COVID-19 and Return to In-Person Education

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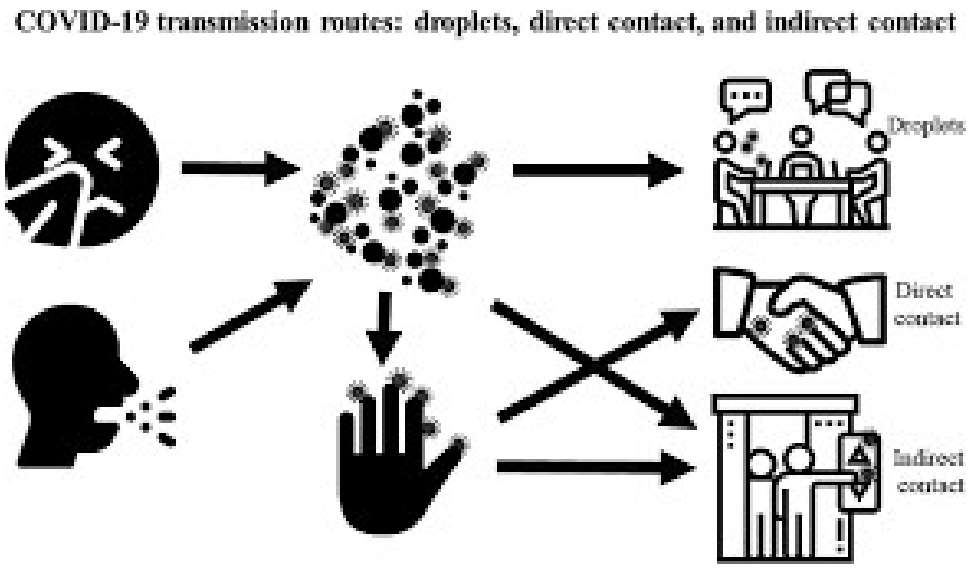
Purpose

- To review the literature to inform appropriate school policies designed to protect children and adults in the school setting

- We will cover:
  - Description of COVID-19 transmission in adults
  - Description of COVID-19 transmission and symptoms in children
  - Summary—What We Know, What We Need, What We Don’t Know

COVID-19 Transmission

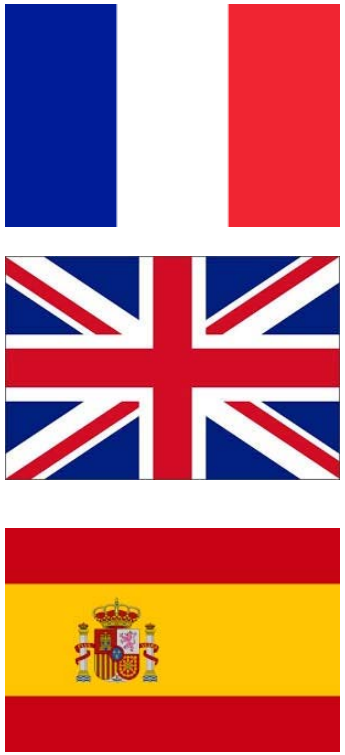
- Primarily transmitted via respiratory droplets
  - Virus released in respiratory secretions when a person coughs, sneezes or talks
  - Can infect another person if direct contact with mucous membranes
- Infection can also occur if a person touches an infected surface and then touches their eyes, nose, or mouth
- Droplets typically do not travel more than six feet and do not linger in the air

