

Acute Inflammatory Illness in Children Temporally Linked to COVID-19 aka Multi Inflammatory Syndrome in Children (MIS-C)

GOAL: Awareness of the Syndrome, early identification of its signs that can be recognized by parents/caregivers, EMS systems, and other first responders, with transport to an appropriate hospital for further evaluation & care.

Background: Two labels for one scary syndrome. The first one is from the WHO and the second one is from the CDC for the U.S. The “temporally linked” to COVID is important since no one is sure yet that COVID-19 and this syndrome are cause and effect, but the vast majority of the cases reported have children either testing positive for SARS-CoV-2 or having antibodies to it (showing previous infection). Typically, the COVID infection occurred without any symptoms or with mild symptoms which did not seem to indicate COVID. Other times, the child was found during contact tracing as one who had been exposed to another, had a family member that had been sick with COVID, or lived in a particular area with a spike in COVID cases that matches up to the timeline. In general, this Inflammatory Syndrome can occur anywhere from two to six weeks after the COVID-19 infection, with four being the most common. First identified in late March in the UK, other countries began finding it, in small numbers in other countries in Europe, then found in New York City in early May, with Canada putting out a Health Advisory on May 12 and the CDC following on May 14. Reportedly, about a thousand cases have been found worldwide. No one is sure if this is a brand-new syndrome sharing signs & symptoms with some old ones, or if it is the body responding to the COVID-19 infection with either complete or incomplete Kawasaki Disease (KD) and/or Toxic Shock Syndrome (TSS).

MIS-C puts the patient at risk for serious and life-threatening medical complications, depending on what system(s) are affected. No one is still quite sure of the cause or pathways of it, but believe that the Syndrome is an inflammatory process which is part of an uncontrolled immune response or, in some cases, may be a septic event. There can be damage done to the many of systems of the body including cardiac, hematologic, neurological, gastrointestinal, renal, and skin.

Either way, **time matters**. If these children are found and treated effectively in the first couple of days, they do really well and leave the hospital quickly. If treatment is delayed, the syndrome takes better hold and causes more persistent damage requiring more supportive treatment and even death.

Until more is known about this Syndrome, the most important thing is early recognition by the parents or caregivers (believe them that something is wrong or has changed). Be aware and looking for it just as you are/were for COVID-19. Spread the word to your friends, family, religious leaders, to anyone who can get the word out. It may save a life.

Although there are mostly minor differences in the Case Definitions of the virus, the one most relevant to EMS is that the WHO uses ages 0-19 and the CDC uses < 21. Canada hasn't finalized their Case Definition yet but promises that it will be out soon. The complete case definition is harder for EMS to utilize, and is appropriate for hospital settings where more in depth testing is possible.

For our purposes, the signs and symptoms were blended and mostly taken from the CDC list provided for parents to recognize the Syndrome, while the WHO's case definition symptoms, that can be assessed in the pre-hospital environment, are included.

Signs & Symptoms that EMS Should Assess For

CDC EMS Possible Signs/Symptoms of MIS-C	WHO EMS-Adjusted Case Definition of Multisystem Inflammatory Disorder
Fever $\geq 38.0^{\circ}$ C (100.4 $^{\circ}$ F) ≥ 24 hours	Fever $\geq 38.0^{\circ}$ C (100.4 $^{\circ}$ F) ≥ 3 days
AND	AND TWO OF THE FOLLOWING
Abdominal Pain	Rash
Vomiting	Bilateral Conjunctivitis without Pus
Diarrhea	Mucous membrane Signs - Oral
Neck Pain	Skin Signs – hands/feet
Rash	Hypotension or Shock
Conjunctivitis	Features of Myocardial Dysfunction
Feeling extra fatigue	Acute GI Signs: vomiting/diarrhea
	Abdominal Pain
CDC More Emergent Possible Signs of MIS-C	
Chest Pain or Pressure that Persists	
Difficulty Breathing / Signs of Hypoxia	
New Confusion	
Decreased GCS	
Cyanosis in lips or face	
Severe Abdominal Pain	
Swollen Lymph Glands	

Template for Multisystem Inflammatory Syndrome Awareness, Policy & Protocol Development

This Multisystem Inflammatory Syndrome (every country seems to have a slightly different name) has only been identified since March. The guesstimate is that there might be about 1000 cases worldwide and the U.S. seems to have the most so far, with more than 200 in a fair amount of states. It is theorized that this syndrome has an association with COVID-19 but that has not been proven. A registry for the reporting of all cases has been developed. Those Physicians taking care of these children and teens affected, as well as Public Health Officials, at the Local, State/Provincial, and Federal levels are all exchanging information on a regular basis.

