

TGIF edition!

Today I selected several of recent CDC publications. The first looks at deaths in persons <21. Hispanic/African American were disproportionately represented, and obesity was an important risk factor. The next review is an update on the CDC Indicators for opening schools. I found this update to be very useful, but late in coming. The next 2 articles look at maternal and birth outcomes in hospitalized pregnant women. Premature births and stillbirths appear higher in pregnant women infected with SARS-CoV-2. The last article is a comprehensive review based on current science on transmission of SARS-CoV-2. Very complete and well referenced.

Have a terrific weekend

Ed

SARS-CoV-2–Associated Deaths Among Persons Aged <21

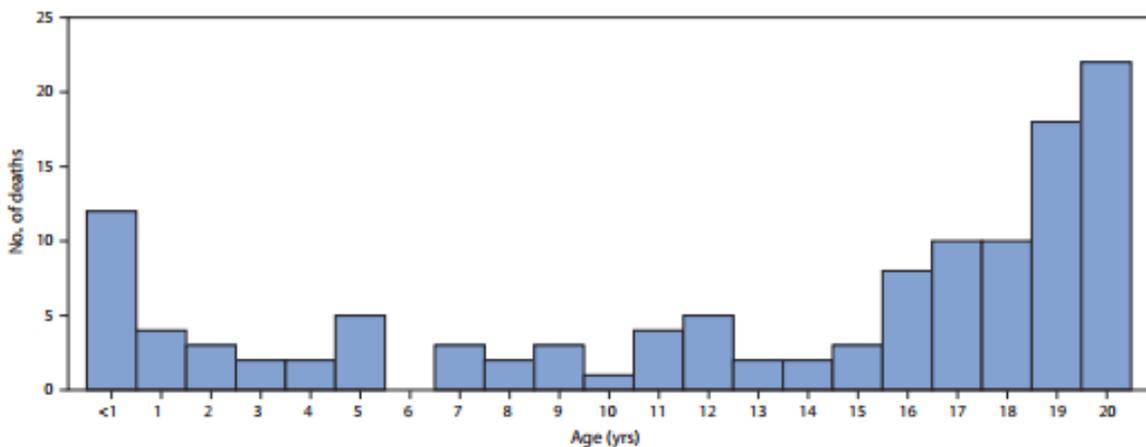
MMWR published online September 15th

Three quarters of SARS-CoV-2-related deaths in U.S. youth under age 21 occurred among those with underlying health conditions, to this study in *MMWR*.

CDC researchers identified 121 deaths related to COVID-19 or multisystem inflammatory syndrome in children (MISC) in people under 21 across the U.S. from February through July. Among the other findings:

- Some 70% of the deaths were in those aged 10 through 20 years, 20% were in children aged 1 through 9, and 10% occurred in those under 1 year.
- Latino and Black youth were disproportionately affected, accounting for 74% of deaths.
- The most common underlying conditions were chronic lung disease (mostly asthma), obesity, neurologic/developmental conditions, and cardiovascular conditions.
- Some 65% of deaths occurred in the hospital, 19% in the emergency department, and 13% at home.

FIGURE 2. Age at death among persons aged <21 years with SARS-CoV-2–associated deaths*† — United States, February 12–July 31, 2020[§]



Comment: Among persons aged <21 years reported to CDC by July 31, 2020, 12 (10%) were infants and 85 (70%) were aged 10–20 years most with an underlying medical condition. Hispanic and Black and

non-Hispanic accounted for 74% of these deaths; 13% of deaths occurred outside of a hospital. Infants, children, adolescents, and young adults, particularly those from racial and ethnic minority groups at higher risk, those with underlying medical conditions, and their caregivers, need clear, consistent, and developmentally, linguistically, and culturally appropriate (taking into account medical literacy) COVID-19 prevention messages (e.g., related to mask wearing, physical distancing, hand hygiene). This is a nice companion article to the article reviewed in the Daily Briefing on 9-11 looking at clinical outcomes in young adults.