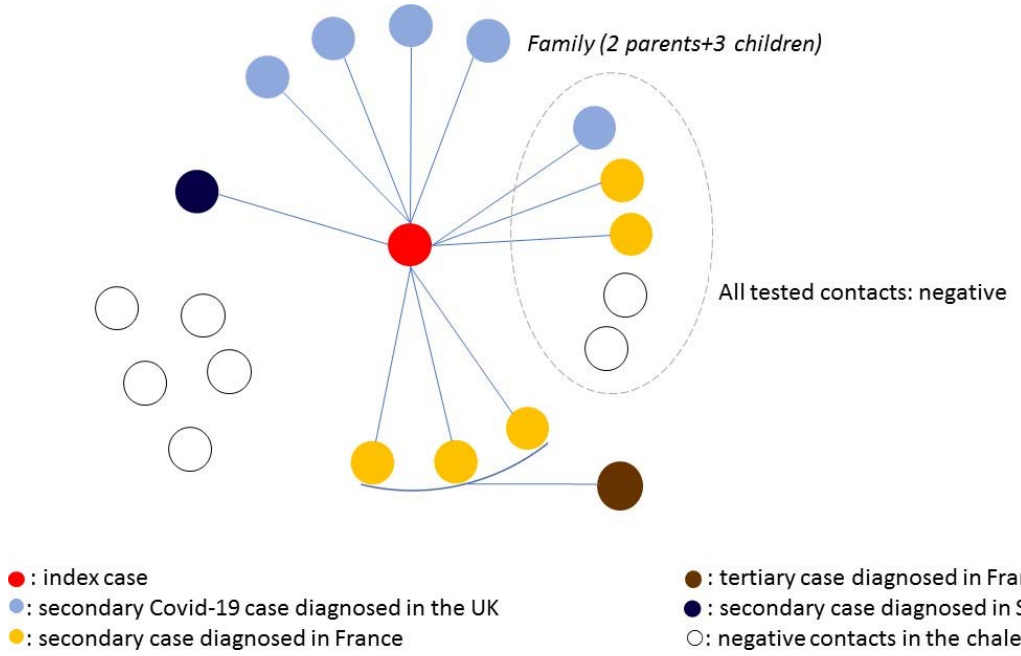


COVID-19 Transmission in Adults

- Pre-symptomatic and/or asymptomatic transmission can occur
  - In widespread testing, 17-56% of cases are asymptomatic, but some do develop symptoms
  - Many are thought to be contagious 2-5 days prior to having symptoms
- Transmission commonly occurs with prolonged duration of contact in close settings (household, cruise ships, health care workers)
- Hot spots:
  - Meat packing (densely packed workers who communicate to each other over loud machinery)
  - Weddings, funerals, birthday

