

# Multisystem Inflammatory Syndrome in Children (MIS-C)

## Associated with COVID-19 Disease

**MIS-C** is a newly described syndrome likely related to COVID-19 in children. Consider MIS-C in a child presenting with persistent fever, inflammation (neutrophilia, elevated CRP and lymphopenia) and evidence of single or multi-organ dysfunction (shock, cardiac, respiratory, renal, gastrointestinal or neurological disorder). This may include children fulfilling full or partial criteria for Kawasaki disease.

### ► VARIOUS CLINICAL MANIFESTATION PATTERNS

- Refractory vasodilatory shock (toxic shock syndrome), normal cardiac function
- Septic and/or cardiogenic shock state with impaired cardiac function
- Kawasaki-like illness
- HLH/Macrophage Activation Syndromes
- Some combination of the above
- **Usually few to no respiratory symptoms**

See CDC case definition:  
<https://emergency.cdc.gov/han/2020/han00432.asp>

### ► CLINICAL FEATURES

- **Symptoms:** Sore throat, headache, abdominal pain, vomiting, rash, and conjunctivitis
- **Signs:** Fever, Shock, Rash, conjunctivitis, swollen hands/feet, and hypoxia
- **Labs:** Elevated CRP, BNP, Neutrophils, D-Dimers. Decreased lymphocytes
- **COVID-19 PCR:** May or may not be positive, may have positive antibody test
- Exclusion of any other microbial cause, including bacterial sepsis, staphylococcal or streptococcal shock syndromes, infections associated with myocarditis such as enterovirus

### ► EVALUATION

LABS		IMAGING	
Basic	CBC, BMP, LFTs	Echocardiogram	Evaluate for decreased contractility, myocarditis, KD features (coronaries)
Inflammatory/Rheum	CRP <b>AND</b> ESR, ferritin, cytokine panel, sIL-2 receptor, fibrinogen, triglycerides		
Heme/Onc	PT/INR, PTT, D-Dimer, LDH	Chest radiograph	Despite minimal respiratory symptoms, many have significant but varied CXR changes
Cardiac	BNP, troponin		
Infectious Disease	COVID-19 (SARS-CoV-2) PCR and antibody	Consider Abdominal U/S	colitis, HSM, ascites

### ► EARLY MEDICAL MANAGEMENT

- Empiric antibiotics per sepsis protocols with blood cultures.
- **Seek consult recommendations** for any patient with signs of shock requiring aggressive fluid resuscitation/inotropes where symptoms are not explained by another diagnosis. Recommend consultation with infectious disease and rheumatology **PRIOR** to starting the treatments listed below.
- The following treatments have been given (no proven or preferred therapy yet)
  - Corticosteroids
  - Anakinra
  - IVIG; aspirin if meets Kawasaki Disease criteria

These guidelines apply to common clinical circumstances, and may not be appropriate for certain patients and situations. The treating clinician must use judgment in applying guidelines to the care of individual patients.