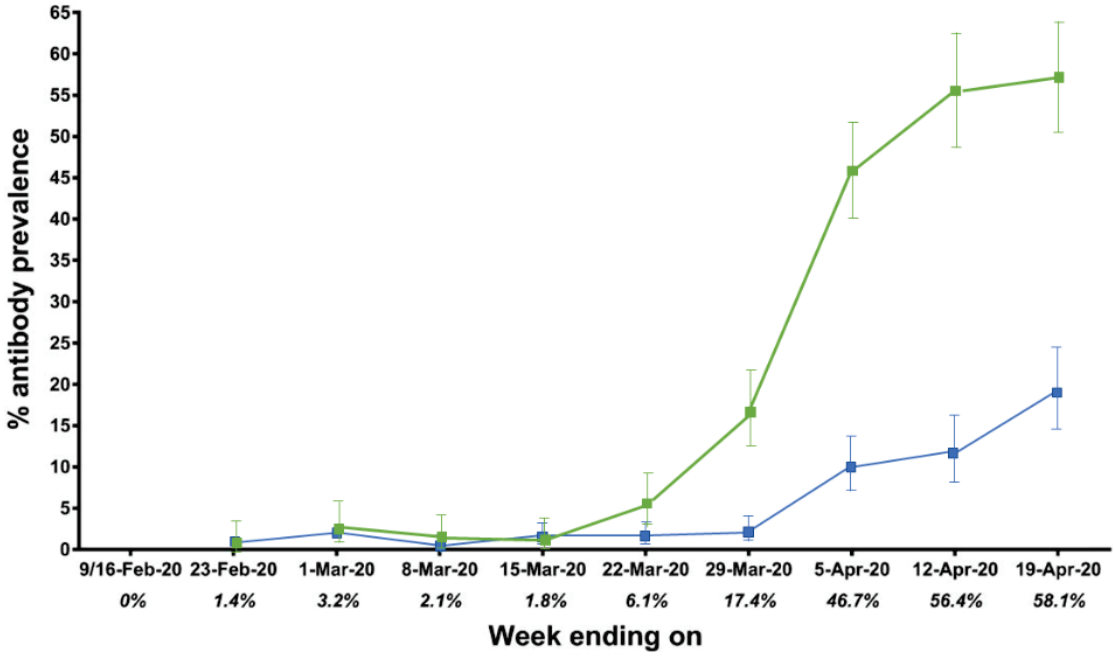
Key findings:

- Seroprevalence among emergency department (ED) and hospitalized patients reached 58% by April 19 (Figure).
- Seroprevalence among patients from other clinical settings reached 19.3% by April 19, 2020 (Figure).
- Earliest seropositive samples were collected February 23, 2020.

Methods: Weekly SARS-CoV-2 seroprevalence in samples from 2,073 ED and hospitalized patients and 3,412 patients from other clinical settings, collected between February 9 and April 19, 2020, Mount Sinai Hospital, NYC. *Limitations*: Single center.

Implications: Seropositive samples pre-dated first COVID-19 detection in NYC (Feb 29, 2020). Seropositivity increased and is relatively high among Mount Sinai Hospital patients.

Figure:



Note: Adapted from Stadlbauer *et al*. The seroprevalence per week in **ED and hospitalized patients** increased to 58.1% by April 19, 2020. The seroprevalence per week of **patients from other clinical settings** at Mount Sinai Hospital increased to 19.3% by April 19, 2020. Used by permission from author.

In Brief

- Moynan *et al*. **The role of healthcare staff COVID-19 screening in infection prevention & control**. Journal of Infection. Describes a remarkably high seropositivity among healthcare workers in an Irish hospital with nosocomial COVID-19 cases.
- Solinas *et al*. **A critical evaluation of glucocorticoids in the treatment of severe COVID-19**. Cytokine & Growth Factor Reviews. In-depth review of the role of glucocorticoids and dexamethasone in COVID-19 management and lists ongoing clinical trials.
- Herman *et al*. **Evaluation of chilblains as a manifestation of the COVID-19 pandemic**. JAMA Dermatology. Refuting recent speculation of SARS-CoV-2 causing chilblains, 31 patients with chilblains did not have SARS-CoV-2 infection. Authors speculate that lifestyle changes from staying at home may instead have caused chilblains.
- Feldstein *et al.* **Multisystem inflammatory syndrome in U.S. children and adolescents**. NEJM. Describes 186 children with MIS-C in the US, many of whom had severe multiorgan system involvement.
- Dufort *et al.* **Multisystem inflammatory syndrome in children in New York State**. NEJM. 99 cases of MIS-C in New York with description of variations in presenting symptoms and manifestations according to age.

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