Asymptomatic Transmission in French Alps





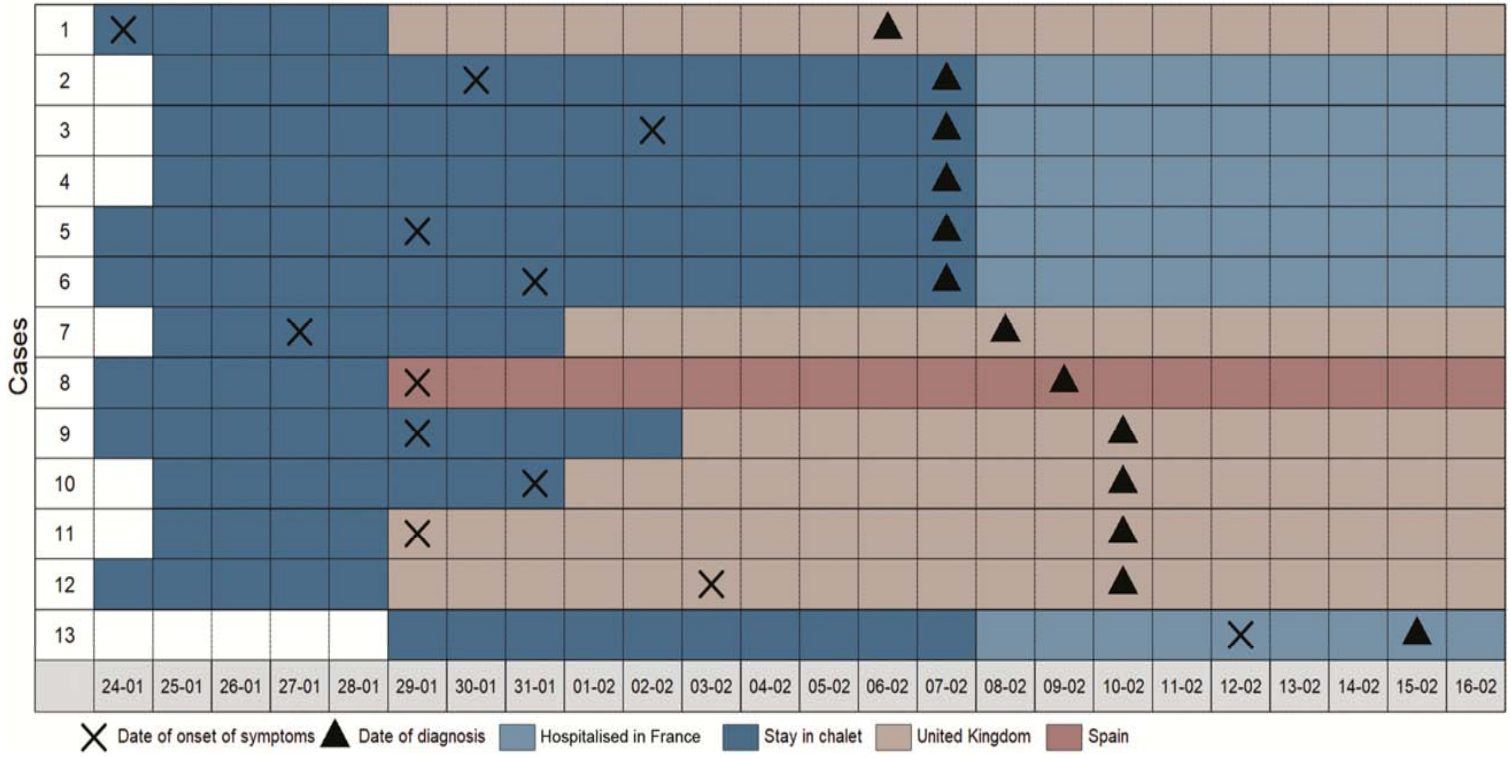
1 case infected 11 people

9 yo child

- Attended 3 schools
- Came into contact with 172 people
- Zero transmissions

Danis, Kostas. CID 2020

Figure 2. Temporal relation between coronavirus disease 2019 cases in the chalet and onset of symptoms of cases, ...



Clin Infect Dis, ciaa424, https://doi.org/10.1093/cid/ciaa424

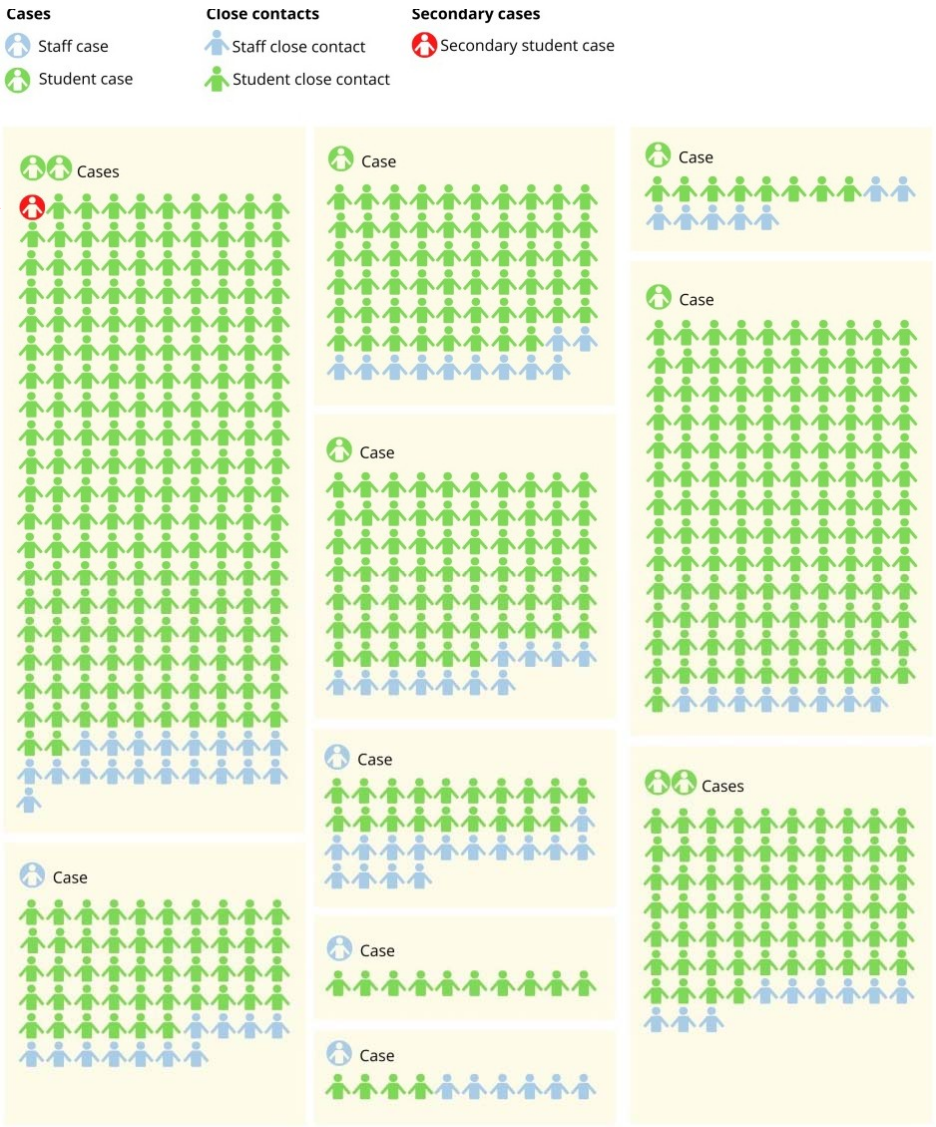
Table 1.

