# COVID-19 Updates: What Clinicians Need to Know About Multisystem Inflammatory Syndrome in Children

Clinician Outreach and Communication Activity (COCA) Call

Thursday, February 10, 2022

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- The presentation will not include any discussion of the unlabeled use of a product or a product under investigational use.

- CDC did not accept commercial support for this continuing education activity.

# Objectives

At the conclusion of today's session, the participant will be able to accomplish the following:

- Describe sources of MIS-C surveillance data.
- Identify resources on MIS-C symptoms and what parents and caregivers need to know before and after a diagnosis of MIS-C.
- List key points for healthcare providers to use when talking with families and caregivers about MIS-C.
- Discuss information related to COVID-19 vaccination and MIS-C.

# To Ask a Question

- Using the Zoom Webinar System
  - Click on the “Q&A” button
  - Type your question in the “Q&A” box
  - Submit your question

- If you are a patient, please refer your question to your healthcare provider.

- If you are a member of the media, please direct your questions to CDC Media Relations at 404-639-3286 or email media@cdc.gov

# Today's Presenters

**Angela Campbell, MD, MPH, FAAP, FPIDS, FIDSA**
Medical Officer
Multisystem Inflammatory Syndrome (MIS) Unit
COVID-19 Response
Centers for Disease Control and Prevention

**Shana Godfred-Cato, DO, FAAP**
Medical Officer
Multisystem Inflammatory Syndrome (MIS) Unit
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**Anna Yousaf, MD**
Medical Officer
Multisystem Inflammatory Syndrome (MIS) Unit
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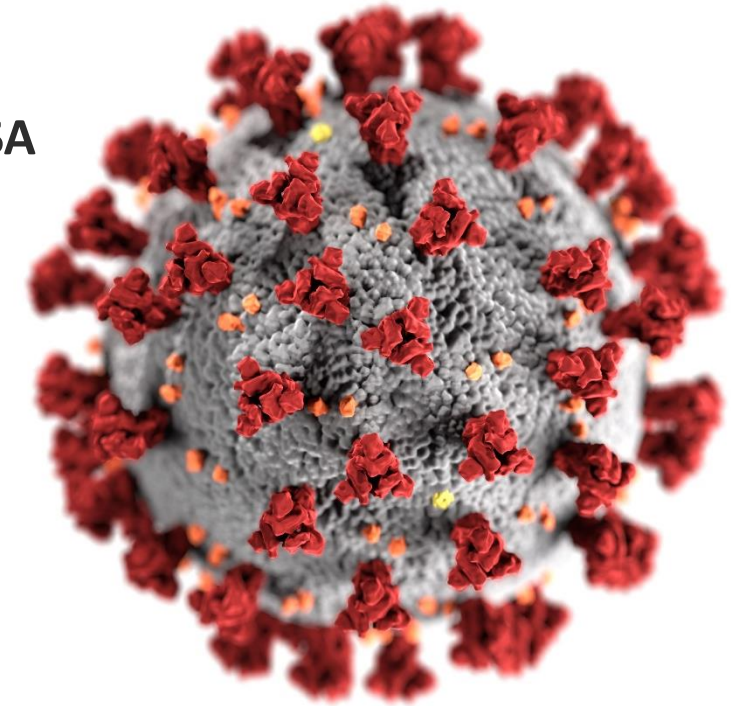
Centers for Disease Control and Prevention

# COVID-19 Updates: What Clinicians Need to Know About Multisystem Inflammatory Syndrome in Children (MIS-C)

**Angela Campbell, MD, MPH, FAAP, FPIDS, FIDSA**
**Shana Godfred-Cato, DO, FAAP**
**Anna Yousaf, MD**



**CDC COCA Call**
**February 10, 2022**

**cdc.gov/coronavirus**

# CDC Surveillance for MIS-C

# Multisystem Inflammatory Syndrome in Children (MIS-C)

- April 2020 – Severe inflammatory syndrome recognized in the UK, occurring in children with current or recent infection with SARS-CoV-2, the virus that causes COVID-19
- May 2020 – Cases reported in New York City and New York State
- May 14, 2020 – CDC recommended healthcare professionals report patients meeting the MIS-C case definition to local, state, and territorial health departments

Multisystem Inflammatory Syndrome in Children (MIS-C) Associated with Coronavirus Disease 2019 (COVID-19)



Distributed via the CDC Health Alert Network
May 14, 2020, 4:45 PM ET
CDCHAN-00432

# MIS-C Case Definition

- An individual aged <21 years presenting with fever,* laboratory evidence of inflammation,** 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 exposure to a suspected or confirmed COVID-19 case within the 4 weeks prior to the onset of symptoms.

*Fever >38.0°C for ≥24 hours, or report of subjective fever lasting ≥24 hours

**>1 of the following: 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 or low albumin

Information for HCPs about MIS-C: https://www.cdc.gov/mis/mis-c/hcp/index.html **is available on CDC's website.**

# National Surveillance: Health Department-reported Cases of MIS-C

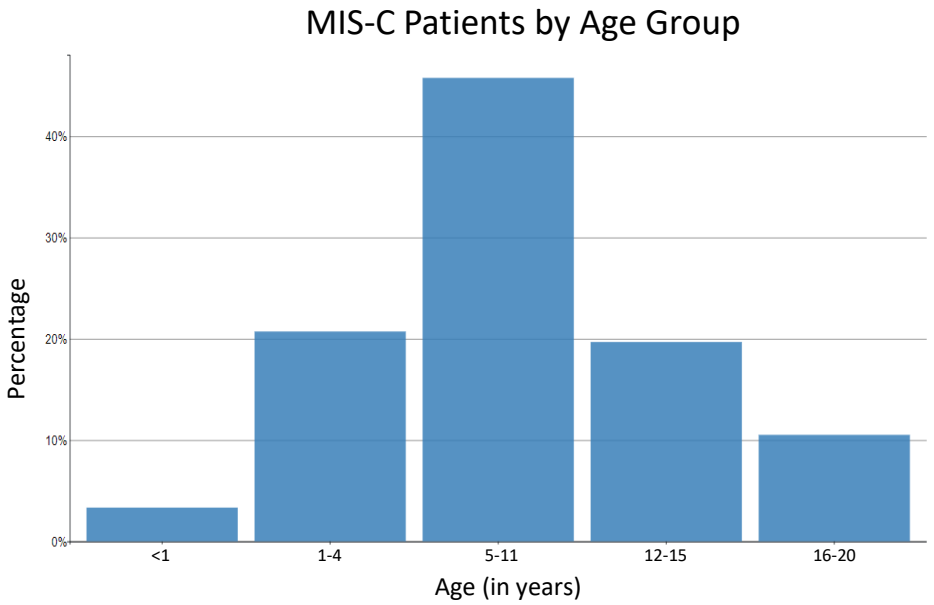
- Passive surveillance
- Healthcare professionals voluntarily report to state, local, and territorial health departments
- Health departments report voluntarily to CDC
- Not nationally notifiable condition, but provides standardized surveillance
- Cases have been reported from 54 U.S. jurisdictions (50 states, New York City, Puerto Rico, Guam, and Washington, DC)
- Reported MIS-C cases are posted each month on the COVID Data Tracker MIS-C page

**The COVID Data Tracker: https://covid.cdc.gov/covid-data-tracker/ has details on health department-reported MIS-C cases.**

