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Impact of COVID-19 on Children and School Health Services

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Maryland State School Health Council Webinar

June 10, 2020

Agenda

- Today's key updates
- School Related Issues and Considerations
- Consequences of Pediatrics and COVID-19
  - Childhood Immunizations
  - Multisystem Inflammatory Syndrome in Children
- Q & A

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Morbidity and Mortality Update

	Cumulative Cases	Cumulative Hospitalized	Cumulative Deaths
United States	1,970,596 (06/09/20)	224,813 (06/09/20)	105,981 (06/09/20)
Maryland	59,465 (06/10/20)	9,755 (06/10/20)	2,719 (125*) (06/10/20)

* Probable COVID-19 deaths

Age	Cases (06/10/20)	Deaths (06/10/20)
0-9	1,573	
10-19	2,791	(1)
20-29	8,408	(14) 1*
30-39	11,089	(34) 4*

* Probable COVID-19 deaths

Sources https://coronavirus.maryland.gov/ Accessed 06/10/2020
https://datausa.io/coronavirus Accessed 06/10/2020

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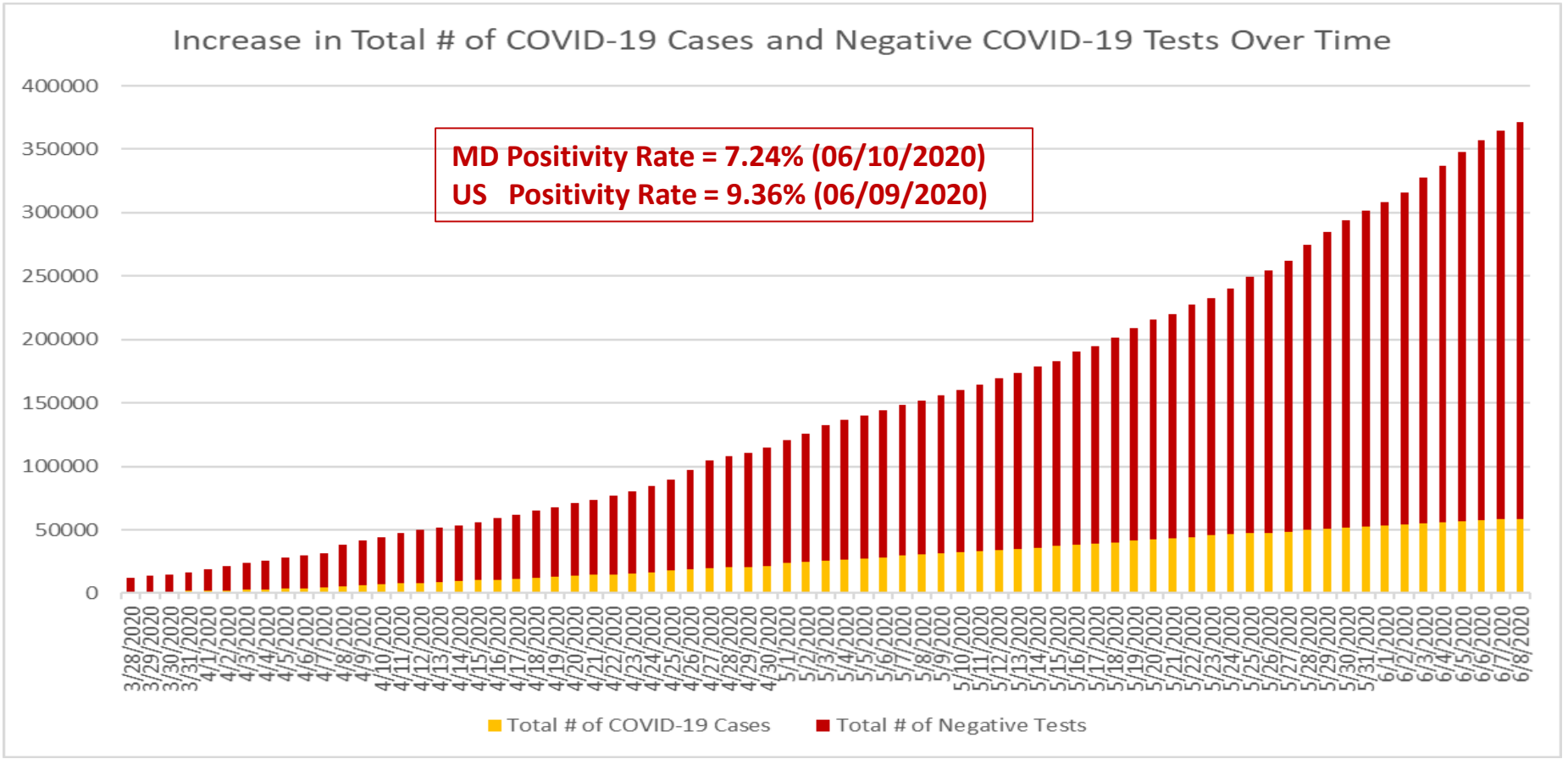
COVID-19 Growth in Maryland



Sources https://coronavirus.maryland.gov/ Accessed 06/10/2020
https://datausa.io/coronavirus Accessed 06/10/2020