Number of High-risk and Low-risk Contacts and Virological Results for Respiratory Viruses, Contamines-Montjoie, France, January–February 2020

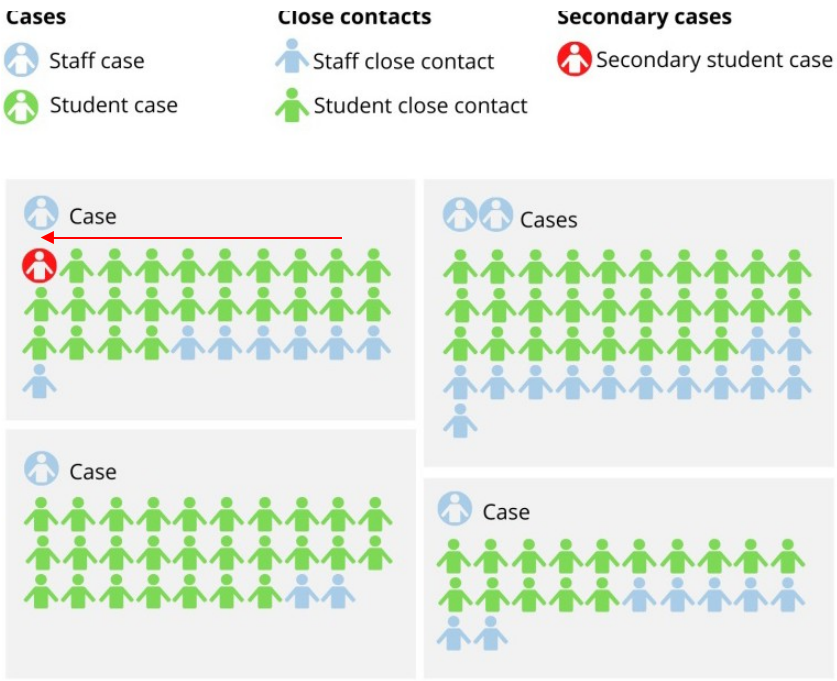
Risk Category	Contacts, No.	Contacted[a]	Possible Cases[a]	Sampled[a]	SARS-CoV-2[b]	Adenovirus[b]	Hun Cor
School A							
High risk	31	31 (100)	18 (58)	19 (61%)[c]	0 (0)	0 (0)	6 (3 HKU
Low risk	24	24 (100)	23 (96)	23 (96)	0 (0)	1 (4)	2 (9)
School B							
High risk	5	5 (100)	2 (40)	2 (40)	0 (0)	0 (0)	0 (0)
Low risk	0	…	…	…	…	…	…
School C							
High risk	25	25 (100)	10 (40)	10 (40)	0 (0)	0 (0)	0 (0)
Low risk	1	1 (100)	1 (100)	1 (100)	0 (0)	0 (0)	0 (0)

School-based contact tracing in Australia: High Schools

- 8 students infected (2 cases in the same school at 2 schools)
- 4 teachers infected
- 863 close contacts were tested including nasal swab and antibodies
- Only 1 student infected



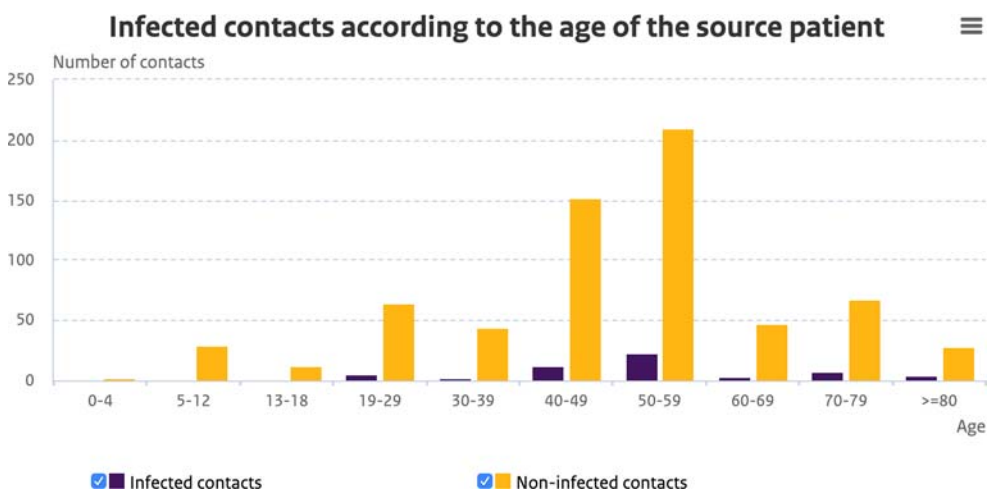
School-based contact tracing: Primary Schools