# National Surveillance: Health Department-reported Cases of MIS-C (by age)

**Date of reported MIS-C onset**
**February 19, 2020–January 31, 2022**

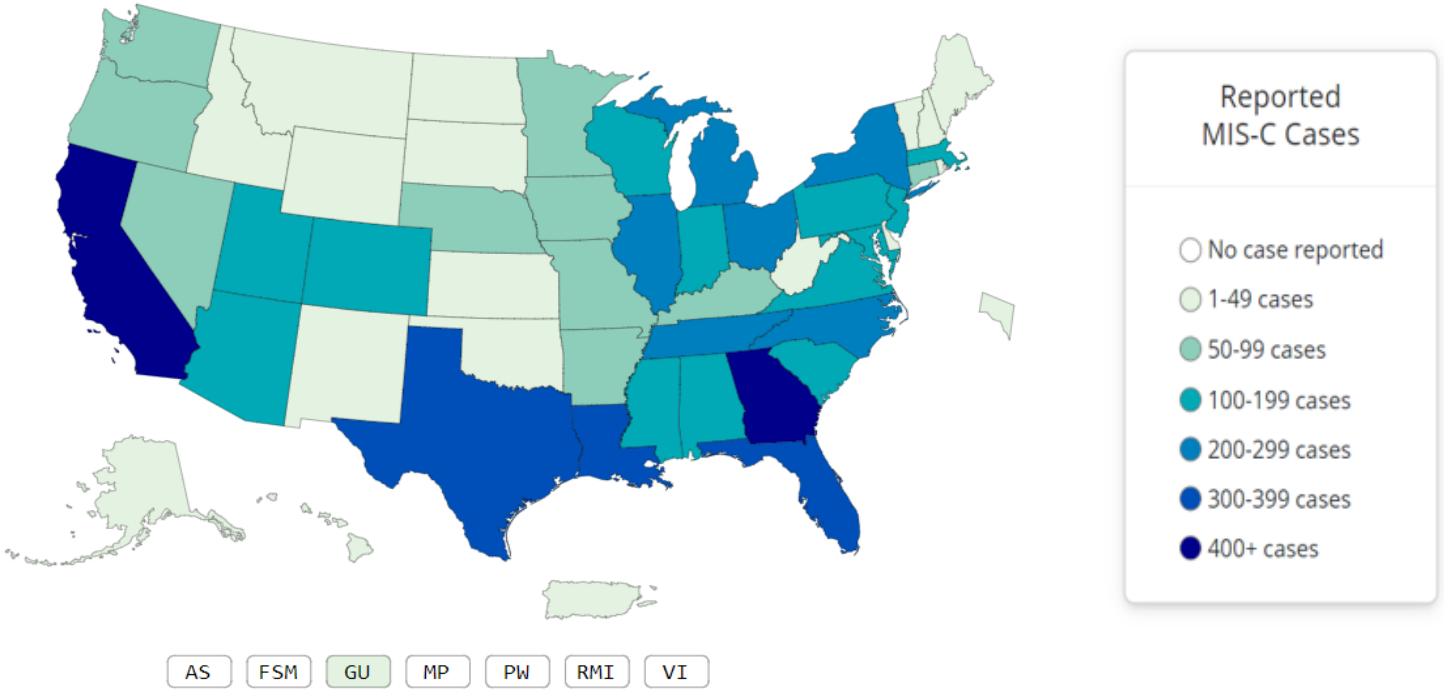
- 6,851 MIS-C cases reported
- 59 deaths
- Median age of 9 years
- 60% male
- 32% occurred in children who are non-Hispanic Black; 27% in children who are Hispanic/Latino




**The COVID Data Tracker: https://covid.cdc.gov/covid-data-tracker/ has details on health department-reported MIS-C cases.**

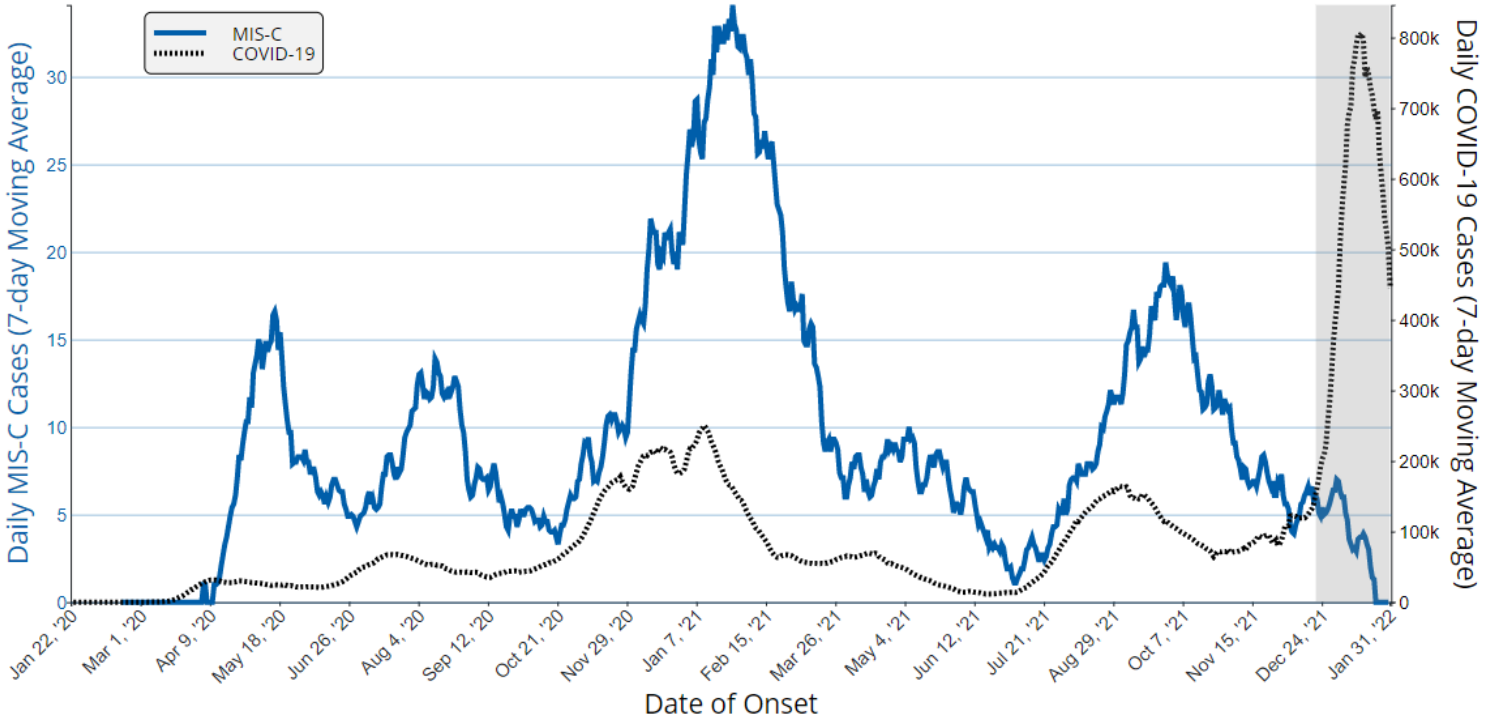
# National Surveillance by Jurisdictions: Health Department-reported Cases of MIS-C

**February 19, 2020 – January 31, 2021**




The COVID Data Tracker: https://covid.cdc.gov/covid-data-tracker/ has details on health department-reported MIS-C cases.

# Daily MIS-C Cases and COVID-19 Cases Reported to CDC (7-Day Moving Average)




N=6,849; Gray area on right represents most recent 6 weeks of data, for which case reports are likely incomplete.

**Refer to the CDC COVID Data Tracker: https://covid.cdc.gov/covid-data-tracker/#mis-national-surveillance.**

# MIS-C National Surveillance

## What can we do with these data?

- Examine demographic and clinical characteristics among reported cases
- Examine changes in reported demographic and clinical characteristics over time
- Describe treatments received
- Use toward estimation of MIS-C incidence

## What can we not do with these data?

- Understand details of clinical course
- Assess effectiveness of various interventions/treatments
- Infer causality with regard to treatment and resolution
- Quantify the burden of MIS-C in the United States

# COVID-19–Associated Multisystem Inflammatory Syndrome in Children — United States, March–July 2020

Shana Godfred-Cato, DO[1]; Bobbi Bryant, MPH[1,2]; Jessica Leung, MPH[1]; Matthew E. Oster, MD[1]; Laura Conklin, MD[1]; Joseph Abrams, PhD[1]; Katherine Roguski, MPH[1]; Bailey Wallace, MPH[1,2]; Emily Prezzato, MPH[1]; Emilia H. Koumans, MD[1]; Ellen H. Lee, MD[3]; Anita Geevarughese, MD[3]; Maura K. Lash, MPH[3]; Kathleen H. Reilly, PhD[3]; Wendy P. Pulver, MS[4]; Deepam Thomas, MPH[5]; Kenneth A. Feder, PhD[6]; Katherine K. Hsu, MD[7]; Nottasorn Plipat, MD, PhD[8]; Gillian Richardson, MPH[9]; Heather Reid[10]; Sarah Lim, MBBCh[11]; Ann Schmitz, DVM[12,13]; Timmy Pierce, MPH[1,2]; Susan Hrapcak, MD[1]; Deblina Datta, MD[1]; Sapna Bamrah Morris, MD[1]; Kevin Clarke, MD[1]; Ermias Belay, MD[1]; California MIS-C Response Team

**Three classes of patients:**

- **Class 1 (n=203), "typical" MIS-C**
  - 98% serology positive, 36% RT-PCR positive
  - 100% cardiovascular and 98% GI manifestations
  - Markedly elevated laboratory markers of inflammation
  - 84% ICU admission
- **Class 2 (n=169), acute COVID-19/MIS-C combo**
  - 16% serology positive, 100% RT-PCR positive
  - More severe respiratory involvement (37% pneumonia, 10% ARDS)
  - 62% ICU admission
- **Class 3 (n=198), milder illness**
  - 97% serology positive, 36% RT-PCR positive
  - Younger, median age 6 years
  - Higher frequency of rash (63%), mucocutaneous lesions (45%)
  - 44% ICU admission

Godfred-Cato, et al. *MMWR* 2020;69:1074-80

# Factors linked to severe outcomes in multisystem inflammatory syndrome in children (MIS-C) in the USA: a retrospective surveillance study

*Joseph Y Abrams*, Matthew E Oster*, Shana E Godfred-Cato, Bobbi Bryant, S Deblina Datta, Angela P Campbell, Jessica W Leung, Clarisse A Tsang, Timmy J Pierce, Jordan L Kennedy, Teresa A Hammett, Ermias D Belay*