The multi-disciplinary teams that are treating these pediatric patients have rapidly learned, based on management of similar diseases/syndromes (like Kawasaki and Toxic Shock), how to quickly and successfully manage their care. That's if they get them to a Pediatric Medical Center quick enough. Some agencies will have their choice of Pediatric Hospitals (stand alone or integrated), others will have to develop back up plans to stabilize and transfer, if Pedi Centers are further away. Lastly, since this is so new, as more data is collected and analyzed, expect modified case definitions, suggestions for care, etc. Monitor the FirstWatch Health Intelligence Page (HIP) for updates as they develop <https://www.firstwatch.net/hi/> . Here are some suggestions for developing a program to help these affected kids.

1. Secure a meeting with appropriate stakeholders including EMS and other Agency Leadership with the Medical Director, Operations, and Infection Control or Occupational Health personnel. Consider inviting to the initial meeting, or a subsequent one, Local Public Health Officials who may have a firm idea of the amount of COVID-19 in your area, and if there have been cases of this Inflammatory Syndrome (it is a reportable disease in all countries). Others who might have helpful input would include ED and/or Pediatric Management from those hospitals that accept pediatric patients, especially the potentially very sick ones. However, if the Agency is distant from a Pediatric Receiving Hospital, consider also having those hospital representatives that would receive these patients, stabilize, and then transfer to a Regional Pediatric Center. The goal is to identify these children/teenagers as rapidly as possible, and get them to care early enough to stop the inflammatory process and send the child/teen home intact. With early, good care, this is possible. Very advanced procedures may be required for some of these children, and multi system assessment and lab work is essential.

2. Consider devising a plan for EMS Responders for these patients, including specific requirements for assessment and management, which may even need some policy or protocol adjustment for better care. If the Medical Director has not already done so, it would be helpful if he/she, or the entire team, could meet with Pediatric Specialists including Infectious Disease, Critical Care, Rheumatology, Cardiology and Immunology, who can help with a better understanding of the syndrome and EMS's role in it. They can also help in the development of Policies and Protocols for assessment, treatment, and transport guidance. They may also be useful for telemedicine or quick consults for specific patients.

In order to begin, there is a Sample Protocol, found below, that can be used as a starting point. It contains some suggestions for assessment and care that have come out of the

literature, and directly from practitioners during recent webinars. There is also a list of signs and symptoms, one from the CDC and the other from the WHO, that have been adjusted from the case definitions and what parents have been told to look for, so that EMS can recognize possible victims of this syndrome, and get them to effective care. Canada is working on their Case Definition and expect that it will be out soon, perhaps on June 1.

There is an exceptional PowerPoint and Webinar recording from today that will be available in the next day or so for anyone interested in watching. It contains more information on the syndrome and was presented by Pat Frost, RN, PHN, MS, PNP. She is Vice Chair of the National Pediatric Disaster Coalition and was the EMS Director for Contra Costa County.

What EMS Can Do

1. Gather as much pre-arrival info as possible from dispatch related to S/S, etc.
2. If Inflammatory Multisystem Syndrome is suspected, **don appropriate PPE per COVID-19 Policy**. Children often shed virus longer than adults.
3. Obtain the child's or teen's medical & event history. Determine if they may have had or been exposed to COVID-19 (realizing that they may have been asymptomatic or mildly symptomatic with only cold or GI symptoms), been exposed to a family member or health care worker, or be in an area with known COVID.
4. Remember children compensate well until they don't. Don't let the presentation fool you. Assess the child/teen carefully unless in obvious shock or requiring resuscitation. Include:
 - a. **level of consciousness**, general appearance & affect, age appropriate behavior
 - b. **respiratory rate**, audible breathing noises, accessory muscle use or retracting, **lung sounds** (all fields; include under axilla for better separation from heart sounds; check bases), **Pulse Ox, ETCO₂**, if possible. **Apply O₂**, if needed per Protocol.
 - c. **skin color & temperature**, signs of **rash** or other **skin defect**, examine mouth/lips for signs of redness, skin sloughing, or strawberry tongue.
 - d. check **BP, peripheral pulses & cap refill times** (absence or delay suggestive of shock); check body **temperature**, if not reported by caregiver. 3 or 5 lead **EKG** per protocol.
5. **Determine if Inflammatory Syndrome possible. Consult Medical Direction**, if indicated. **Determine Transport Destination and go ASAP. Inform Receiving Hospital** of transport and concerns so they can be ready to receive. **Maintain PPE except for Driver as per SOP.**
6. Perform any treatment necessary, per Protocol.
 - a. **Titrate O₂** per vital signs and other exam results, per Protocol.
 - b. **If signs of shock, secure IV access**, per protocol and give a lower than normal **bolus @ 10 ml/kg (max 500 ml)**. **Reassess BP, P, skin and lung sounds**. If lungs clear in all fields and still shock, repeat **10 ml/kg bolus** and then recheck. Titrate per Medical Direction, Protocol, or when stable.
 - c. **If approved by Medical Direction in real time**, consider **early vasopressor, if needed**. Dopamine is reportedly less helpful in these patients than other meds are. **Discuss fluid amount, dose & rate with Medical Direction.**
7. Upon Arrival at Hospital, **renotify of possible case and wait for direction**. After patient transfer, Document appropriately and according to SOP. **Decon truck per COVID SOP.**