

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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Epidemiology

PEER-REVIEWED

[Clinical characteristics and results of semen tests among men with coronavirus disease 2019](#). Li *et al.* JAMA Network Open (May 7, 2020; [Correction](#) on June 1, 2020).

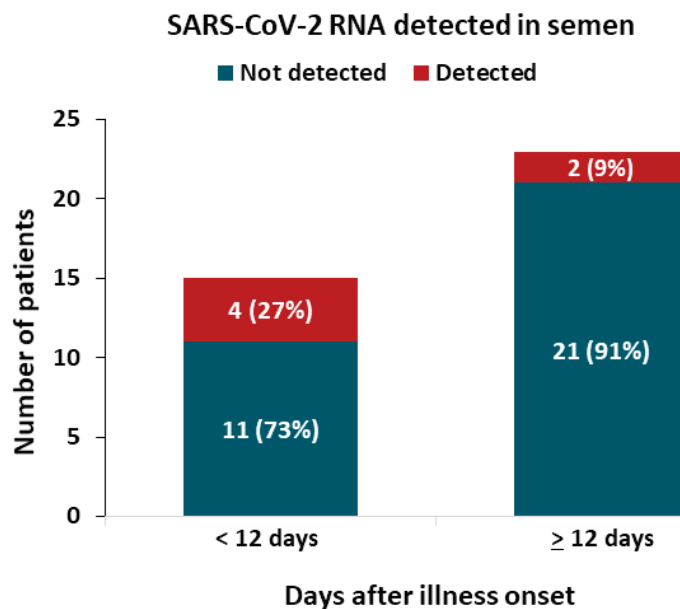
Key findings:

- Semen samples from 6 of 38 patients (15.8%) were positive for SARS-CoV-2 RNA.
 - 4 of 15 (27%) were collected <12 days after onset (Figure).
 - 2 of 23 (9%) were collected ≥12 days after onset.

Methods: 38 males age >15 years hospitalized with COVID-19 at a single hospital, Shangqiu, China. SARS-CoV-2 RNA RT-PCR testing of semen samples. **Limitations:** Small sample size; no repeat testing to determine duration of viral RNA in semen; unknown if viral RNA detected in semen reflects presence of live virus.

Implications: This is the first report of SARS CoV-2 RNA detection in semen, but this report does not establish that the virus can be sexually transmitted. Additional research is needed to assess whether infectious SARS-CoV-2 can occur in semen.

Figure:



Note: Adapted from Li *et al.* SARS CoV-2 RNA **detected** or **not detected** by PCR in semen obtained from patients < 12 days or ≥ 12 days after illness onset. Licensed under CC-BY.

[SARS-CoV-2 rates in BCG-vaccinated and unvaccinated young adults](#). Hamiel *et al.* JAMA (May 13, 2020).

Key findings:

- Rates of COVID-19 did not differ between cohorts of persons routinely vaccinated with BCG and those not vaccinated with BCG.

Methods: Cohort study comparing SARS-CoV-2 RNA RT-PCR-positive test results among individuals born during the 3-year time periods before and after cessation of Israel's universal newborn BCG immunization program in 1982 (1979-1981 [N = 3,064] and 1983-1985 [N = 2,869], respectively). PCR results obtained for people with COVID-19 symptoms were tested during March 1 and April 5, 2020. The proportions and rates per 100,000 people of positive test results in the 2 groups (cohorts routinely vaccinated with BCG vs. not vaccinated with BCG) were compared using chi square tests. **Limitations:** Ecological study; individual BCG vaccination status was not assessed; only symptomatic individuals were tested for COVID-19.

Implications: In this study, BCG vaccination did not appear to provide protection against SARS-CoV-2 infection.

Pediatric Comorbidities

COVID-19 in children is milder than in adults, and severe illness is rare in infants and children. However, children can become critically ill with COVID-19. Some features of illness in children mirror those seen in adults, but there is emerging data that there are also features that are unique to infants and children.