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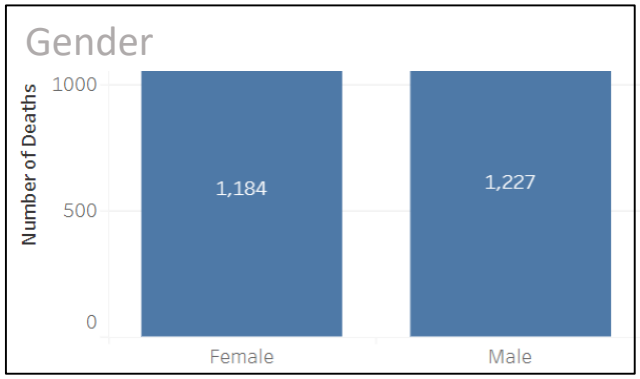
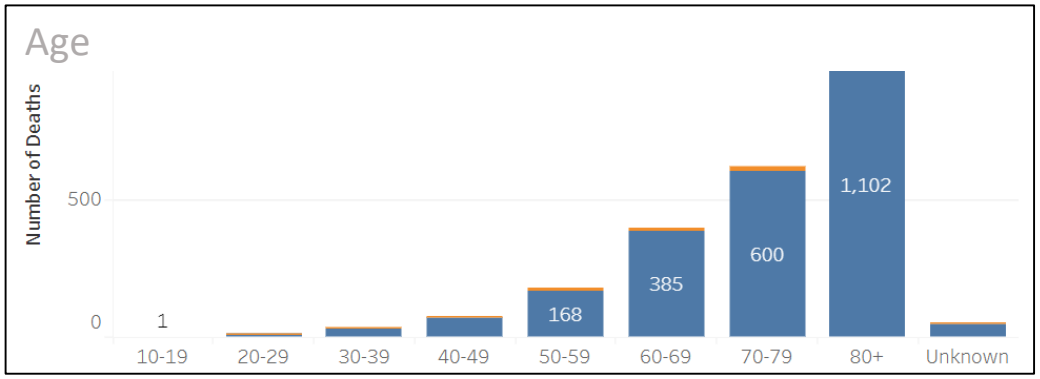
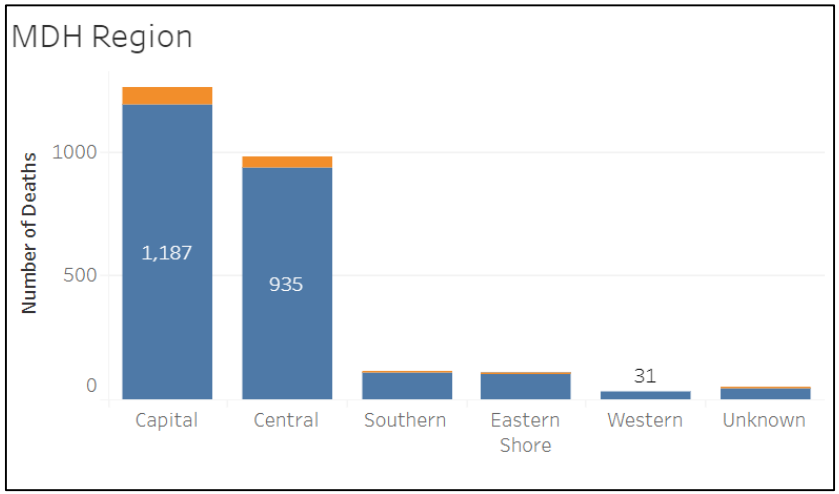
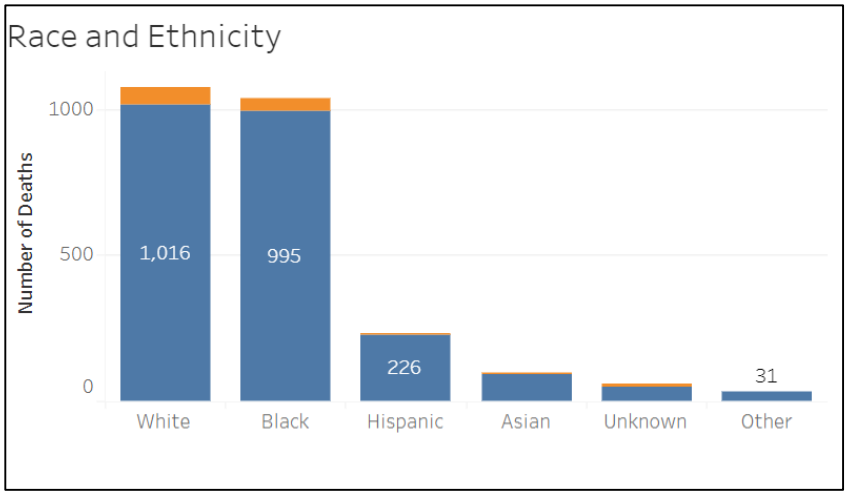
Disparities in COVID-19 Impact (Deaths)









Death Data available through 5/31/2020

Sources https://coronavirus.maryland.gov/ Accessed 06/10/2020

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Challenges for Pediatrics

- Impact of school closure on children and families
- Need for routine well child visits and immunizations
- Data about how COVID-19 affects children is still emerging
  - Symptoms list growing
  - Mild illness hard to identify COVID-19 (common)
  - Limited testing for children (improving)
  - Children as carriers? vs infected by adults?
- Increased challenges to treating/managing illness in families
- Challenges to practice of primary care
- Slower development of guidance for children
- Developmental considerations for application of guidance
- Special needs populations (foster, DJS, homeless, etc.)

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Return to In-Person Education: Context

- Epidemiology of SARS-CoV2 (COVID-19).
- The availability of testing; the capacity for community surveillance and contact tracing.
- Policy, procedures and infrastructure to maintain infection control procedures and other processes to limit spread
- Emerging data about the role that school-aged children and adolescents play in transmission of COVID-19.
- The possibility of intermittent closures of schools in the event of COVID-19 infections.
- Establishing options for a phased re-opening

https://services.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/covid-19-planning-considerations-return-to-in-person-education-in-schools/ Accessed 05/06/2020

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School Health Considerations and Re-opening Guidance

- Social/physical distancing (e.g., class size, schedules)
- Cloth face coverings
- Temperature/symptom checks
- Diverse student needs (e.g., disabilities and special populations)
- Sports/athletics
- Access to testing
- Supplies
- Training
- Cleaning
- Planning for intermittent closures
- Response plans and protocols for illness
- Absenteeism data and reporting
- Annual SHS requirements (e.g., IZ, sports PE)
- On-site SHS / SBHCs
- Mental Health

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Current Efforts

- Support for school nutrition programs
- Listening sessions with SHS leaders
- Workgroup for guidance development

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Childhood Vaccinations

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Current Recommendations

- Both CDC and AAP recommend continuation of essential services, including immunizations, during the COVID-19 pandemic
- Prioritize well child and immunizations for <24 months of age.
  - https://www.cdc.gov/coronavirus/2019-ncov/hcp/pediatric-hcp.html
  - https://services.aap.org/en/pages/covid-19-clinical-guidance-q-a/.