CDC Indicators for Dynamic School Decision-Making Updated September 15, 2020

| INDICATORS | Lowest risk of transmission in schools | Lower risk of transmission in schools | Moderate risk of transmission in schools | Higher risk of transmission in schools | Highest risk of transmission in schools |
|--|--|--|--|--|---|
| CORE INDICATORS | | | | | |
| Number of new cases per 100,000 persons within the last 14 days* | <5 | 5 to <20 | 20 to <50 | 50 to ≤ 200 | >200 |
| Percentage of RT-PCR tests that are positive during the last 14 days** | <3% | 3% to <5% | 5% to <8% | 8% to ≤ 10% | >10% |
| <p>Ability of the school to implement 5 key mitigation strategies:</p> <ul style="list-style-type: none"> • Consistent and correct use of masks • Social distancing to the largest extent possible • Hand hygiene and respiratory etiquette • Cleaning and disinfection • Contact tracing in collaboration with local health department <p>Schools should adopt the additional mitigation measures outlined below to the extent possible, practical and feasible.</p> | Implemented all 5 strategies correctly and consistently | Implemented all 5 strategies correctly but inconsistently | Implemented 3-4 strategies correctly and consistently | Implemented 1-2 strategies correctly and consistently | Implemented no strategies |
| SECONDARY INDICATORS | | | | | |
| Percent change in new cases per 100,000 population during the last 7 days compared with the previous 7 days (negative values indicate improving trends) | <-10% | -10% to <-5% | -5% to <0% | 0% to ≤ 10% | >10% |
| Percentage of hospital inpatient beds in the community that are occupied*** | <80% | <80% | 80 to 90% | >90% | >90% |

| | | | | | |
|---|------|------------|------------|------|------|
| Percentage of intensive care unit beds in the community that are occupied*** | <80% | <80% | 80 to 90% | >90% | >90% |
| Percentage of hospital inpatient beds in the community that are occupied by patients with COVID-19*** | <5% | 5% to <10% | 10% to 15% | >15% | >15% |
| Existence of localized community/public setting COVID-19 outbreak**** | No | No | Yes | Yes | Yes |

Mitigation Strategies

- **Masks:** Encourage consistent and correct use of face masks, by all students, teachers, and staff to prevent SARS-CoV-2 transmission through respiratory droplets. Exceptions for use of face masks include children under the age of 2 years and persons with or those who support individuals with cognitive, sensory, or behavioral issues.
- **Social Distancing to the extent possible:** Maintain a distance of at least 6 feet between people
- **Hand hygiene and respiratory etiquette:** Teach and reinforce handwashing with soap and water for at least 20 seconds and increase monitoring to ensure adherence among students and staff. Encourage students and staff to cover coughs and sneezes with a tissue and immediately wash their hands after blowing their nose, coughing or sneezing. Persons with disabilities may need assistance with hand hygiene.
- **Cleaning and disinfection:** Clean and disinfect frequently touched surfaces (e.g., playground equipment, door handles, sink handles, toilets, drinking fountains) within the school and on school buses at least daily or between use as much as possible.
- **Contact Tracing:** Systematic contact tracing of infected students, teachers, and staff in collaboration with local health department.
- **Cohorting:** Cohorts (or “pods”) are groups of students, and sometimes teachers or staff, that stay together throughout the school day to minimize exposure for students, teachers, and staff across the school environment. Ensure that cohorts are as static as possible by having the same group of students stay with the same teachers or staff (all day for young children, and as much as possible for older children). If additional space is needed to support cohorting, consider all available safe spaces in the community and any relevant partnerships with properly vetted school volunteers that can support students while minimizing group size. Consider ways to support equitable access to cohort support. Limit mixing between cohorts if possible.
- **Staying home when appropriate:** Educate staff and families about when they and their child(ren) should stay home and when they can return to school. Learn more about preparing for someone is sick with COVID-19.
- **Adequate supplies:** Support healthy hygiene behaviors by providing adequate supplies, including soap, hand sanitizer with at least 60 percent alcohol (for staff and older children who can safely use hand sanitizer), a way to dry hands, tissues, disinfectant wipes, face masks (as feasible) and no-touch/foot-pedal trash cans.
- **Staggered scheduling:** Stagger school arrival and drop-off times or locations by cohort, or put in place other protocols to limit contact between cohorts, as well as direct contact with parents, as much as possible.
- **Alternating schedules with fixed cohorts:** Alternate schedules with fixed cohorts of students and staff to decrease class size and promote social distancing to prevent wide scale transmission.