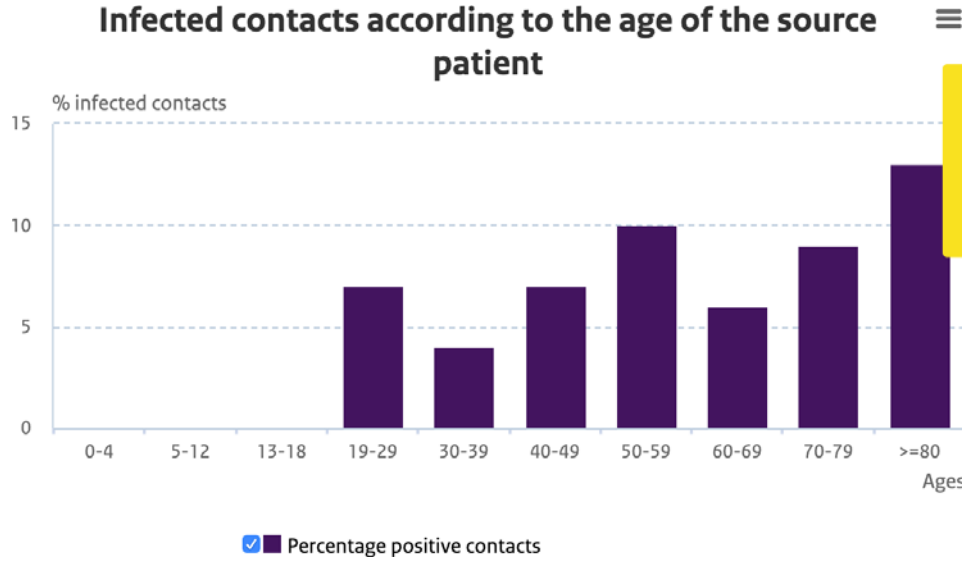


- 1 student cases—no transmission to peers or teachers
- 5 teacher cases—infected 1 student

Prepared by the National Centre for Immunisation Research and Surveillance (NCIRS) 26 April 2020

Data from the Netherlands





https://www.rivm.nl/en/novel-coronavirus-covid-19/children-and-covid-19

ronavirus disease with a history of school attendance and contacts, Ireland, 1 March–13 March 2020 (n

Age group in years	Symptoms	Number of contacts				Number of secondary c		
		Child		Adult		Child		A
		School	Other[a]	School	Other[a]	School	Other[a]	School
10–15	Fever	475	29	30	3	0	0	0
10–15	None	125	30	25	8	0	0	0
10–15	Fever	222	14	28	0	0	0	0
Adult>18	Coryza/cough	52	2	4	38	0	0	0
Adult>18	Cough	39	2	2	3	0	0	0
Adult>18	Cough	11	0	12	1	0	0	0

nission settings include households of friends and family and recreational activities.

- A total of 1,155 contacts of these six cases were identified.
  - Exposed school in the classroom, during sports lessons, music lessons and during choir practice for a religious ceremony,
- Among 1,001 child contacts of these six cases there were no confirmed cases of COVID-19.
- Caveat: Only testing symptomatic contacts—not asymptomatic contacts

Heavey, L. www.eurosurveillance.org

Internationally, schools have re-opened…

Summary of Health and Safety Practices

	China	Denmark	Norway	Singapore	Taiwan
Context	Gradual reopening since March	Opened April 15 for children up to age 12	Opened April 27 for Grades 1–4	Opened until April 8, then closed due to non-school-related outbreak	Never fully closed; local, temporary closures as needed
Health screening	Temperature checks at least twice daily	Temperature checks on arrival	Temperature checks on arrival	Temperature checks twice daily	Temperature checks on arrival
Quarantine and school closure policy	Quarantine if sick until symptoms resolve	Stay home 48 hours if sick	Stay home if sick until symptom-free 1 day	Quarantine required and legally enforced if one has had close contact with a confirmed case; school closes for deep cleaning if case confirmed	Class is suspended 14 days if one case confirmed, school suspended 14 days if 2+ cases
Group size and staffing	Class size reduced from 50 to 30 in some areas of the country	Class sizes reduced to accommodate 2-meter (6 feet) separation in classrooms; non-teaching staff provide support	Maximum class size 15 for Grades 1–4, 20 for Grades 5–7	No maximum class size; classrooms are large enough to ensure 1–2 meter (3–6 feet) separation	No maximum class size; students in stable homerooms; subject-matter teachers move between classes
Classroom space/ physical distancing	Group desks broken up; some use dividers	Physical distancing (2 meters) within classrooms; use of outdoor space, gyms, and secondary school classrooms	Physical distancing within classrooms; use of outdoor space encouraged	Group desks broken up in Grade 3 and up; 1–2 meter (3–6 feet) distance maintained	Group desks broken up; some use dividers
Arrival procedures	Designated routes to classes; multiple entrances	No family members past entry; staggered arrival/ dismissal	No family members past entry; staggered arrival/ dismissal	No family members past entry; parents report travel; staggered arrival/	No family members past entry