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MMWR Article – May 8, 2020

- "Effects of the COVID-19 Pandemic on Routine Vaccine Ordering and Administration – United States, 2020"
- Sharp decreases in ordering and administrations noticed starting in mid-March (national emergency declaration) and continuing though April
- Smaller decline in administrations to <24 months in line with CDC and AAP recommendations

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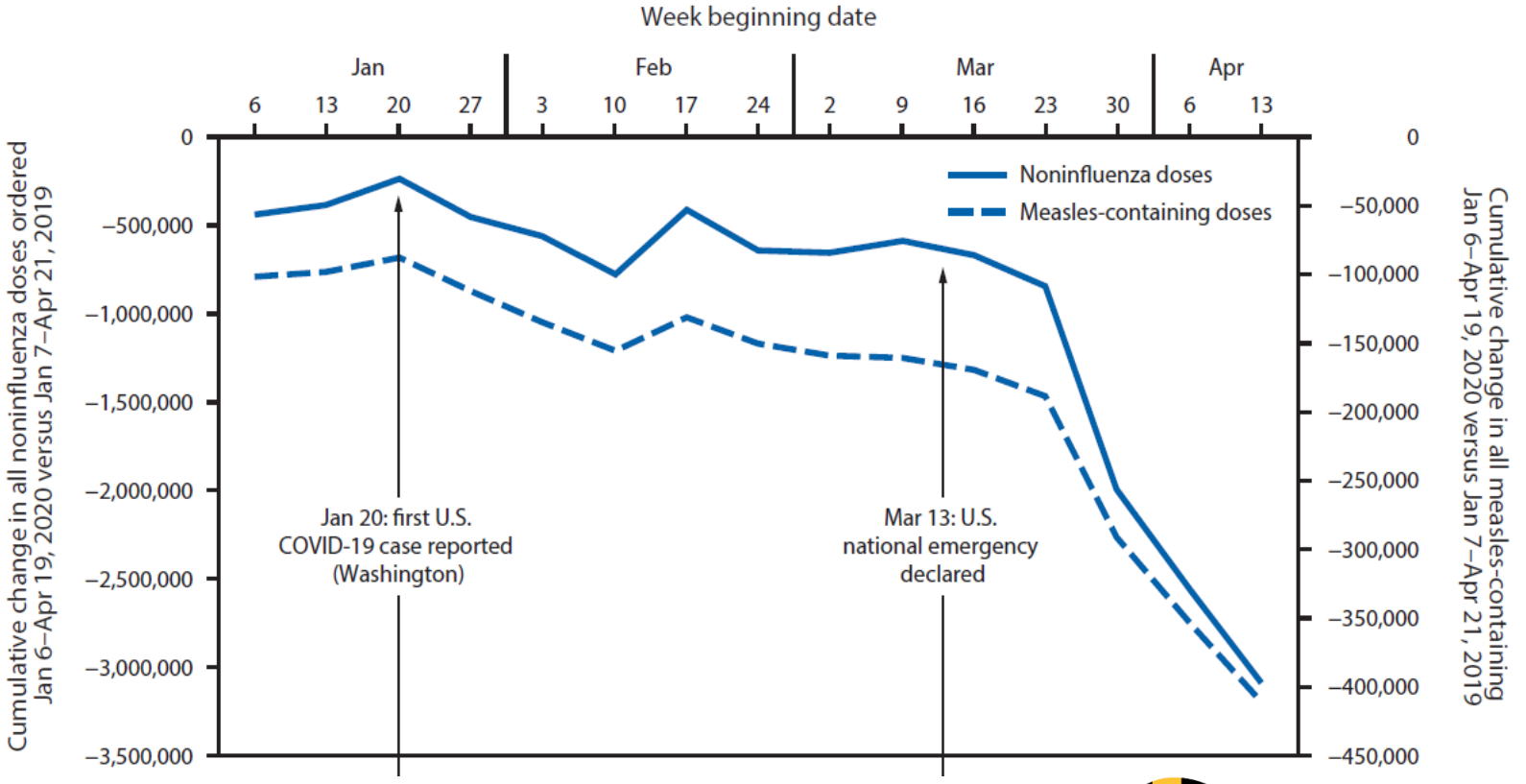
MMWR – VFC Provider Orders, US

FIGURE. Weekly changes in Vaccines for Children Program (VFC) provider orders* and Vaccine Safety Datalink (VSD) doses administered† for routine pediatric vaccines — United States, January 6–April 19, 2020



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Maryland Vaccinations

- Source: ImmuNet (Maryland's Immunization Information System (IIS))
- Compared Jan-May 2019 to Jan-May 2020
- Looked at the number of vaccinations by age (0-18 yo) and vaccine type
- Not much difference Jan-Feb 2019 vs Jan-Feb 2020
- Began to see downward trend in March and then more significant change in April
- Some improvement seen in May