**JAMA Pediatrics** | Original Investigation

# Trends in Geographic and Temporal Distribution of US Children With Multisystem Inflammatory Syndrome During the COVID-19 Pandemic

Ermias D. Belay, MD; Joseph Abrams, PhD; Matthew E. Oster, MD; Jennifer Giovanni, PhD; Timmy Pierce, MPH; Lu Meng, PhD; Emily Prezzato, MPH; Neha Balachandran, MBBS, MPH; John J. Openshaw, MD; Hilary E. Rosen, MPH; Moon Kim, MD; Gillian Richardson, MPH; Siri Wilson, MPH; Amanda Hartley, BSN, RN; Cassandra Jones; Zachary Colles, MPH; Teresa Hammett, MPH; Pragna Patel, MD; Angela P. Campbell, MD; Shana Godfred-Cato, DO

# Racial and Ethnic Disparities in Multisystem Inflammatory Syndrome in Children in the United States, March 2020 to February 2021

*Bryan Stierman, MD, MPH,*† Joseph Y. Abrams, PhD, MPH,* Shana E. Godfred-Cato, DO,* Matthew E. Oster, MD, MPH,* Lu Meng, PhD,*‡ Luke Yip, MD,* Pragna Patel, MD, MPH,* Neha Balachandran, MBBS, MPH,* Emily Prezzato, MPH,* Timmy Pierce, MPH,*§ Katherine K. Hsu, MD, MPH,¶ Meagan Burns, MPH,¶ Xandy Peterson Pompa, MPH,‖ Priscilla Lauro, MPH,‖ Amanda Hartley, RN, BSN,** Cassandra Jones, MPH,** Stephanie Gretsch, MPH,†† Heather Reid, BS, CHES,‡‡ Sarah Lim, MBBCh,§§ Angela P. Campbell, MD, MPH,* and Ermias D. Belay, MD**

*Open Forum Infectious Diseases*

BRIEF REPORT

# Demographic and Clinical Factors Associated With Death Among Persons <21 Years Old With Multisystem Inflammatory Syndrome in Children—United States, February 2020–March 2021

**Anna Bowen, Allison D. Miller, Laura D. Zambrano, Michael J. Wu, Matthew E. Oster, Shana Godfred-Cato, Ermias D. Belay, and Angela P. Campbell**

CDC COVID-19 Response Team, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

*Clinical Infectious Diseases*

MAJOR ARTICLE

IDSA Infectious Diseases Society of America

hivma hiv medicine association

OXFORD

# Multisystem Inflammatory Syndrome in Children—United States, February 2020–July 2021

**Allison D. Miller,[1] Laura D. Zambrano,[1] Anna R. Yousaf,[1] Joseph Y. Abrams,[1] Lu Meng,[1] Michael J. Wu,[1] Michael Melgar,[1] Matthew E. Oster,[1] Shana E. Godfred Cato,[1] Ermias D. Belay,[1] and Angela P. Campbell[1]; for the MIS-C Surveillance Authorship Group[a]**

[1]CDC COVID-19 Response Team, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

- 4,470 cases of MIS-C reported to CDC's national surveillance system with symptom onset from February 19, 2020, through July 31, 2021
- Frequency of several cardiovascular complications including cardiac dysfunction, myocarditis, and shock/vasopressor receipt declined over time
- Clinical outcomes—including length of hospitalization, receipt of mechanical ventilation, ECMO, and death—improved across the first three pandemic waves of MIS-C

Miller, et al. *Clin Infect Dis.* Online ahead of print 2021 Dec 5.

# Overcoming COVID-19 Network

- Originated as a CDC-funded ICU network led by Boston Children's Hospital to assess influenza vaccine effectiveness against critical illness in pediatric patients
- Active prospective surveillance of MIS-C and severe COVID-19 in hospitalized children through a multicenter network (>60 hospitals in >30 states)
- Detailed epidemiologic and clinical data, interviews on subset
- Biological specimen collection
- Ongoing studies: MIS-C and severe COVID-19 registry; risk factor study; immunobiology study; neurologic/neurodevelopmental outcomes study; COVID-19 vaccine effectiveness

OVERCOMING COVID-19

Boston Children's Hospital

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

# Multisystem Inflammatory Syndrome in U.S. Children and Adolescents

L.R. Feldstein, E.B. Rose, S.M. Horwitz, J.P. Collins, M.M. Newhams, M.B.F. Son, J.W. Newburger, L.C. Kleinman, S.M. Heidemann, A.A. Martin, A.R. Singh, S. Li,

Contents lists available at ScienceDirect

EClinicalMedicine

journal homepage: https://www.journals.elsevier.com/eclinicalmedicine

ELSEVIER

## Data-driven clustering identifies features distinguishing multisystem inflammatory syndrome from acute COVID-19 in children and adolescents

Alon Geva[a,b,c], Manish M. Patel[d,e], Margaret M. Newhams[a], Cameron C. Young[a], Mary Beth F. Son[f], Michele Kong[g], Aline B. Maddux[h], Mark W. Hall[i], Becky J. Riggs[j],

JAMA | Original Investigation

## Characteristics and Outcomes of US Children and Adolescents With Multisystem Inflammatory Syndrome in Children (MIS-C) Compared With Severe Acute COVID-19

Leora R. Feldstein, PhD; Mark W. Tenforde, MD; Kevin G. Friedman, MD; Margaret Newhams, MPH; Erica Billig Rose, PhD; Heda Dapul, M
Vijaya L. Soma, MD; Aline B. Maddux, MD; Peter M. Mourani, MD; Cindy Bowens, MD; Mia Maamari, MD; Mark W. Hall, MD; Becky J. Rigg
John S. Giuliano Jr, MD; Aalok
Stephanie P. Schwartz, MD; Tr
Christopher J. Babbitt, MD; Jar
Tamara T. Bradford, MD; Lincol
Steven M. Horwitz, MD; Ryan
Bria M. Coates, MD; Ashley M.
Adrienne G. Randolph, MD; for

JAMA Neurology | Original Investigation

## Neurologic Involvement in Children and Adolescents Hospitalized in the United States for COVID-19 or Multisystem Inflammatory Syndrome

e, MD; Becky J. Riggs, MD; Tina Y. Poussaint, MD; Cameron C. Young; Margaret M. Newhams, MPH; Mia Maamari, MD;
MD; Aalok R. Singh, MD; Heda Dapul, MD; Charlotte V. Hobbs, MD; Gwenn E. McLaughlin, MD; Mary Beth F. Son, MD;

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

# Multisystem Inflammatory Syndrome in Children — Initial Therapy and Outcomes

M.B.F. Son, N. Murray, K. Friedman, C.C. Young, M.M. Newhams, L.R. Feldstein, L.L. Loftis, K.M. Tarquinio, A.R. Singh, S.M. Heidemann, V.L. Soma, B.J. Riggs, J.C. Fitzgerald, M. Kong, S. Doymaz, J.S. Giuliano, Jr., M.A. Keenaghan, J.R. Hume, C.V. Hobbs, J.E. Schuster, K.N. Clouser, M.W. Hall, L.S. Smith, S.M. Horwitz, S.P. Schwartz, K. Irby, T.T. Bradford, A.B. Maddux, C.J. Babbitt, C.M. Rowan, G.E. McLaughlin, P.H. Yager, M. Maamari, E.H. Mack, C.L. Carroll, V.L. Montgomery, N.B. Halasa, N.Z. Cvijanovich, B.M. Coates, C.E. Rose, J.W. Newburger, M.M. Patel, and A.G. Randolph, for the Overcoming COVID-19 Investigators*

| Analytic Approach and Outcomes | IVIG plus Glucocorticoids | IVIG Alone | Risk Ratio (95% CI) |
|---|---|---|---|
| | *no. of events/total no. (%)* | | |
| **Propensity-Score–Matched Analysis** | | | |
| Primary outcome: cardiovascular dysfunction | 18/103 (17) | 32/103 (31) | 0.56 (0.34–0.94) |
| Secondary outcomes | | | |
| Left ventricular dysfunction | 6/75 (8) | 13/75 (17) | 0.46 (0.19–1.15) |
| Shock resulting in vasopressor use | 13/102 (13) | 24/102 (24) | 0.54 (0.29–1.00) |
| Adjunctive immunomodulatory therapy | 36/106 (34) | 74/106 (70) | 0.49 (0.36–0.65) |
| Persistent or recurrent fever | 31/101 (31) | 40/101 (40) | 0.78 (0.53–1.13) |
| **Inverse-Probability-Weighted Analysis** | | | |
| Primary outcome: cardiovascular dysfunction | 27/133 (20) | 39/160 (24) | 0.65 (0.48–0.89) |
| Secondary outcomes | | | |
| Left ventricular dysfunction | 8/96 (8) | 15/103 (15) | 0.58 (0.32–1.02) |
| Shock resulting in vasopressor use | 21/131 (16) | 30/152 (20) | 0.59 (0.40–0.85) |
| Adjunctive immunomodulatory therapy | 52/134 (39) | 104/161 (65) | 0.53 (0.44–0.62) |
| Persistent or recurrent fever | 40/131 (31) | 66/153 (43) | 0.70 (0.56–0.88) |

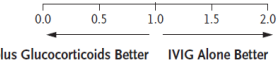



Figure 3. Associations between Initial Treatment with IVIG plus Glucocorticoids, or with IVIG Alone, and Clinical Outcomes.