https://learningpolicyinstitute.org/product/reopening-schools-covid-19-brief

Clinical Manifestation

Italy:

Overall, pediatric patients made up 1% of all cases diagnosed

- 100 Children 3/3-3/27
- 39% had a fever>38 degrees C
- 51% had cough/SOB
- 79% symptoms in ED
- 67% admitted
- 100% survived

Parri, N. NEJM, May 2020

Table 1. Epidemiologic Characteristics, Clinical Features, and Outcomes in the Italian CONFIDENCE Cohort as Compared with Other Cohorts.*

Characteristics	CONFIDENCE Study (N=100)	Lu et al.[3] (N=171)	Dong et al.[4] (N=731)	CDC MMWR[5] (N=2572)†
Median age (range) — yr	3.3 (0–17.5)	6.7 (1 day–15 yr)	7 (NA)	11 (0–17)
Age distribution — no. (%)				
<1 yr	40 (40.0)	31 (18.1)	86 (11.8)	398 (15.5)
1 to <6 yr	15 (15.0)	40 (23.4)	137 (18.7)	NA
6–10 yr	21 (21.0)	58 (33.9)	171 (23.4)	NA
>10 yr	24 (24.0)	42 (24.6)	337 (46.1)	NA
Sex — no./total no. (%)				
Female	43/100 (43.0)	67/171 (39.2)	311/731 (42.5)	1082/2490 (43.4)
Male	57/100 (57.0)	104/171 (60.8)	420/731 (57.5)	1408/2490 (56.5)
Coexisting conditions — no./total no. (%)	27/100 (27.0)	NA	NA	80/345 (23.2)
Exposure to SARS-CoV-2 — no./total no. (%)				
Family cluster	45/100 (45.0)	131/171 (76.6)‡	NA	168/184 (91.3)
Other exposure	48/100 (48.0)	2/171 (1.2)	NA	16/184 (8.7)
Unknown exposure	7/100 (7.0)	15/171 (8.8)	NA	0
Signs and symptoms in patients for whom data were available — no./total no. (%)	100/100 (100.0)	171/171 (100.0)	0	291/2572 (11.3)
Symptomatic on presentation in emergency department — no./total no. (%)	79/100 (79.0)	144/171 (84.0)	637/731 (87.1)	291/2572 (11.3)
Fever, cough, or shortness of breath — no./total no. (%)	28/54 (51.8)	NA	NA	213/291 (73.2)
Fever — no./total no. (%)	54/100 (54.0)	71/171 (41.5)	NA	163/291 (56.0)
Temperature — no./total no. (%)§				
≤37.5°C	46/100 (46.0)	100/171 (58.5)	NA	128/291 (44.0)
37.6–38.0°C	15/100 (15.0)	16/171 (9.4)	NA	NA
38.1–39.0°C	28/100 (28.0)	39/171 (22.8)	NA	NA
>39.0°C	11/100 (11.0)	16/171 (9.4)	NA	NA
Symptoms — no./total no. (%)				
Cough	44/100 (44.0)	83/171 (48.5)	NA	158/291 (54.3)
Shortness of breath	11/100 (11.0)	NA	NA	39/291 (13.4)
No feeding or difficulty feeding	23/100 (23.0)	NA	NA	NA
Rhinorrhea	22/100 (22.0)	13/171 (7.6)	NA	21/291 (7.2)

CDC MMWR

Overall 1.7% of all cases were <18 yo

2572 children

- 56% had no fever
- 73% had Cough or SOB
- 5.7% admitted
- 99.8% survived

This has remained consistent—children<18 yo make up <0.02% of COVID deaths

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[illegible]eeding	23/100 (23.0)	NA	NA	NA
[illegible]	22/100 (22.0)	13/171 (7.6)	NA	21/291 (7.2)