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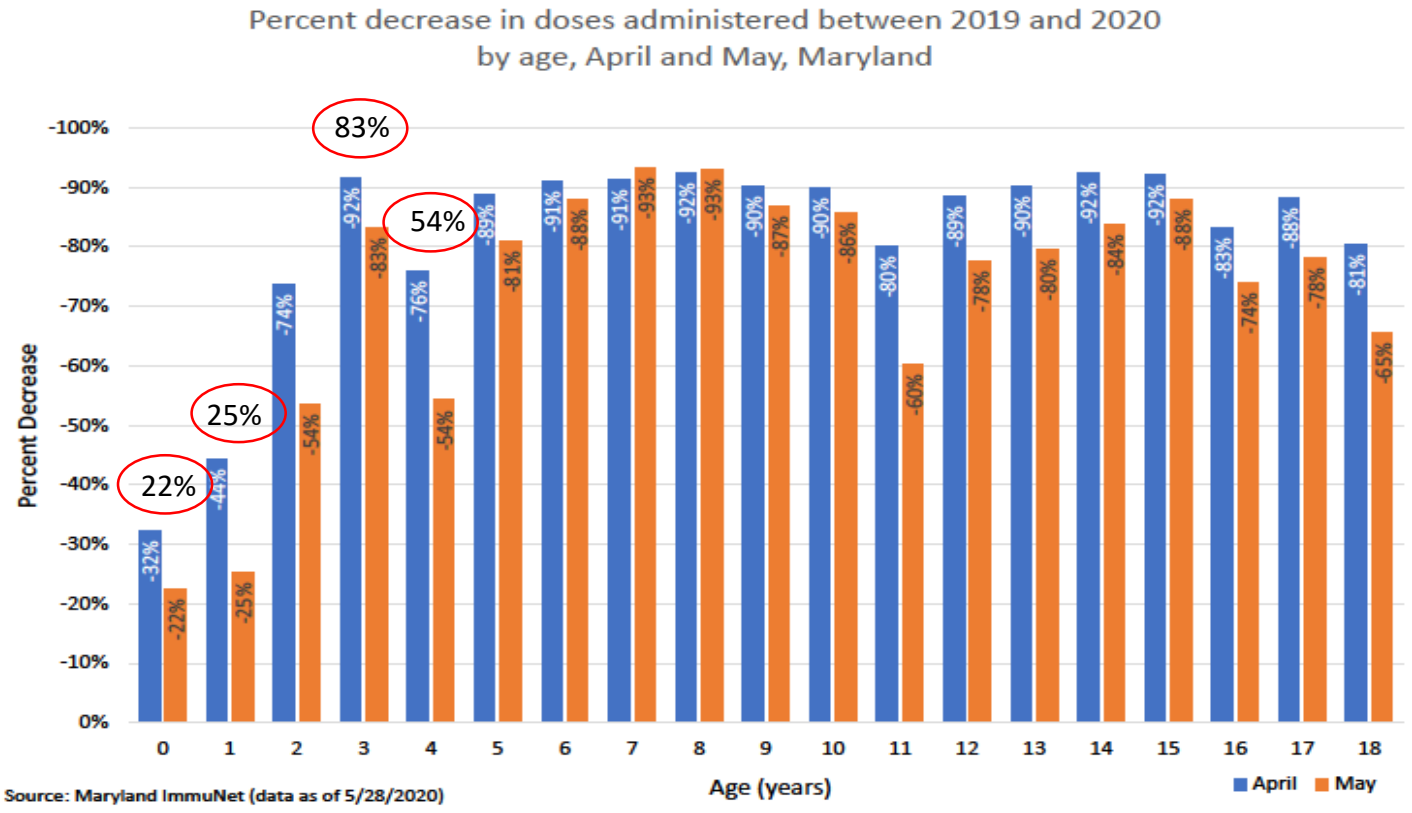
Vaccinations by Age – April/May



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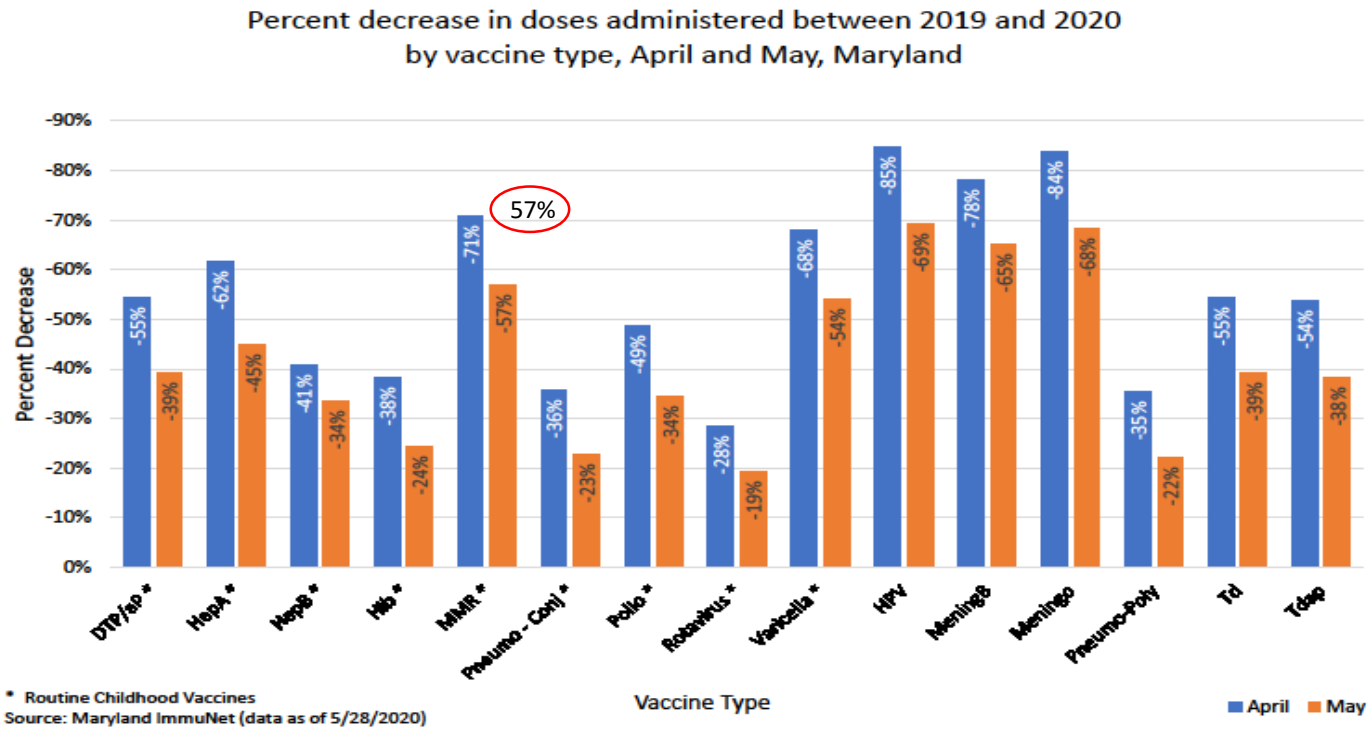
Vaccinations by Vaccine Type – April/May