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A. [Characteristics and outcomes of children with coronavirus disease 2019 \(COVID-19\) infection admitted to US and Canadian pediatric intensive care units](#). Shekerdemian *et al.* JAMA Pediatrics (May 11, 2020).

Key findings:

- Among 48 children with COVID-19 admitted to ICUs, 35 (73%) presented with respiratory symptoms, 33 (69%) had severe or critical illness, 18 (38%) required mechanical ventilation, 11 (23%) had failure of two or more organ systems, and 2 (4%) died.
- 40 (83%) had pre-existing comorbidities; 19 (40%) had developmental or genetic disorders with long-term dependence on technological support (including tracheostomy). Other comorbidities included cancer, diabetes, obesity, and seizures.

Methods: Retrospective review of 48 patients (25 male and 23 female) aged ≤ 16 with confirmed COVID-19 in pediatric ICUs in 14 US hospitals, between March 14 and April 3, 2020. **Limitations:** 15 (31%) patients remained hospitalized at the time of the report; small sample size.

B. [COVID-19 in children with cancer in New York City](#). Boulad *et al.* JAMA Oncology (May 13, 2020).

Key findings:

- Among 20 children who tested positive for SARS-CoV-2 infection at a pediatric cancer hospital, only one required hospital admission for COVID-19 but did not need ICU-level care.

Methods: Retrospective review of 20 patients (17 male and 3 female) positive for SARS-CoV-2 at a New York City hospital specializing in cancer care, between March 10 and April 12, 2020. **Limitations:** Characteristics of COVID-19 patients other than sex were not specified; unclear if all had cancer; small sample size.

Implications of both studies (Shekerdemian *et al.* & Boulad *et al.*): Most children with symptomatic COVID-19 have pre-existing comorbidities. However, severe COVID-19 among pediatric cancer patients may be low.

Collateral Effects of COVID-19

The public health and clinical resources required to respond to the COVID-19 pandemic are considerable. Diversion of these resources to address this unprecedented event as well, as recommendations for social distancing and public concern about exposure to SARS-CoV-2 in health care settings, have likely contributed to lapsed or delayed care of non-COVID-19-related medical issues.

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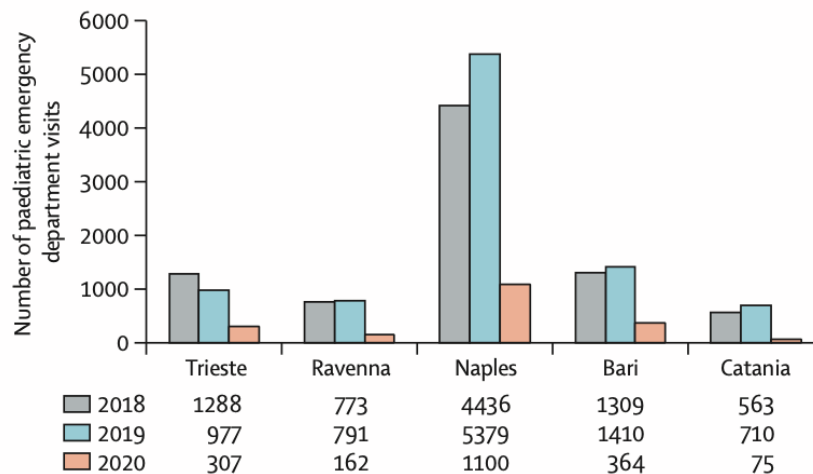
A. [Delayed access or provision of care in Italy resulting from fear of COVID-19](#). Lazzerini *et al.* *Lancet Child & Adolescent Health* (April 9, 2020).

Key findings:

- Visits to 5 pediatric emergency departments decreased 77% during March 2020 compared with the same period in 2018 and 2019 (Figure).
- 12 children with delayed care had serious conditions at the time of hospitalization, including diabetic ketoacidosis, acute leukemia, prolonged seizures, sepsis, hypovolemic shock, hypoglycemia, abdominal tumor, and complications of cerebral palsy.
 - 6 were admitted to ICUs and 4 died.
- Among those with serious conditions, parents reported delays in seeking care because of fear of COVID-19. In 5 (42%) cases, a health provider was contacted, but unavailable or hospital access was discouraged.