- **Shared objects:** Discourage sharing of items, particularly those that are difficult to clean or disinfect.
- **Visitors:** Limit any nonessential visitors, volunteers, and activities involving external groups or organizations as much as possible – especially with individuals who are not from the local geographic area (e.g., not from the same community, town, city, county). Persons with disabilities may need direct service providers or service animals in a school environment.
- **Ventilation:** Ensure ventilation systems operate properly and increase circulation of outdoor air as much as possible, for example by opening windows and doors. Do not open windows and doors if doing so poses a safety or health risk (e.g., risk of falling, triggering asthma symptoms) to anyone using the facility.
- **Water systems:** Take steps to ensure that all water systems and features (e.g., sink faucets, decorative fountains) are safe to use after a prolonged facility shutdown.
- **Physical barriers and guides:** Install physical barriers, such as sneeze guards and partitions, particularly in areas where it is difficult for individuals to remain at least 6 feet apart (e.g., reception desks).
- **Communal spaces:** Close communal use of shared spaces, such as dining halls and playgrounds with shared playground equipment, if possible; otherwise, stagger use and clean and disinfect between use.
- **Food service:** Avoid offering any self-serve food or drink options such as hot and cold food bars, salad or condiment bars, and drink stations. Have children bring their own meals as feasible, or serve individually plated or pre-packaged meals instead.

Comment: This is certainly a welcome document. The CDC states that each indicator or combination of indicators should neither be used in isolation nor should they be viewed as hard cut-offs by officials. Rather, they serve as broad guideposts of inherent risk to inform decision-making. Regardless of the level of risk, as determined by the indicators, it is important that schools use multiple mitigation strategies including correct use of masks, social distancing to the extent possible, hand hygiene and respiratory etiquette, cleaning and disinfection, and contact tracing to help prevent the spread of SARS-CoV-2.

SARS-CoV-2 Infection Among Hospitalized Pregnant Women: Reasons for Admission and Pregnancy Characteristics — Eight U.S. Health Care Centers, March 1–May 30, 2020

MMWR published online September 16, 2020

105 hospitalized pregnant women with SARS-CoV-2 infection were identified, including 62 (59%) hospitalized for obstetric reasons (i.e., labor and delivery or another pregnancy-related indication) and 43 (41%) hospitalized for COVID-19 illness without an obstetric reason. Overall, 50 (81%) of 62 pregnant women with SARS-CoV-2 infection who were admitted for obstetric reasons were asymptomatic. Among 43 pregnant women hospitalized for COVID-19, 13 (30%) required intensive care unit (ICU) admission, six (14%) required mechanical ventilation, and one died from COVID-19. Pre-pregnancy obesity was more common (44%) among pregnant women hospitalized for COVID-19 than that among asymptomatic pregnant women hospitalized for obstetric reasons (31%). Likewise, the rate of gestational diabetes (26%) among pregnant women hospitalized for COVID-19 was higher than it was among women hospitalized for obstetric reasons (8%). Preterm delivery occurred in 15% of pregnancies among 93 women who delivered, and stillbirths (fetal death at ≥ 20 weeks' gestation) occurred in 3%.