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State Strategies to Improve Vaccinations

- Communication to parents
  - Child care
  - Schools
    - LSHCs
    - Wellness Councils
  - SBHCs
- Communication Materials
  - FAQ Document
  - Media (PSA, Social Media)
- Program collaborations

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Multisystem Inflammatory Syndrome in Children (MIS-C)

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What is Multisystem Inflammatory Syndrome in Children (MIS-C)?

- Multisystem inflammatory syndrome in children (MIS-C) is a new health condition associated with COVID-19 that is appearing in children the US and elsewhere. The syndrome was previously called pediatric multisystem inflammatory syndrome or PMIS.
- Features of Kawasaki Disease and Toxic Shock Syndrome
- Previously healthy children presenting with a severe inflammatory syndrome with Kawasaki disease-like features
- Most positive for current or recent infection by SARS-CoV-2, or had an epi link to a COVID-19 case

Signs and Symptoms

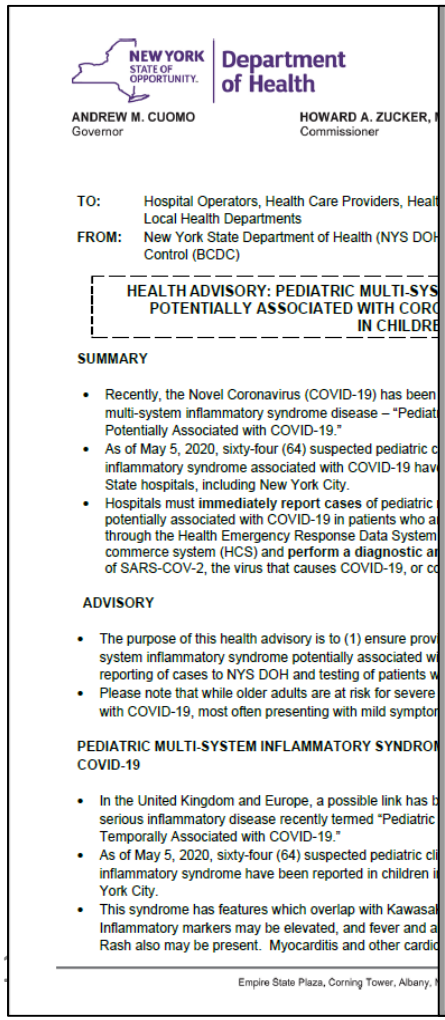
- **Prolonged fever (temperature of 100.4 degrees F or 38.0 degrees C or greater)**
- Irritability or decreased activity
- **Abdominal pain without another explanation (often very severe), diarrhea, vomiting**
- Rash, Swollen hands and feet, which might also be red
- Conjunctivitis (red or pink eyes)
- Poor feeding
- Hypotension
- Multiorgan involvement (cardiac, gastrointestinal, renal, hematologic, dermatologic and neurologic)
- Respiratory symptoms NOT present in all cases

Situational Descriptions

May 5, 2020 case series in NYC

May 6, 2020 case series in the UK (April 2020)

May 13, 2020 one case series in Italy



NEW YORK STATE OF OPPORTUNITY. Department of Health

ANDREW M. CUOMO
Governor

HOWARD A. ZUCKER, M
Commissioner

TO: Hospital Operators, Health Care Providers, Healt
Local Health Departments

FROM: New York State Department of Health (NYS DOH
Control (BCDC)

**HEALTH ADVISORY: PEDIATRIC MULTI-SYS
POTENTIALLY ASSOCIATED WITH CORO
IN CHILDRE**

SUMMARY

- Recently, the Novel Coronavirus (COVID-19) has been
multi-system inflammatory syndrome disease – "Pediat
Potentially Associated with COVID-19."
- As of May 5, 2020, sixty-four (64) suspected pediatric c
inflammatory syndrome associated with COVID-19 hav
State hospitals, including New York City.
- Hospitals must **immediately report cases** of pediatric
potentially associated with COVID-19 in patients who a
through the Health Emergency Response Data System
commerce system (HCS) and **perform a diagnostic ar**
of SARS-COV-2, the virus that causes COVID-19, or co