By Comparison…

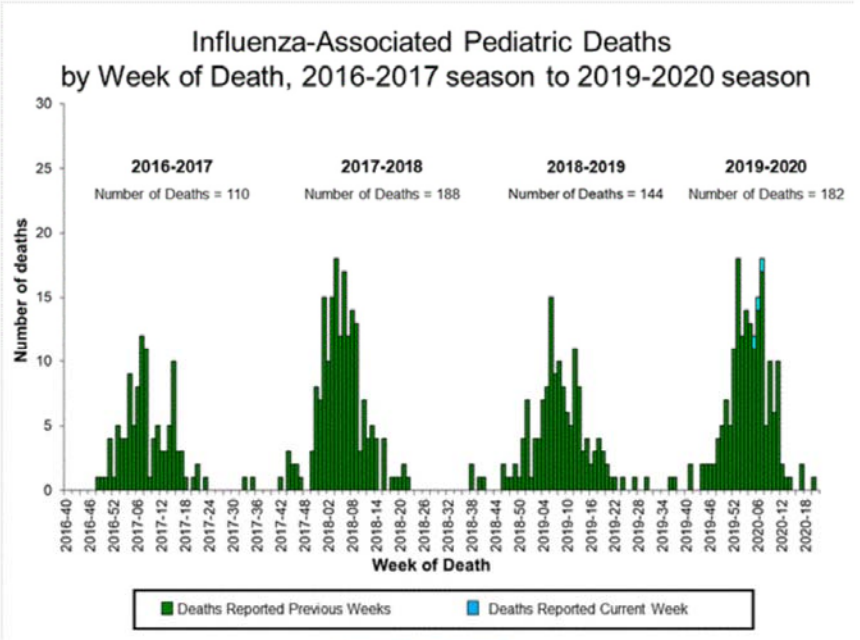
Influenza in Pediatrics kills 150-200 children each year in the US

Vaccine is available

Vaccine is known to decrease the odds of hospitalization and death…

But only 57% of children 6 months to 18 years of age get vaccinated each year.

A total of 182 influenza-associated pediatric deaths occurring during the 2019-2020 season have been reported to CDC.



View Full Screen

Additional pediatric mortality surveillance information for current and past seasons:
Surveillance Methods | FluView Interactive

Can children acquire infection easily?

Table 3. The characteristics of secondary transmission of COVID-19 in households

	Infected cases	Total contacts	Secondary attack rates %	OR 95% CI	p Value
General attack rate	64	392	16.3		
Symptomatic attack rate	55	392	14		
Genders of contacts					
Female	31	181	17.1	0.92 (0.51 to 1.64)	0.78
Male	33	211	15.6		
Ages of contacts					
< 18 years	4	100	4	0.18 (0.06 to 0.54)*	0.002
0-5 years	1	44	2.3		
6-17 years	3	56	5.4		
≥ 18 years	60	292	20.5		
18-30 years	12	55	21.8		
31-40 years	14	76	18.4		
41-50 years	9	35	25.7		
51-60 years	18	71	25.3		
> 60 years	7	55	12.7		
Quarantine of index case at initiation of symptom					
Yes	0	43	0	0 (0.00 to 0.00)	0.00
No	64	349	18.3		
Relationships with index cases					
Spouse	25	90	27.8	2.27 (1.22 to 4.22)	0.010
No spouse (ex children)	35	202	17.3		
Genders of index cases					
Female	29	183	15.8	0.79 (0.42 to 1.47)	0.45
Male	35	209	16.7		
Symptoms of index cases					
No fever	26	194	13.4	0.61 (0.30 to 1.24)	0.169
Fever	38	198	19.2		
No cough	45	271	16.6	0.88 (0.47 to 1.64)	0.68
Cough	19	121	15.7		
Exposure-period categories					
0-1 day	10	46	21.7	0.90 (0.61 to 1.33)	0.58
2-5 days	14	91	15.4		
> 5 days	40	253	15.8		

Notes: OR, Odds Ratio; CI, confidence interval; Exposure-period, The time between onset of illness and hospitalization. p< 0.05 was considered statistically significant. *, comparing children with adults

- 105 index cases (all adults)
- 392 household contacts swabbed 2-4 times for SARS-CoV2 via RT-PCR
- Child infected in 4 instances.
- Secondary attack rate was 4% in children (2.3% <5 yo)
- Attack rate was 20% in adults

Li, Wei. CID 2020

- Of 4310 SARS-CoV-2 cases, 40 were under 16 yo
- 73% of the time, parents had symptoms before children
- 8% of the time, child had symptoms first