CDC

JAMA Network Open

Original Investigation | Public Health

# Incidence of Multisystem Inflammatory Syndrome in Children Among US Persons Infected With SARS-CoV-2

Amanda B. Payne, PhD, MPH; Zunera Gilani, PhD, MPH; Shana Godfred-Cato, DO; Ermias D. Belay, MD; Leora R. Feldstein, PhD; Manish M. Patel, MD; Adrienne G. Randolph, MD; Margaret Newhams, MPH; Deepam Thomas, MPH; Reed Magleby, MD; Katherine Hsu, MD, MPH; Meagan Burns, MPH; Elizabeth Dufort, MD; Angie Maxted, DVM, PhD; Michael Pietrowski, MPH; Allison Longenberger, PhD, MPT; Sally Bidol, MPH; Justin Henderson, MPH; Lynn Sosa, MD; Alexandra Edmundson, MPH; Melissa Tobin-D'Angelo, MD, MPH; Laura Edison, DVM; Sabrina Heidemann, MD; Aalok R. Singh, MD; John S. Giuliano Jr, MD; Lawrence C. Kleinman, MD, MPH; Keiko M. Tarquinio, MD; Rowan F. Walsh, MD; Julie C. Fitzgerald, MD, PhD, MSCE; Katharine N. Clouser, MD; Shira J. Gertz, MD; Ryan W. Carroll, MD, MPH; Christopher L. Carroll, MD, MS; Brooke E. Hoots, PhD, MSPH; Carrie Reed, DrPH; F. Scott Dahlgren, MSPH; Matthew E. Oster, MD, MPH; Timmy J. Pierce, MPH; Aaron T. Curns, MPH; Gayle E. Langley, MD, MPH; Angela P. Campbell, MD, MPH; and the MIS-C Incidence Authorship Group

- Adjusted incidence: 316 (95% CI, 278-357) MIS-C cases per million SARS-CoV-2 infections

| | Adjusted* Incidence per Million SARS-CoV-2 Infections in Children (95% CI) | Adjusted* Incidence Rate Ratio (95% CI) |
|---|---|---|
| **Race and Ethnicity** | | |
| White | 110 (77–156) | reference |
| Black/African American | 616 (481–790) | 6 (4–9) |
| Hispanic/Latino | 467 (371–588) | 4 (3–6) |
| Asian/Pacific Islander | 315 (169–589) | 3 (1–6) |

* Adjusted for jurisdiction, race/ethnicity, sex, and age group

Payne, et al, JAMA Netw Open, 2021;4(6):e2116420

Morbidity and Mortality Weekly Report

# Effectiveness of Pfizer-BioNTech mRNA Vaccination Against COVID-19 Hospitalization Among Persons Aged 12–18 Years — United States, June–September 2021

Samantha M. Olson, MPH[1,*]; Margaret M. Newhams, MPH[2,*]; Natasha B. Halasa, MD[3]; Ashley M. Price, MPH[1]; Julie A. Boom, MD[4]; Leila C. Sahni, PhD[4]; Katherine Irby, MD[5]; Tracie C. Walker, MD[6]; Stephanie P. Schwartz, MD[6]; Pia S. Pannaraj, MD[7]; Aline B. Maddux, MD[8]; Tamara T. Bradford, MD[9]; Ryan A. Nofziger, MD[10]; Benjamin J. Boutselis[2]; Melissa L. Cullimore, MD[11]; Elizabeth H. Mack, MD[12]; Jennifer E. Schuster, MD[13]; Shira J. Gertz, MD[14]; Natalie Z. Cvijanovich, MD[15]; Michele Kong, MD[16]; Melissa A. Cameron, MD[17]; Mary A. Staat, MD[18]; Emily R. Levy, MD[19]; Brandon M. Chatani, MD[20]; Kathleen Chiotos, MD[21]; Laura D. Zambrano, PhD[1]; Angela P. Campbell, MD[1]; Overcoming COVID-19 Inv

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

# Effectiveness of BNT162b2 Vaccine against Critical Covid-19 in Adolescents

S.M. Olson, M.M. Newhams, N.B. Halasa, A.M. Price, J.A. Boom, L.C. Sahni, P.S. Pannaraj, K. Irby, T.C. Walker, S.P. Schwartz, A.B. Maddux, E.H. Mack, T.T. Bradford, J.E. Schuster, R.A. Nofziger, M.A. Cameron, K. Chiotos, M.L. Cullimore, S.J. Gertz, E.R. Levy, M. Kong, N.Z. Cvijanovich, M.A. Staat, S. Kamidani, B.M. Chatani, S.S. Bhumbra, K.E. Bline, M.G. Gaspers, C.V. Hobbs, S.M. Heidemann, M. Maamari, H.R. Flori, J.R. Hume, M.S. Zinter, K.N. Michelson, L.D. Zambrano, A.P. Campbell, M.M. Patel, and A.G. Randolph, for the Overcoming Covid-19 Investigators*

Morbidity and Mortality Wee

# Effectiveness of Pfizer-BioNTech mRNA
# Hospitalization Among Persons Aged
# June–Septembe

Samantha M. Olson, MPH[1,*]; Margaret M. Newhams, MPH[2,*]; Natasha B. Halasa, MD[3]
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| Subgroup | Vaccinated Case Patients | Vaccinated Control Patients | Vaccine Effectiveness (95% CI) |
|---|---|---|---|
| | *no. of patients with event/total no. (%)* | | |
| Both control groups combined | | | |
| Any Covid-19 hospitalization | | | |
| Fully vaccinated | | | |
| 12–18 yr | 17/444 (4) | 282/723 (39) | 94 (90–96) |
| 12–15 yr | 8/251 (3) | 156/427 (37) | 95 (88–97) |
| 16–18 yr | 9/193 (5) | 126/296 (43) | 94 (88–97) |
| Partially vaccinated | | | |
| 12–18 yr | 1/428 (<1) | 54/495 (11) | 97 (86–100) |
| Severity of disease, 12–18 yr | | | |
| Fully vaccinated | | | |
| ICU admission for Covid-19 | 2/196 (1) | 282/723 (39) | 98 (93–99) |
| Life support for Covid-19 | 1/127 (<1) | 282/723 (39) | 98 (92–100) |

Morbidity and Mortality Wee

# Effectiveness of Pfizer-BioNTech mRNA V
# Hospitalization Among Persons Aged 1
# June–Septembe

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ORIGINAL ARTICLE

# Effectiveness of BNT162b2 Vaccine against Critical Covid-19 in Adolescents

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| Subgroup | Vaccinated Case Patients | Vaccinated Control Patients | Vaccine Effectiveness (95% CI) |
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| | *no. of patients with event/total no. (%)* | | |
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| Life support for Covid-19 | 1/127 (<1) | 282/723 (39) | 98 (92–100) |

# Self Knowledge Check: The following statements regarding MIS-C during the COVID-19 pandemic are true EXCEPT:

A. Nationally, peaks of pandemic MIS-C activity follow peaks of COVID-19 activity by about 1 month.

B. Individuals aged 16-20 years comprise the highest proportion of MIS-C cases after SARS-CoV-2 infection.

C. Incidence of MIS-C is approximately 316 cases per million SARS-CoV-2 infections, which is 1 case in ~3,200 SARS-CoV-2 infections.

D. MIS-C incidence is higher among Black/African American and Hispanic/Latino children compared with White children.

# Answer: The following statements regarding MIS-C during the COVID-19 pandemic are true EXCEPT:

A. Nationally, peaks of pandemic MIS-C activity follow peaks of COVID-19 activity by about 1 month.

B. **Individuals aged 16-20 years comprise the highest proportion of MIS-C cases after SARS-CoV-2 infection.**

C. Incidence of MIS-C is approximately 316 cases per million SARS-CoV-2 infections, which is 1 case in ~3,200 SARS-CoV-2 infections.

D. MIS-C incidence is higher among Black/African American and Hispanic/Latino children compared with White children.

*Rationale:* **Answer is B –** Children aged 5-11 years have consistently comprised the highest proportion of MIS-C cases.