Hospitalized pregnant women with COVID-19 can have severe illness

About half of hospitalized pregnant women with COVID-19 had symptoms



Some hospitalized pregnant women who had symptoms had severe outcomes, including

ICU admission

Mechanical ventilation

Death

Slow the spread and protect yourself from COVID-19 during pregnancy



Wear a mask when out in public



Stay 6 feet apart



Wash hands often



Continue receiving prenatal care

COVID-19 Associated Hospitalization Surveillance Network (COVID-NET) among 13 states
Vaccine Safety Datalink (VSD) surveillance of COVID-19 hospitalizations among eight healthcare centers

CDC.GOV

MMWR

Comment: Compared with background rates of all pregnant women during the same period, the current findings indicate increased percentages of preterm delivery and stillbirths occur among all pregnant women with SARS-CoV-2 infection. Other studies have also found higher rates of preterm delivery and stillbirth in pregnant women with SARS-CoV-2 infection (symptomatic and asymptomatic), compared with those in the general population. [see below] Antenatal counseling emphasizing preventive measures, including use of masks, frequent hand washing, and social distancing, might help prevent COVID-19 among pregnant women, especially those with pre-pregnancy obesity and gestational diabetes.

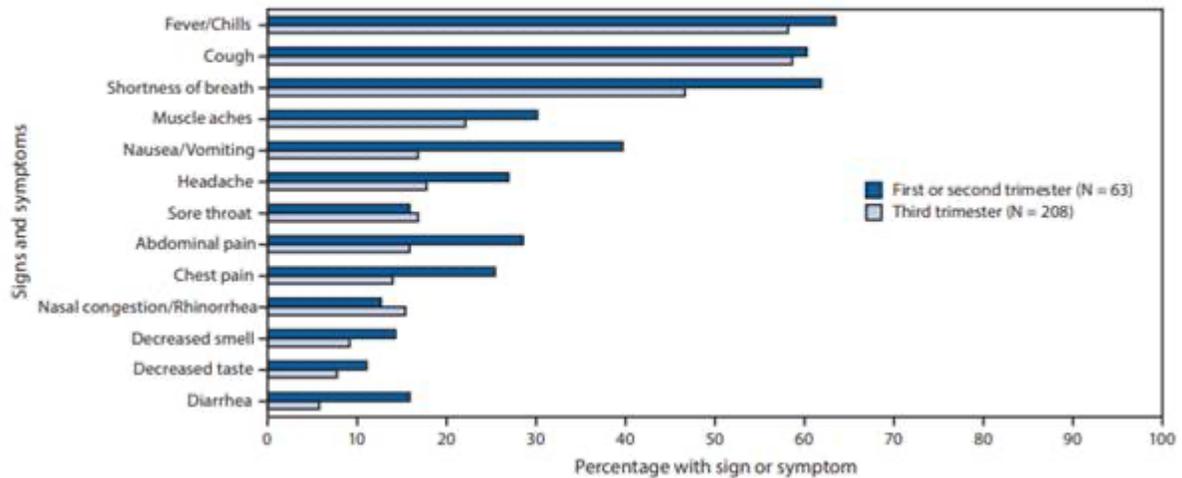
Characteristics and Maternal and Birth Outcomes of Hospitalized Pregnant Women with Laboratory-Confirmed COVID-19 — COVID-NET, 13 States, March 1–August 22, 2020

MMWR published online September 16, 2020

This study looked at 598 pregnant women with Covid-19 hospitalized in 13 states from March 1 through Aug 22. The median age was 30, but one in five had a chronic health problem, most commonly asthma or hypertension. About 42 percent were Hispanic and 26.5 percent were Black.

More than half of these women were asymptomatic when they were admitted, for a variety of reasons, to the hospital. Among the 272 pregnant women who had symptoms, 16 percent required intensive care, and 8.5 percent required ventilators to help with breathing. Two women died. Of the entire group of 598 women in this study, 458 completed their pregnancies during the hospitalization, and 448 had a live birth. Both symptomatic and asymptomatic women had premature births and pregnancy losses, though preterm births affected about 25 percent of symptomatic women, compared with only 8 percent of the asymptomatic women. Ten women, or 2.2 percent, some symptomatic and some not, had miscarriages or stillbirths. [The national rate of premature births has been 10 percent in recent years, and one in 160 pregnancies result in a stillbirth, according to the C.D.C.]