Figure 1. Description of individual household clusters with asymptomatic, suspected and confirmed SARS-CoV-2 cases

Patient →	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Total	Symptomatic
RT-PCR CT value	16	22	21	22	30	34	34	19	32	33	26	31	16	16	14	17	24	33	16	19	13	28	20	23	24	38	24	32	34	37	34	28	35	32	31	35	36	32	36	n	n (%)
Mother	+			+	+	-				+	-		+	-		-	+	+	+	+	+	+	+	+		+			-	+	+		-	+	+	+	-	-		39	36 (92)
Father	-			+		+		+			+		+			+			+	+	+	+	+	+	+	+					+						+	+		32	24 (75)
Adult Sibling 1																	+						+	+							+										
Adult Sibling 2																																								8	8 (100)
Grand-Parent 1							+							+																								+	+		
Grand-Parent 2														+																										7	5 (71)
Other Adult																															-					+				2	2 (100)
Pediatric Sibling 1					-				-													-									-										
Pediatric Sibling 2																																									
Pediatric Sibling 3																																									
Pediatric Sibling 4																																								23	10 (43)

Green, yellow and red squares correspond to symptomatic household contacts who developed symptoms respectively, before, simultaneously and after study patients. White squares correspond to asymptomatic household contacts. The "+" and "-" signs correspond to the results of SARS-CoV-2 nasopharyngeal RT-PCR; patients without testing have an empty square. The absence of a family member inside a given household cluster is shown in grey.
The study patient was the first to develop symptoms in clusters #2, #3 and #13 only.
CT values correspond to the number of PCR cycles required to amplify the virus; hence the CT value is inversely proportional to the viral load.
SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2; RT-PCR: reverse-transcription polymerase chain reaction; CT: cycle threshold.

https://pediatrics.aappublications.org/content/pediatrics/early/2020/05/22/peds.2020-1576.full.pdf

Indirect costs of COVID-19 on children

- Decreased vaccination rates
- Decreased well-child visits and sick visits for conditions that may need treatment
- Poor outcomes seen with distance learning
  - "Elementary students [in urban districts] may have lost 30% of their reading skills"
  - Widening gap between the "haves" (e.g., Internet, tutors, computers) and "have-nots" resulting in inequities that will impact low-income students and students of color
- Denied opportunities for social and emotional development that come with play
- Under-reporting of child abuse

Dooley, DG. JAMA Pediatrics May 2020.

https://www.mckinsey.com/industries/public-sector/our-insights/covid-19-and-student-learning-in-the-united-states- the-hurt-could-last-a-lifetime?cid=eml-web#

What We Know

- In general, children have milder respiratory symptoms and less fever
  - Severe illness is seen but mainly in medically complex older children and young adults
- Acquisition of SARS-CoV-2 is less common than in adults based on household studies
- Transmission among children is less common although possible
- Transmission in adults is greater with prolonged exposure in a poorly ventilated space
  - For adults, mortality is low but morbidity can be high
  - Very dependent on age and other comorbid conditions such as obesity and diabetes

What We Need

- Available testing for everyone with symptoms
- Ability for staff to take time off from work if ill without any financial repercussions (or transition to distance teaching)
- Monitoring of absenteeism
- Utilization of universal face covering for all staff; consider for older children
- Limit number of staff/adults allowed in congregate areas (lounges, kitchens)
- Increase utilization of outdoor spaces
- Handwashing stations everywhere
- Decrease crowding (staggered opening/closing; space desks apart)
- Fluidity to transition to distance learning/teaching as needed
- Understand that school-based outbreaks WILL happen

What We Don’t Know

- Can we limit classroom sizes?
  - Prevent congregating
  - Decreased number of contacts makes it easier to control outbreaks
  - Consider creating a “school family”; grouping students to prevent spread
- Are interventions like temperature checks, masking of young children, frequent asymptomatic testing beneficial?
  - Probably not
- Will we see a rise in cases as we open schools up?
  - Not necessarily from schools, but as communities open up and parents are more mobile, they are more likely to infect their children

Pediatricians Take a Stand

- American Academy of Pediatrics (representing 67,000 pediatricians across the country) released guidance June 25, 2020
  - Council on School Health
  - Council on Children with Disabilities
  - Council on Children and Disasters
  - Council on Community Pediatrics
  - Council on Environmental Health
  - Committee on Infectious Diseases
  - Family Partnership Network
- **Strongly advocates that all policy considerations for the coming school year should start with a goal of having students physically present in school**

Questions??