# MIS-C Healthcare Professional Project and Resources

# MIS-C Healthcare Professional (HCP) Engagement Project

- **Objective:** Assess and address HCP awareness, attitudes, knowledge, and resource needs with respect to MIS-C

- **Project Phases:**

**Phase 1**
- Quantitative MIS-C HCP Survey (*N*=272)

**Phase 2**
- In-Depth Interviews (IDIs) with HCPs (*N*=24)

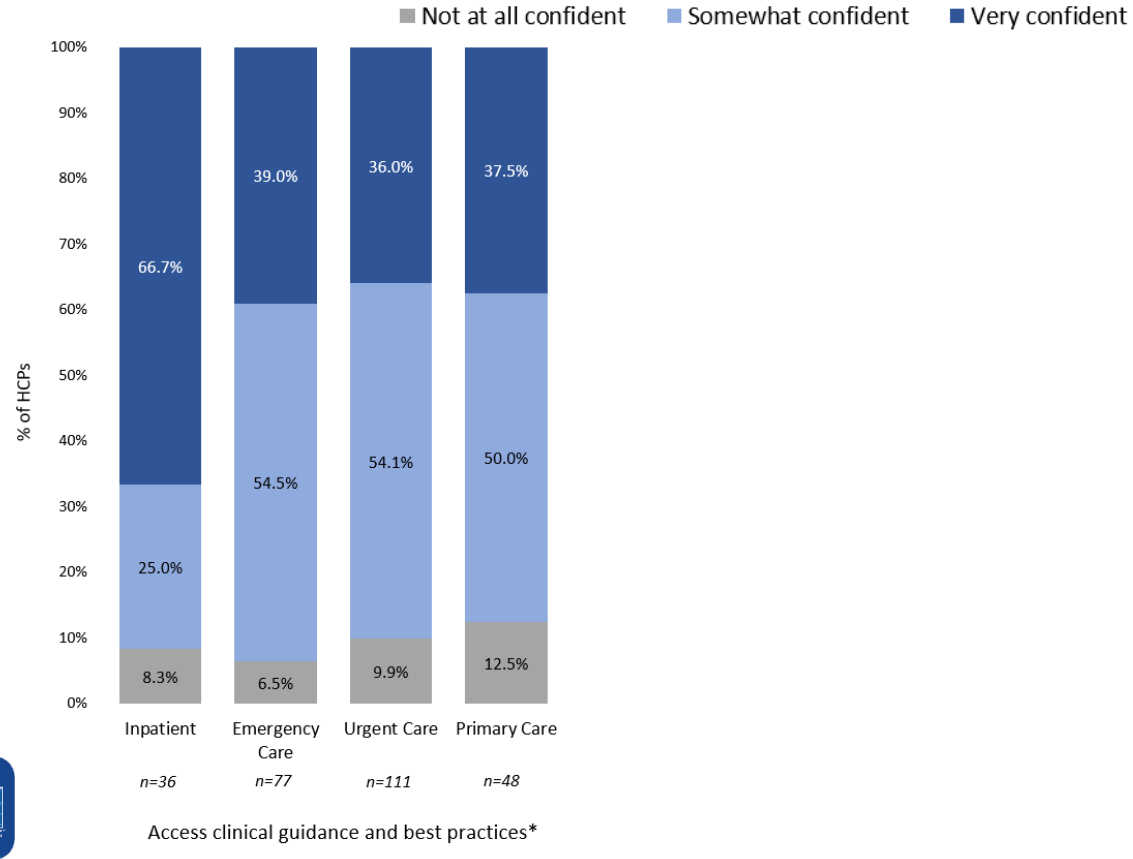
**Phase 3**
- Materials Development and Testing

**Phase 4**
- Partner Engagement, Dissemination, & Evaluation

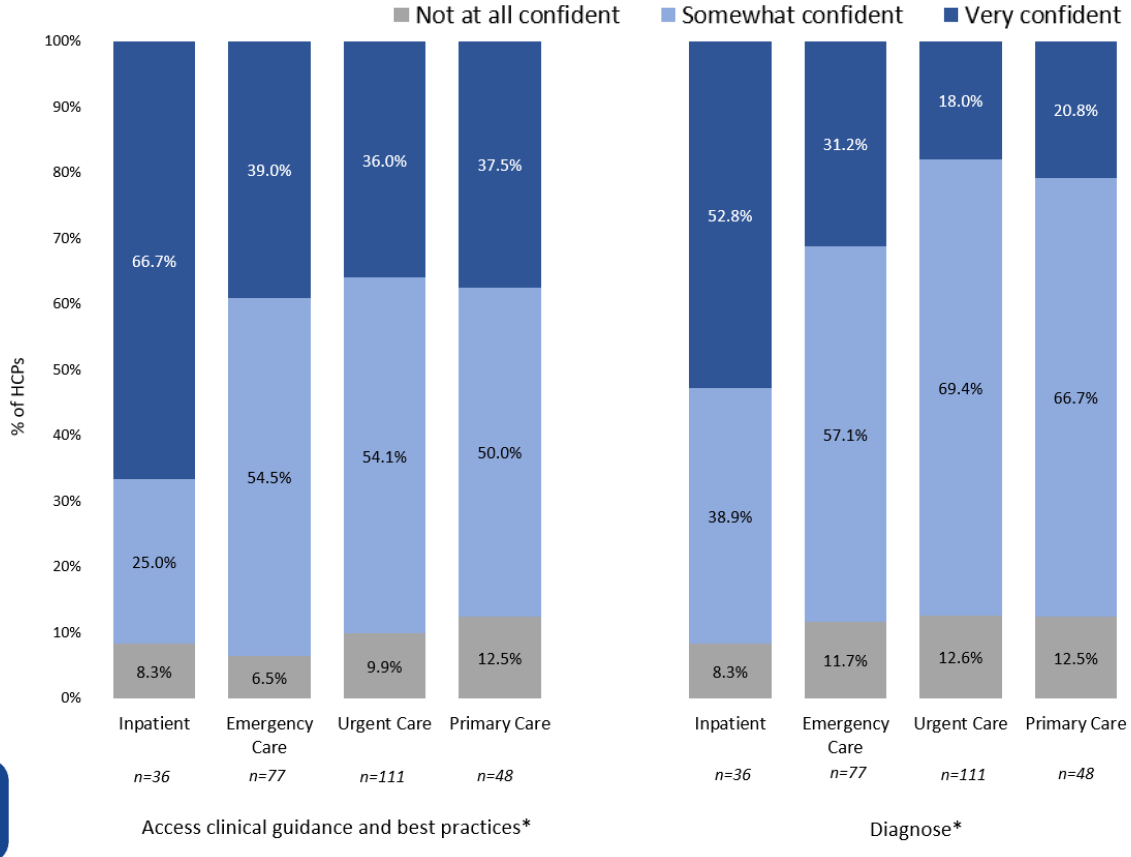
# MIS-C Healthcare Professional Project: Data Collection Methods

- Partnered with Medscape to assist with recruiting healthcare professionals for the Phase 1 survey, Phase 2 in-depth interviews, Phase 3 material testing
- Screening questionnaire administered to ensure surveyed population included:
  - HCPs treating pediatric and young adult populations
  - HCPs working in inpatient, emergency, urgent, and primary care settings
  - MDs/DOs, PAs, and NPs
- Quotas set to ensure representation of MDs/DOs, PAs, and NPs across all clinical settings

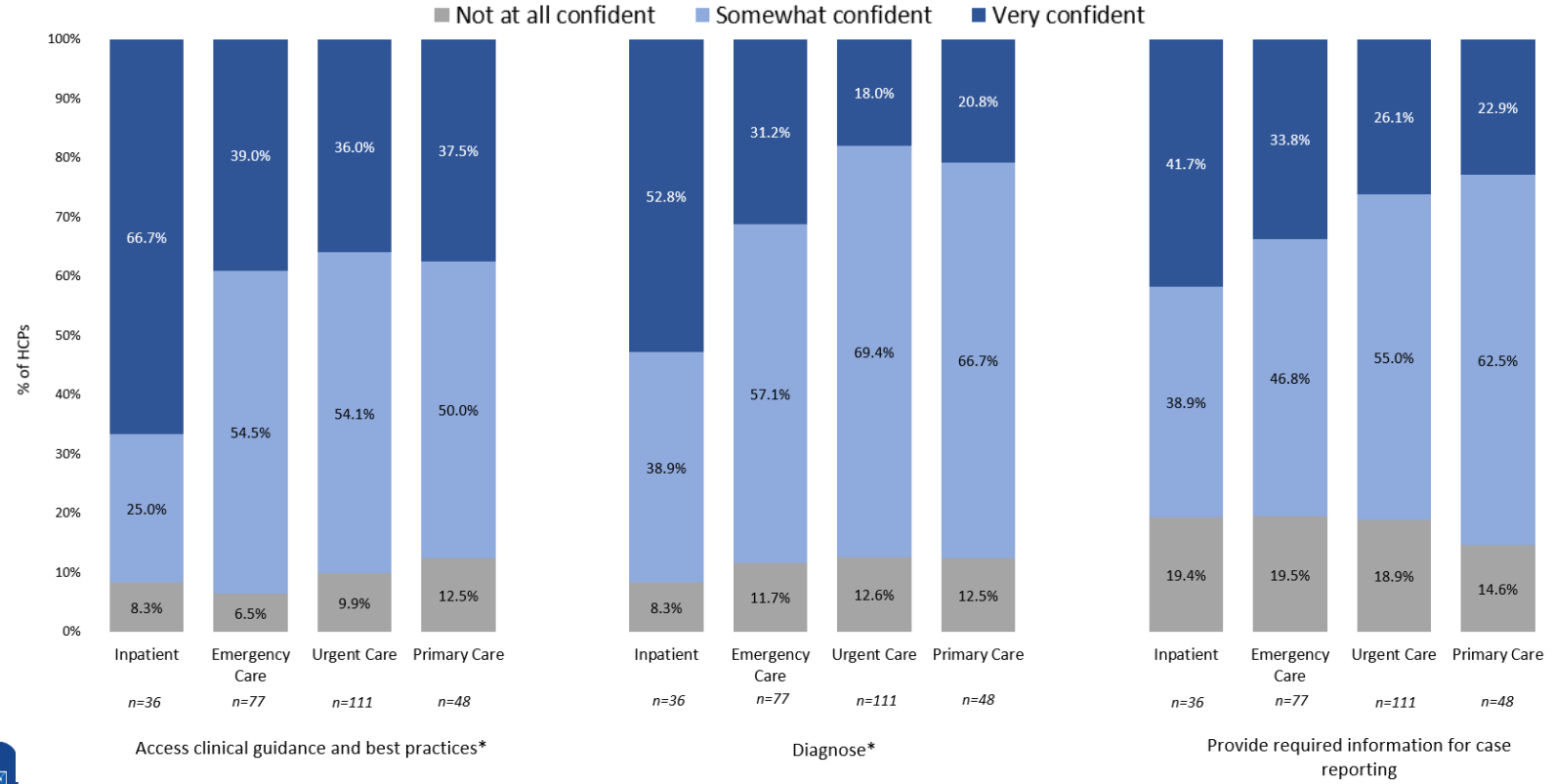
# HCP Confidence in Caring for MIS-C Patients by Clinical Setting: *Diagnosis and Reporting* *Phase 1 – January 2021 (N=272)*