Methods: Retrospective analysis of hospital data on visits to 5 pediatric emergency departments in Italy between March 1 and 27, 2020 compared with visits during the same period in 2018 and 2019. Cases of delayed care were reviewed. **Limitations:** Delayed care not assessed systematically; school and sports cancellation may have contributed to fewer infections and injuries requiring care.

Figure:



Note: Adapted from Lazzerini *et al.* Visits to pediatric emergency departments in 5 Italian cities during March 1–27, 2020 compared with the same period in 2018 and 2019. This article was published in *Lancet Child & Adolescent Health*, Vol 4, Lazzerini *et al.*, Delayed access or provision of care in Italy resulting from fear of COVID-19, Page E10-E11, Copyright Elsevier 2020. This article is currently available at the Elsevier COVID-19 resource center: <https://www.elsevier.com/connect/coronavirus-information-center>.

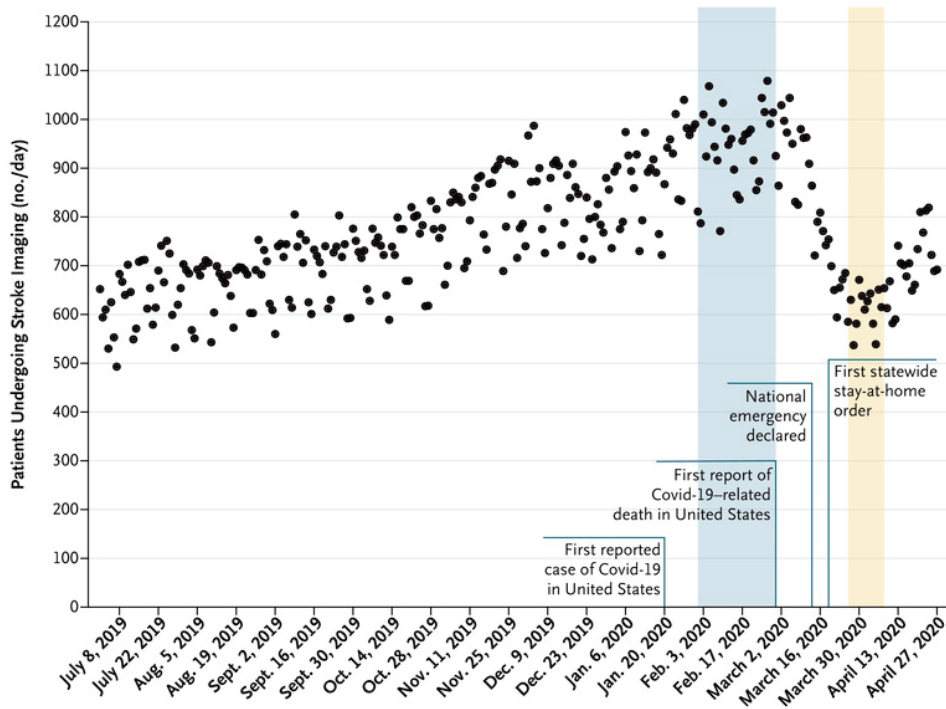
B. [Collateral effect of COVID-19 on stroke evaluation in the United States.](#) Kansagra *et al.* NEJM (May 8, 2020).

Key findings:

- The number of patients evaluated for suspected acute stroke in assessed US hospitals decreased by 39% early in the COVID-19 pandemic (Figure).
- Decreases were seen across all age, sex, and stroke severity subgroups.

Methods: Retrospective analysis of a commercial database of 231,753 patients who underwent neuroimaging for acute ischemic stroke at 856 US hospitals between July 2019 and April 27, 2020. Daily patient counts during a 29-day pre-pandemic period (February 1-29, 2020) were compared with those in a 14-day period during the early outbreak (March 26- April 8, 2020). **Limitations:** Neuroimaging was a surrogate for care provided; findings may not be generalizable.