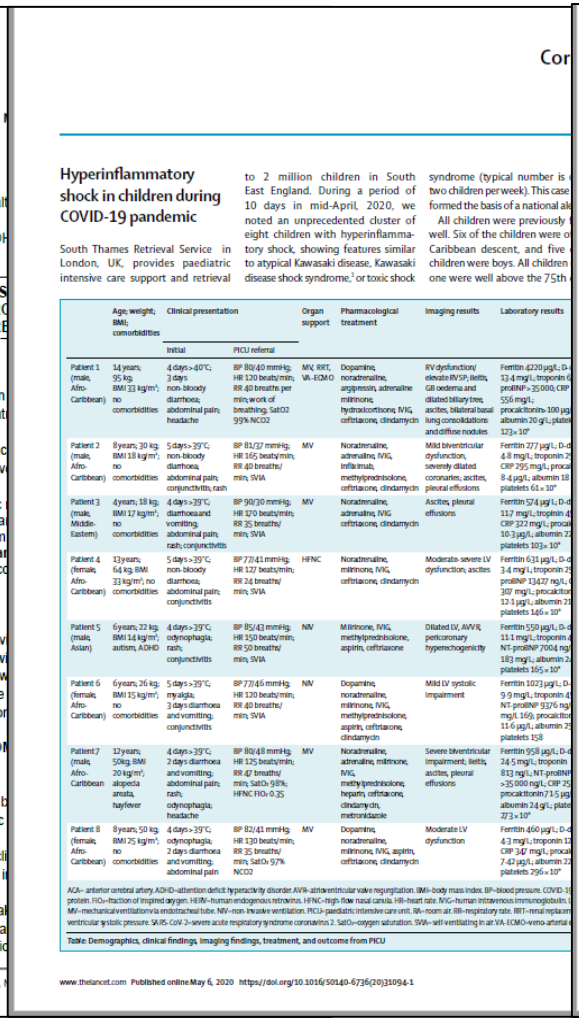
ADVISORY

- The purpose of this health advisory is to (1) ensure prov
system inflammatory syndrome potentially associated wi
reporting of cases to NYS DOH and testing of patients w
- Please note that while older adults are at risk for severe
with COVID-19, most often presenting with mild symptor

**PEDIATRIC MULTI-SYSTEM INFLAMMATORY SYNDRON
COVID-19**

- In the United Kingdom and Europe, a possible link has b
serious inflammatory disease recently termed "Pediatric
Temporally Associated with COVID-19."
- As of May 5, 2020, sixty-four (64) suspected pediatric cli
inflammatory syndrome have been reported in children i
York City.
- This syndrome has features which overlap with Kawasal
Inflammatory markers may be elevated, and fever and a
Rash also may be present. Myocarditis and other cardio

Empire State Plaza, Corning Tower, Albany, N



Cor

Hyperinflammatory shock in children during COVID-19 pandemic

South Thames Retrieval Service in London, UK, provides paediatric intensive care support and retrieval to 2 million children in South East England. During a period of 10 days in mid-April, 2020, we noted an unprecedented cluster of eight children with hyperinflammatory shock, showing features similar to atypical Kawasaki disease, Kawasaki disease shock syndrome,[1] or toxic shock syndrome (typical number is (two children per week). This case formed the basis of a national ale

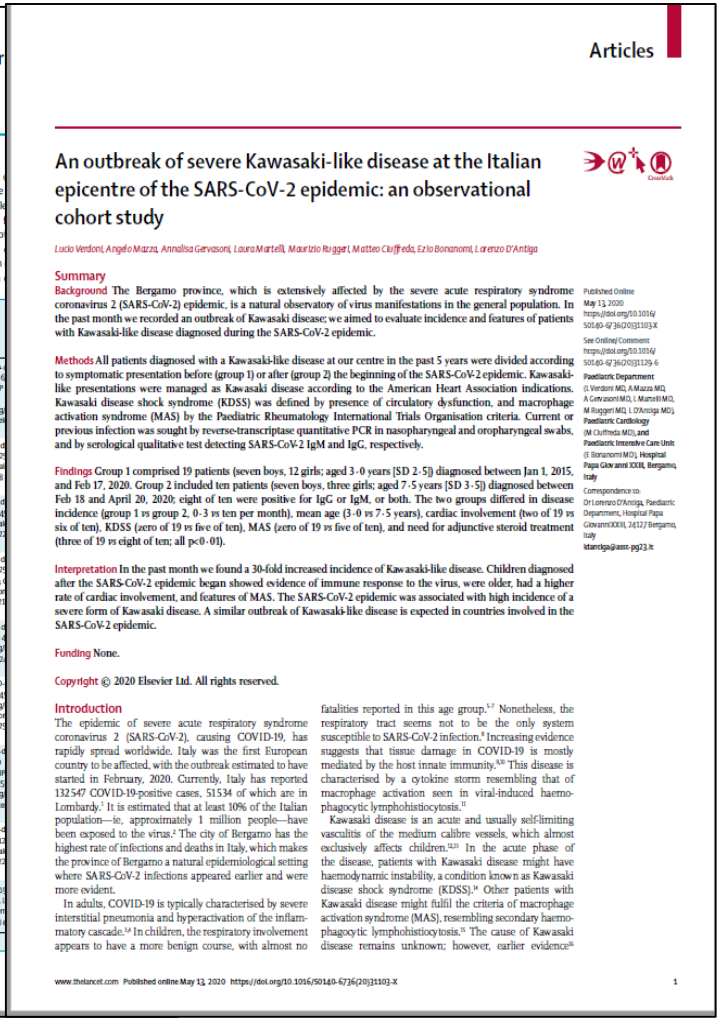
All children were previously well. Six of the children were o Caribbean descent, and five children were boys. All children one were well above the 75th