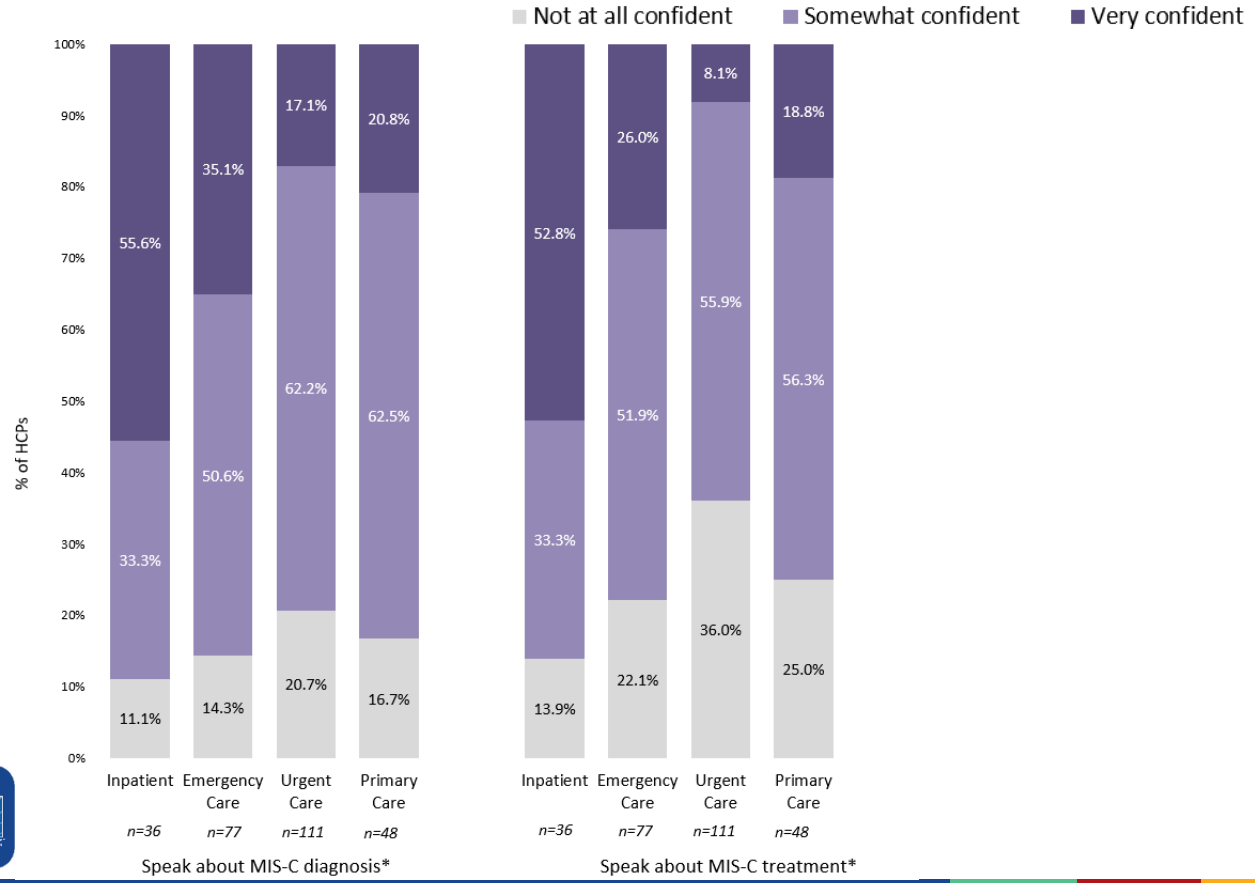
# HCP Confidence in Caring for MIS-C Patients by Clinical Setting: *Focus on Diagnosis* *Phase 1 – January 2021 (N=272)*



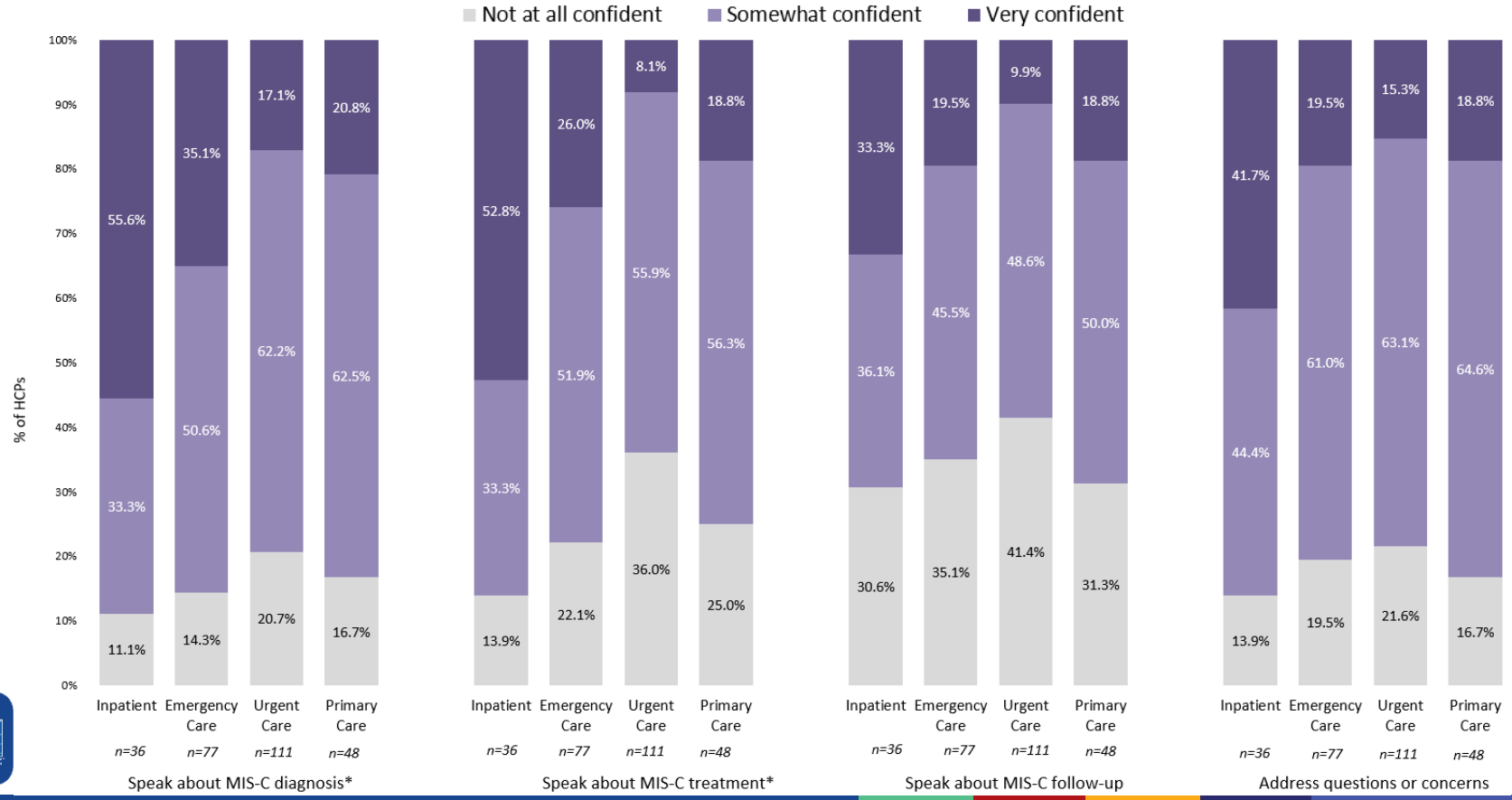
# HCP Confidence in Caring for MIS-C Patients by Clinical Setting: *Focus on Reporting* *Phase 1 – January 2021 (N=272)*