Figure:



Note: Adapted from Kansagra *et al.* Daily counts of patients who underwent neuroimaging for stroke in the United States, during the **pre-pandemic era (February 1–29, 2020)** and **early-pandemic era (March 26 – April 8, 2020)**. From NEJM. 383:400-401. DOI: 10.1056/NEJMc2014816 Copyright ©2020 Massachusetts Medical Society. Reprinted with permission from Massachusetts Medical Society.

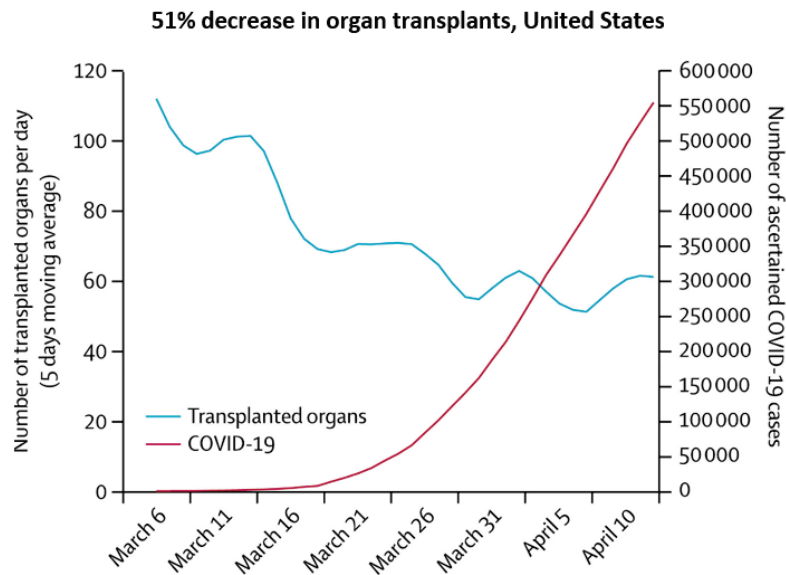
C. [Organ procurement and transplantation during the COVID-19 pandemic.](#) Loupy *et al.* Lancet (May 11, 2020).

Key findings:

- Cadaver organ transplants decreased 91% in France and 51% in the US (Figure) during the COVID-19 pandemic.
 - Reduction driven by decreases in kidney transplants.

Methods: Retrospective study of daily transplantation counts by organ type collected from French and American national registries, between early March and mid-April 2020. **Limitations:** Unclear what dates were compared to calculate the percentage decrease; no transplant counts pre-COVID for comparison.

Figure:



Note: Adapted from Loupy *et al.* Number of **organ transplants from deceased donors per day** and **cumulative COVID-19 cases** in the United States, early March – mid-April 2020. This article was published in *Lancet*, Vol 395, Loupy *et al.*, Organ procurement and transplantation during the COVID-19 pandemic, Page E95-E96, Copyright Elsevier 2020. This article is currently available at the Elsevier COVID-19 resource center: <https://www.elsevier.com/connect/coronavirus-information-center>.

Implications of 3 studies (Lazzerini *et al.*, Kansagra *et al.*, & Loupy *et al.*): The COVID-19 pandemic has adversely impacted the timely receipt of urgently needed, non-COVID-19-related medical care, including stroke management, organ transplantation, and pediatric emergency care.

Laboratory Science

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Prolonged persistence of SARS-CoV-2 RNA in body fluids. Sun *et al.* *Emerging Infectious Diseases* (May 8, 2020).