FIGURE 2. Signs and symptoms* at hospital admission among symptomatic hospitalized pregnant women with COVID-19,[†] by pregnancy trimester — COVID-NET, 13 states,[§] March 1–August 22, 2020



Comment: This article and the one above document severe illness and adverse birth outcomes were increased among hospitalized pregnant women with COVID-19. These findings highlight the importance of preventing and identifying COVID-19 in pregnant women. Continued surveillance for COVID-19 in pregnant women is essential to understand and improve health outcomes for mothers and newborns. A few potential weaknesses: chart abstractions were ongoing and completed for a convenience sample of 29.4% of women aged 15–49 years. Thus, the estimated proportion of hospitalized women with COVID-19 who were pregnant might be biased, because pregnancy status was not yet ascertained for women without completed chart review. Second, pregnant women included in this analysis might not be representative of all pregnant women within the catchment area. Third and a major weakness was information on obesity as an underlying pre-pregnancy condition was not available.

Transmission of SARS-CoV-2: A Review of Viral, Host, and Environmental Factors

Ann Intern Med published online September 17, 2020

Key points:

Respiratory transmission is still the dominant mode of transmission. There is substantial evidence that proximity and duration is a key determinant of transmission risk. A detailed contact tracing study of train passengers that included 2334 index cases and 72 093 close contacts found that the secondary attack rate was intricately linked to both the distance between seats and the duration of shared travel. [similar to air travel] That proximity so clearly increases risk for infection suggests that classic droplet transmission is more important than aerosol transmission. The role of ventilation in preventing or promoting spread highlights the importance of respiratory transmission. In a study of household transmission in China, opening windows to allow better air movement led to lower secondary household transmission. Poor ventilation has been implicated in numerous transmission clusters, including those in bars, churches, restaurants, and public transportation. By contrast, such events have rarely occurred outside, and then only in the context of crowding. In addition, studies have found that masking, both in health care settings and in the community, decreases transmission of SARS-CoV-2. A recent study found that mask use in the household before symptom development markedly reduced risk for household transmission. All this evidence supports the dominant role of respiratory spread of this virus.

Susceptibility to SARS-CoV-2 infection increases with age; children younger than 10 years are around half as susceptible as adults. Viral RNA testing of household contacts in Iceland showed 6.7% and 13.7% positivity in children and adults, respectively, and testing in Wuhan, China, showed 4% and 17.1% positivity. Decreased ACE2 expression in children compared with adults may partly explain the lower susceptibility seen in children. [reviewed in Daily Briefing last month]

Vertical transmission occurs rarely; transplacental transmission has been documented. Several case reports have found placental infection by SARS-CoV-2, and 1 has shown transplacental transmission. In addition, breast milk can harbor viral RNA, although no confirmed transmissions to infants from breast milk have been reported. Taken together, these studies suggest that vertical transmission of SARS-CoV-2 rarely occurs.

Cats and ferrets can be infected and transmit to each other, but there are no reported cases to date of transmission to humans; minks transmit to each other and to humans. Several studies have documented that SARS-CoV-2 can infect domestic animals, including cats, dogs, and ferrets. The virus replicates well in cats (but not in dogs) and is transmissible between cats and ferrets. Direct contact and fomite transmission are presumed but are likely only an unusual mode of transmission. Based on currently available data, the levels of viral RNA or live virus transiently remaining on surfaces are unlikely to cause infection, especially outside of settings with known active cases. Nonetheless, disinfection of high touched surfaces is still recommended.