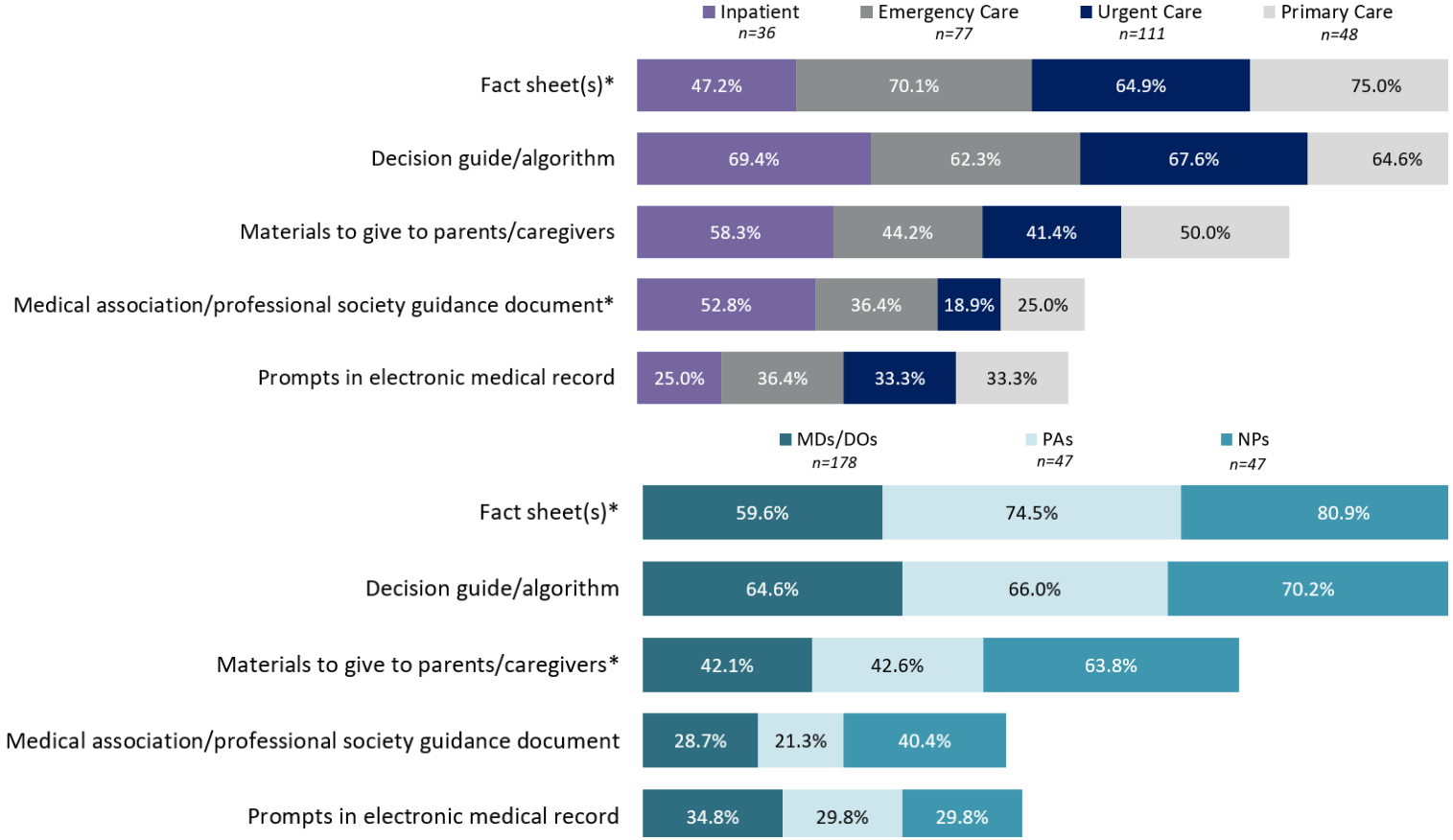
# HCP Confidence in Caring for MIS-C Patients by Clinical Setting: *Engaging with Parents* *Phase 1 – January 2021 (N=272)*



# HCP Confidence in Caring for MIS-C Patients by Clinical Setting: *Engaging with Parents* *Phase 1 – January 2021 (N=272)*



# Top 5 MIS-C Resource Needs to Support Diagnosis by Clinical Setting & HCP Type *Phase 1 – January 2021 (N=272)*



# Key Quotes From In-Depth Interviews with HCPs: MIS-C Experience *Phase 2 – March 2021 (N=24)*

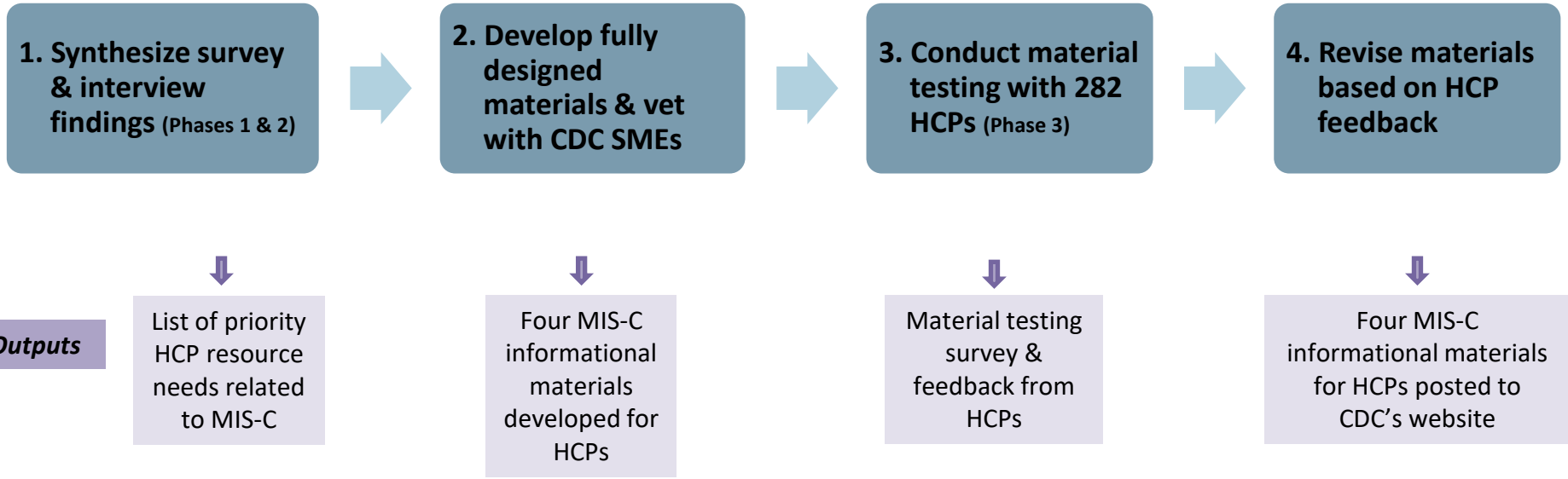
- **"I have never seen it. I know very little about it.** I wouldn't even know what to look for, clinically, outside of maybe a fever of unknown origin, or a kid that just is listless, or just doesn't look right. But really, I have not seen, as I said, very many kids that really appeared ill. So, the clinical challenge would be it's something brand-new, as is everything we've seen this whole year." - Urgent Care Physician Assistant

- "I think [the challenge] would be the fact of **lack of exposure** at this point. …Some flu seasons, after a few months into it, I could tell you whether it was probably type A or type B based upon the presentation of the child, and so that repeated exposure. Though I know the signs and symptoms to look for [for MIS-C], they can often mimic other things and take you down a couple different rabbit holes. And so, I think that by not really having that experience with it, it makes me definitely have a **barrier to identifying it**, because I just haven't had that experience of knowing exactly what the presentation looks like." - Urgent Care Nurse Practitioner

- "I would say over the last six months, I personally have maybe **evaluated** about I would say **eight to ten patients with possible MIS-C**, I'd say admitted, like N minus 2 to that, and then, me personally, I've had one MIS-C patient, but in our PICU." - Hospital Physician

- "**I have not [had experience with MIS-C].** I know some of the other providers have had some patients that they were suspicious of this being on their differential diagnosis. However, I don't know what the end-all, be-all was in terms of what the diagnosis was." - Primary Care Nurse Practitioner

# Methodology for MIS-C Material Development *Phase 3*



# Self Knowledge Check: Healthcare professionals from which practice setting were the most comfortable in treating a patient with MIS-C and communicating with caregivers?

A. Primary care providers
B. Emergency care providers
C. Inpatient providers
D. Urgent care providers

# Answer: Healthcare professionals from which practice setting were the most comfortable in treating a patient with MIS-C and communicating with caregivers?