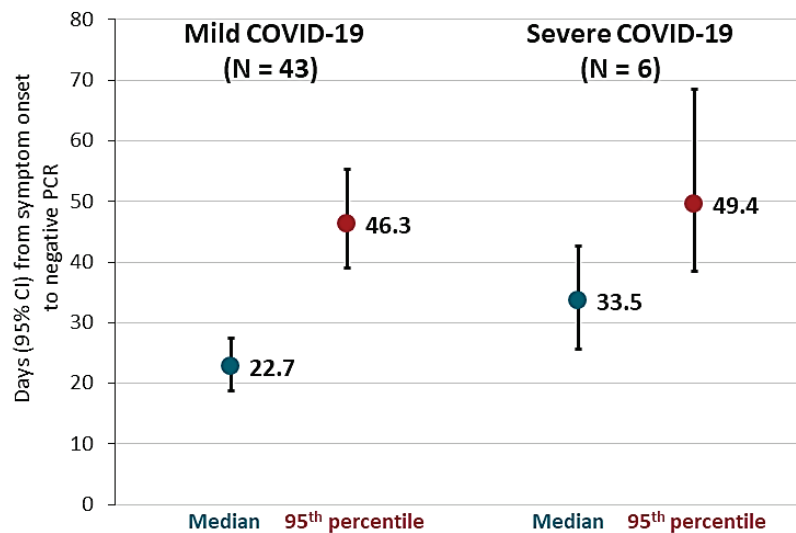
Key findings:

- Average time from onset of COVID-19 symptoms to negative nasopharyngeal PCR was > 3 weeks, and longer in severe than mild cases (Figure).
 - Severe cases: median, 33.5 days; 95th percentile, 49.4 days.
 - Mild cases: median, 22.7 days; 95th percentile, 46.3 days.

Methods: SARS-CoV-2 RT-PCR testing of throat, nasopharynx, sputum, and feces of 49 hospitalized COVID-19 patients (43 mild and 6 severe cases). Estimated time from symptom onset to first negative result after the final positive result (median and 95th percentile) using parametric Weibull regression. **Limitations:** Small sample size; 67% of specimens not collected systematically; no viral culture results.

Implications: Viral shedding can be prolonged in hospitalized COVID-19 patients. Additional studies are needed to determine infectivity of viral particles after clinical recovery.

Figure:



Note: Adapted from Sun *et al.* Days (95% CIs) from onset of COVID 19 symptoms to negative nasopharyngeal RT-PCR (**median** and **95th percentile**) among mild (N = 43) and severe (N = 6) cases. Open access journal; all content freely available.

In Brief

Vaccine Development

- Shah *et al.* [Ethics of controlled human infection to study COVID-19](#). *Science*. Controlled human infection (CHI) studies, where a small number of participants are deliberately exposed, have been proposed to accelerate SARS-CoV-2 vaccine development. An ethical framework for research sponsors, communities, participants, and reviewers is proposed.
- Graham B. [Rapid COVID-19 vaccine development](#). *Science*. The CoV spike protein on the virus surface is a target for a COVID-19 vaccine. Safety pitfalls must be avoided to achieve the fastest path to an effective, safe vaccine.

COVID-19 and Violence

- Sutherland *et al.* [Gun violence during COVID-19 pandemic: Paradoxical trends in New York City, Chicago, Los Angeles and Baltimore](#). *American Journal of Emergency Medicine*. Gun violence in New York, Chicago, and Baltimore has increased in 2020 compared to 2018 and 2019.
- Chandan *et al.* [COVID-19: A public health approach to manage domestic violence is needed](#). *Lancet Public Health*. Possible increase in domestic violence and child abuse during the pandemic.

Other Topics

- Gibbons A. [Ape researchers mobilize to save primates from coronavirus](#). *Science*. The ape form of the ACE2 receptor is identical to the human form, so it's likely apes can be infected. Plans to protect apes from SARS-CoV-2 infection are discussed.

- Cousins S. [New Zealand eliminates COVID-19](#). Lancet. New Zealand recorded its first day of no new cases of COVID-19. This progress has been attributed to its early strict national lockdown.
- Willyard, C. [Coronavirus blood-clot mystery intensifies](#). Nature. Potential reasons for increased clotting seen with COVID-19 and therapeutic options.

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