	Age; weight; BMI; comorbidities	Clinical presentation		Organ support	Pharmacological treatment	Imaging results	Laboratory results
		Initial	PICU referral				
Patient 1 (male, Afro-Caribbean)	14 years; 95 kg; BMI 33 kg/m²; no comorbidities	4 days >40°C; 3 days non-bloody diarrhoea; abdominal pain; headache	BP 80/40 mmHg; HR 120 beats/min; RR 40 breaths per min; work of breathing. SatO2 99% NC02	MV, RRT, VA-ECMO	Dopamine, noradrenaline, angiotensin, adrenaline milrinone, hydrocortisone, IVIG, ceftriaxone, clindamycin	RV dysfunction/ elevate RVSP, ileitis, GB oedema and dilated biliary tree, ascites, bilateral basal lung consolidations and diffuse nodules	Ferritin 4220 µg/L; D-d 13·4 mg/L; troponin 6 proBNP >35 000; CRP 556 mg/L; procalcitonin> 100 µg/ albumin 20 g/L; platel 123×10⁹
Patient 2 (male, Afro-Caribbean)	8 years; 30 kg; BMI 18 kg/m²; no comorbidities	5 days >39°C; non-bloody diarrhoea; abdominal pain; conjunctivitis; rash	BP 81/37 mmHg; HR 165 beats/min; RR 40 breaths/ min; SVIA	MV	Noradrenaline, adrenaline, IVIG, infliximab, methylprednisolone, ceftriaxone, clindamycin	Mild biventricular dysfunction, severely dilated coronaries; ascites, pleural effusions	Ferritin 277 µg/L; D-d 4·8 mg/L; troponin 2 CRP 295 mg/L; procal 8·4 µg/L; albumin 18 platelets 61×10⁹
Patient 3 (male, Middle-Eastern)	4 years; 18 kg; BMI 17 kg/m²; no comorbidities	4 days >39°C; diarrhoea and vomiting; abdominal pain; rash; conjunctivitis	BP 90/30 mmHg; HR 170 beats/min; RR 35 breaths/ min; SVIA	MV	Noradrenaline, adrenaline, IVIG ceftriaxone, clindamycin	Ascites, pleural effusions	Ferritin 574 µg/L; D-d 11·7 mg/L; troponin 4 CRP 322 mg/L; procal 10·3 µg/L; albumin 22 platelets 103×10⁹
Patient 4 (female, Afro-Caribbean)	13 years; 64 kg; BMI 33 kg/m²; no comorbidities	5 days >39°C; non-bloody diarrhoea; abdominal pain; conjunctivitis	BP 77/41 mmHg; HR 127 beats/min; RR 24 breaths/ min; SVIA	HFNC	Noradrenaline, milrinone, IVIG, ceftriaxone, clindamycin	Moderate- severe LV dysfunction; ascites	Ferritin 631 µg/L; D-d 3·4 mg/L; troponin 2 proBNP 13427 ng/L; 6 307 mg/L; procalcitor 12·1 µg/L; albumin 21 platelets 146×10⁹
Patient 5 (male, Asian)	6 years; 22 kg; BMI 14 kg/m²; autism, ADHD	4 days >39°C; odynophagia; rash; conjunctivitis	BP 85/43 mmHg; HR 150 beats/min; RR 50 breaths/ min; SVIA	NIV	Milrinone, IVIG, methylprednisolone, aspirin, ceftriaxone	Dilated LV, AVVR, pericoronary hyperechogenicity	Ferritin 550 µg/L; D-d 11·1 mg/L; troponin 4 NT-proBNP 7004 ng/ 183 mg/L; albumin 2 platelets 165×10⁹
Patient 6 (female, Afro-Caribbean)	6 years; 26 kg; BMI 15 kg/m²; no comorbidities	5 days >39°C; myalgia; 3 days diarrhoea and vomiting; conjunctivitis	BP 77/46 mmHg; HR 120 beats/min; RR 40 breaths/ min; SVIA	NIV	Dopamine, noradrenaline, milrinone, IVIG, methylprednisolone, aspirin, ceftriaxone, clindamycin	Mild LV systolic impairment	Ferritin 1073 µg/L; D-d 9·9 mg/L; troponin 4 NT-proBNP 9376 ng/ mg/L 169; procalcitor 11·6 µg/L; albumin 2 platelets 158
Patient 7 (male, Afro-Caribbean	12 years; 50kg; BMI 20 kg/m²; alopecia areata, hayfever	4 days >39°C; 2 days diarrhoea and vomiting; abdominal pain; rash; odynophagia; headache	BP 80/48 mmHg; HR 125 beats/min; RR 47 breaths/ min; SatO2 98%; HFNC FIO2 0·35	MV	Noradrenaline, adrenaline, milrinone, IVIG, methylprednisolone, heparin, ceftriaxone, clindamycin, metronidazole	Severe biventricular impairment; ileitis, ascites, pleural effusions	Ferritin 958 µg/L; D-d 24·5 mg/L; troponin 812 ng/L; NT-proBNP >35 000 ng/L; CRP 25 procalcitonin 7·5 µg albumin 24 g/L; platel 27·3×10⁹
Patient 8 (female, Afro-Caribbean)	8 years; 50 kg; BMI 25 kg/m²; no comorbidities	4 days >39°C; odynophagia; 2 days diarrhoea and vomiting; abdominal pain	BP 82/41 mmHg; HR 130 beats/min; RR 35 breaths/ min; SatO2 97% NC02	MV	Dopamine, noradrenaline, milrinone, IVIG, aspirin, ceftriaxone, clindamycin	Moderate LV dysfunction	Ferritin 460 µg/L; D-d 4·3 mg/L; troponin 12 CRP 347 mg/L; procal 7·42 µg/L; albumin 22 platelets 296×10⁹

ACA=anterior cerebral artery. ADHD=attention deficit hyperactivity disorder. AVR=atrioventricular valve regurgitation. BMI=body mass index. BP=blood pressure. COVID-19 protein. FIO2=fraction of inspired oxygen. HFNC=high-flow nasal cannula. HR=heart rate. IVIG=human intravenous immunoglobulin. MV=mechanical ventilation via endotracheal tube. NIV=non-invasive ventilation. PICU=paediatric intensive care unit. RA=room air. RR=respiratory rate. RRT=renal replacem ventricular systolic pressure. SARS-CoV-2=severe acute respiratory syndrome coronavirus 2. SatO2=oxygen saturation. SVIA=self-ventilating in air. VA-ECMO=veno-arterial

Table: Demographics, clinical findings, imaging findings, treatment, and outcome from PICU

www.thelancet.com Published online May 6, 2020 https://doi.org/10.1016/S0140-6736(20)31094-1



Articles

An outbreak of severe Kawasaki-like disease at the Italian epicentre of the SARS-CoV-2 epidemic: an observational cohort study

Lucio Verdoni, Angelo Mazza, Annalisa Gervasoni, Laura Martelli, Maurizio Ruggeri, Matteo Ciuffreda, Ezio Bonanomi, Lorenzo D'Antiga

Summary

Background The Bergamo province, which is extensively affected by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epidemic, is a natural observatory of virus manifestations in the general population. In the past month we recorded an outbreak of Kawasaki disease; we aimed to evaluate incidence and features of patients with Kawasaki-like disease diagnosed during the SARS-CoV-2 epidemic.