Although live virus has been isolated from saliva and stool and viral RNA has been isolated from semen and blood donations, there are no reported cases of SARS-CoV-2 transmission via fecal–oral, sexual, or bloodborne routes. To date, there is 1 cluster of possible fecal–respiratory transmission. Persons who have SARS-CoV-2 with or without symptoms can transmit. Those without symptoms may be presymptomatic, or they may remain asymptomatic. Transmission can occur from persistently asymptomatic persons, although they seem to be less likely to transmit, and when they are most infectious is currently unknown. Among those who develop symptoms, 1 report of 3410 close contacts of 391 case patients in China found that the secondary attack rate increased with the severity of the index case and that the specific symptoms of fever and expectoration were associated with secondary infections. Researchers determined that transmissibility peaks around 1 day before symptom onset by analyzing a group of 77 transmission pairs. Assuming an incubation period of 5.2 days, they estimated that infectiousness started 2.3 days before symptom onset, peaked around a day before symptom onset, and declined rapidly within 7 days. Modeling using observed viral load kinetics further supports these findings, suggesting that the threshold viral load for a 50% probability of transmission is approximately $10^{7.5}$ viral RNA copies/mL and that infected persons are likely to be above this threshold for only about 1 day. Symptomatic persons seem to be more likely to transmit than asymptomatic persons.

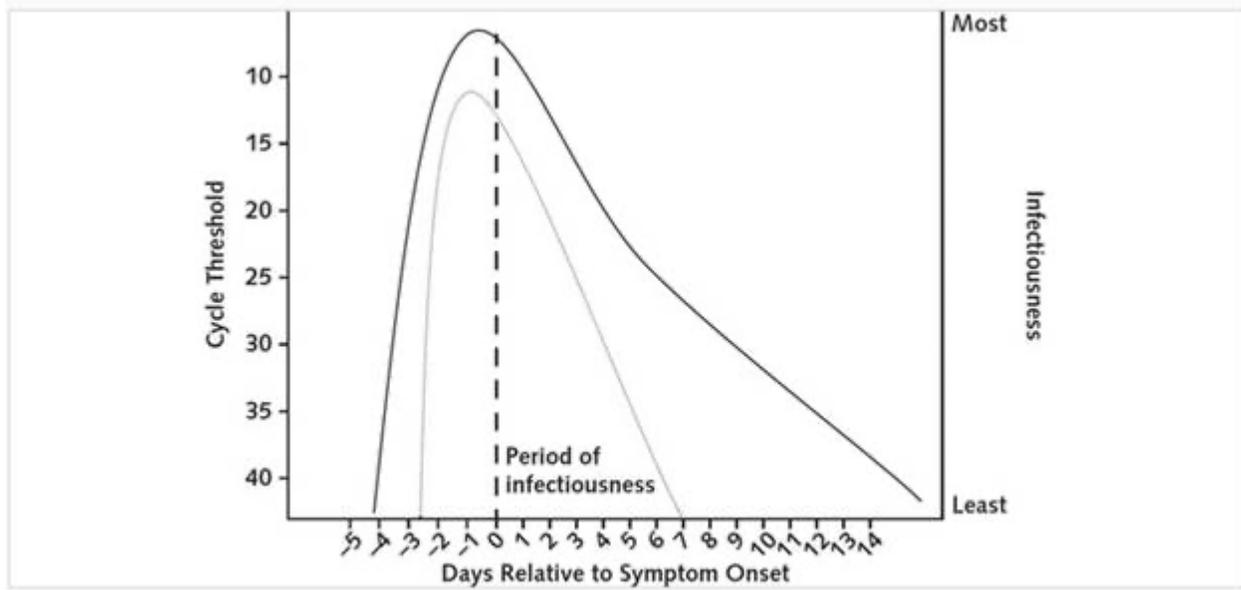


Figure 1. The period of infectiousness for immunocompetent, symptomatic adults (dotted line) and respiratory tract viral load with time (solid line).

The household is another extremely important site of transmission for SARS-CoV-2, with a meta-analysis of 40 studies finding an overall household secondary attack rate of 18.8% (95% CI, 15.4% to 22.2%). In a demonstrative contact tracing study from South Korea including nearly 60 000 contacts of more than 5700 case patients, the attack rate among household contacts was 11.8%, compared with 1.0% for non-household contacts.

Comments: This is one of the best reviews on transmission of SARS-CoV-2 based on current science.