Methods All patients diagnosed with a Kawasaki-like disease at our centre in the past 5 years were divided according to symptomatic presentation before (group 1) or after (group 2) the beginning of the SARS-CoV-2 epidemic. Kawasaki-like presentations were managed as Kawasaki disease according to the American Heart Association indications. Kawasaki disease shock syndrome (KDSS) was defined by presence of circulatory dysfunction, and macrophage activation syndrome (MAS) by the Paediatric Rheumatology International Trials Organisation criteria. Current or previous infection was sought by reverse-transcriptase quantitative PCR in nasopharyngeal and oropharyngeal swabs, and by serological qualitative test detecting SARS-CoV-2 IgM and IgG, respectively.

Findings Group 1 comprised 19 patients (seven boys, 12 girls; aged 3·0 years [SD 2·5]) diagnosed between Jan 1, 2015, and Feb 17, 2020. Group 2 included ten patients (seven boys, three girls; aged 7·5 years [SD 3·5]) diagnosed between Feb 18 and April 20, 2020; eight of ten were positive for IgG or IgM, or both. The two groups differed in disease incidence (group 1 *vs* group 2, 0·3 *vs* ten per month), mean age (3·0 *vs* 7·5 years), cardiac involvement (two of 19 *vs* six of ten), KDSS (zero of 19 *vs* five of ten), MAS (zero of 19 *vs* five of ten), and need for adjunctive steroid treatment (three of 19 *vs* eight of ten; all p<0·01).

Interpretation In the past month we found a 30-fold increased incidence of Kawasaki-like disease. Children diagnosed after the SARS-CoV-2 epidemic began showed evidence of immune response to the virus, were older, had a higher rate of cardiac involvement, and features of MAS. The SARS-CoV-2 epidemic was associated with high incidence of a severe form of Kawasaki disease. A similar outbreak of Kawasaki-like disease is expected in countries involved in the SARS-CoV-2 epidemic.

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See Online/Comment https://doi.org/10.1016/S0140-6736(20)31129-6

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Introduction

The epidemic of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), causing COVID-19, has rapidly spread worldwide. Italy was the first European country to be affected, with the outbreak estimated to have started in February, 2020. Currently, Italy has reported 132 547 COVID-19-positive cases, 51 534 of which are in Lombardy.[1] It is estimated that at least 10% of the Italian population—ie, approximately 1 million people—have been exposed to the virus.[2] The city of Bergamo has the highest rate of infections and deaths in Italy, which makes the province of Bergamo a natural epidemiological setting where SARS-CoV-2 infections appeared earlier and were more evident.

In adults, COVID-19 is typically characterised by severe interstitial pneumonia and hyperactivation of the inflammatory cascade.[3,4] In children, the respiratory involvement appears to have a more benign course, with almost no fatalities reported in this age group.[5–7] Nonetheless, the respiratory tract seems not to be the only system susceptible to SARS-CoV-2 infection.[8] Increasing evidence suggests that tissue damage in COVID-19 is mostly mediated by the host innate immunity.[9,10] This disease is characterised by a cytokine storm resembling that of macrophage activation seen in viral-induced haemophagocytic lymphohistiocytosis.[11]

Kawasaki disease is an acute and usually self-limiting vasculitis of the medium calibre vessels, which almost exclusively affects children.[12,13] In the acute phase of the disease, patients with Kawasaki disease might have haemodynamic instability, a condition known as Kawasaki disease shock syndrome (KDSS).[14] Other patients with Kawasaki disease might fulfil the criteria of macrophage activation syndrome (MAS), resembling secondary haemophagocytic lymphohistiocytosis.[15] The cause of Kawasaki disease remains unknown; however, earlier evidence[16]

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Centers for Disease Control and Prevention: HAN (5/14/2020)

Case Definition for Multisystem Inflammatory Syndrome in Children (MIS-C)

- An individual aged <21 years presenting with fever[i], laboratory evidence of inflammation[ii], and evidence of clinically severe illness requiring hospitalization, with multisystem (≥2) organ involvement (cardiac, renal, respiratory, hematologic, gastrointestinal, dermatologic or neurological); **AND**
- No alternative plausible diagnoses; **AND**
- Positive for current or recent SARS-CoV-2 infection by RT-PCR, serology, or antigen test; or COVID-19 exposure within the 4 weeks prior to the onset of symptoms

[i]Fever ≥38.0°C for ≥24 hours, or report of subjective fever lasting ≥24 hours
[ii]Including, but not limited to, one or more of the following: an elevated C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), fibrinogen, procalcitonin, d-dimer, ferritin, lactic acid dehydrogenase (LDH), or interleukin 6 (IL-6), elevated neutrophils, reduced lymphocytes and low albumin

Additional comments

- Some individuals may fulfill full or partial criteria for Kawasaki disease but should be reported if they meet the case definition for MIS-C
- Consider MIS-C in any pediatric death with evidence of SARS-CoV-2 infection

https://emergency.cdc.gov/han/2020/han00432.asp

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Key Takeaways

- There is still much uncertainty in the pandemic
- The role of schools in this epidemic will continue to evolve
  - Need for School Health guidance
- Several secondary consequences of COVID-19 in children that pose challenges to children and schools (e.g., IZ, MIS-C, other)
  - Need community collaborations and communication

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Discussion and Questions

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