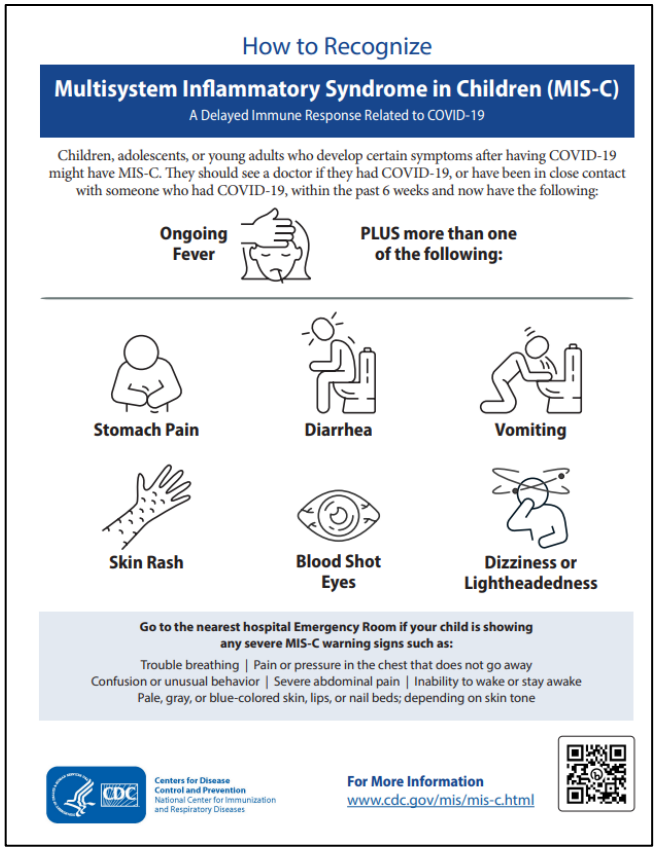
A. Primary care providers
B. Emergency care providers
**C. Inpatient providers**
D. Urgent care providers

*Rationale:* **Answer is C –** The MIS-C healthcare professional engagement project surveyed providers in 4 practice settings and found that inpatient providers were the most comfortable in caring for and communicating with caregivers about MIS-C. Depending on the scenario inpatient providers were 70-90% somewhat or very confident.

# MIS-C Materials

For Parents, Caregivers, and Outpatient HCPs

# Materials for Parents: *Symptoms*



How to Recognize

**Multisystem Inflammatory Syndrome in Children (MIS-C)**

A Delayed Immune Response Related to COVID-19

Children, adolescents, or young adults who develop certain symptoms after having COVID-19 might have MIS-C. They should see a doctor if they had COVID-19, or have been in close contact with someone who had COVID-19, within the past 6 weeks and now have the following:

**Ongoing Fever**

**PLUS more than one of the following:**

**Stomach Pain**

**Diarrhea**

**Vomiting**

**Skin Rash**

**Blood Shot Eyes**

**Dizziness or Lightheadedness**

**Go to the nearest hospital Emergency Room if your child is showing any severe MIS-C warning signs such as:**

Trouble breathing | Pain or pressure in the chest that does not go away
Confusion or unusual behavior | Severe abdominal pain | Inability to wake or stay awake
Pale, gray, or blue-colored skin, lips, or nail beds; depending on skin tone

Centers for Disease Control and Prevention
National Center for Immunization and Respiratory Diseases

**For More Information**
www.cdc.gov/mis/mis-c.html

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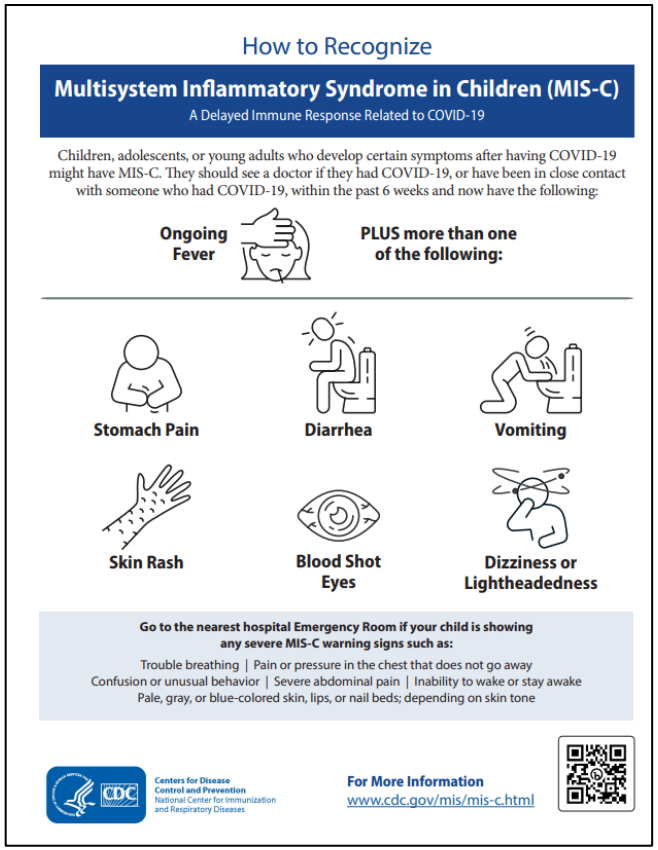

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***How to use:***
Reference for recognizing possible MIS-C and to share with parents/caregivers

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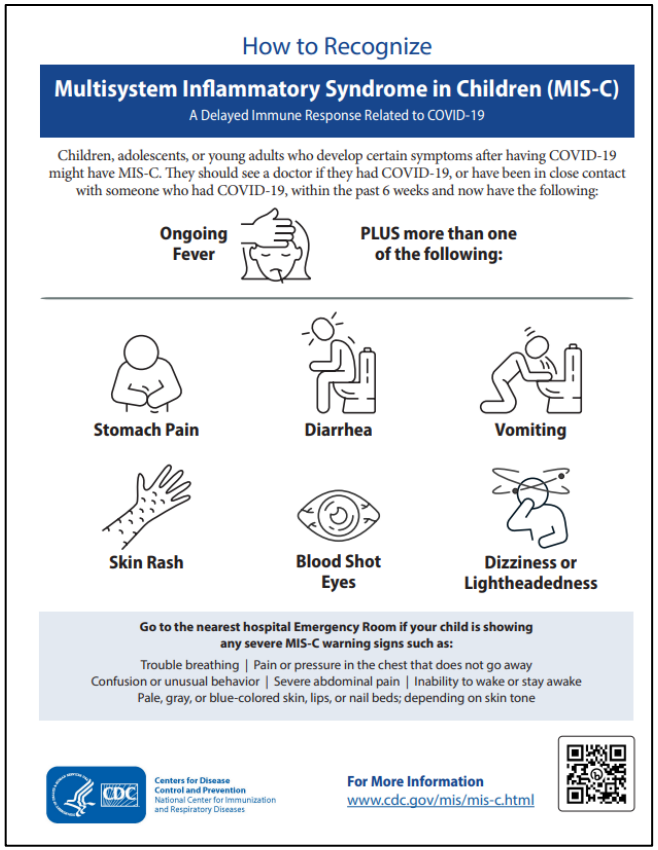

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***How to use:***
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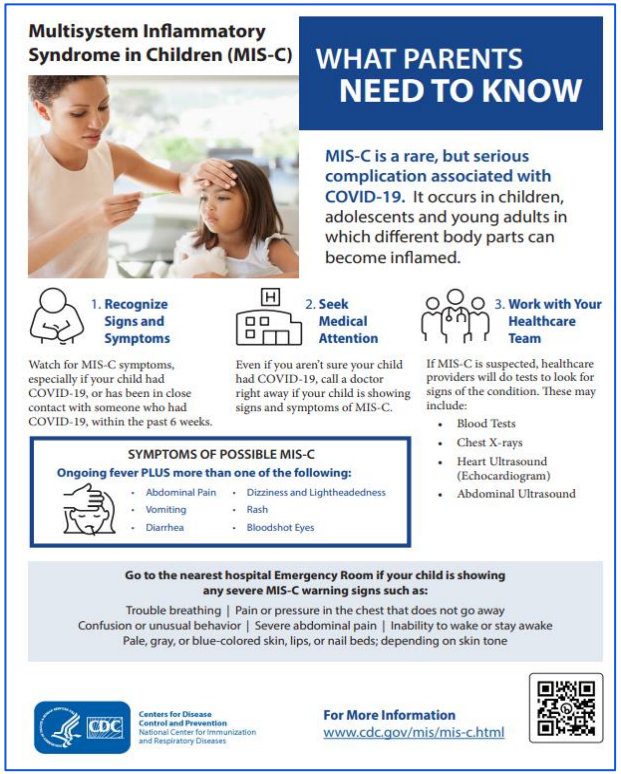
***Find this resource at CDC's [MIS-C healthcare provider resource page](https://www.cdc.gov/mis/mis-c/hcp/provider-resources/index.html):***
***[https://www.cdc.gov/mis/mis-c/hcp/provider-resources/index.html](https://www.cdc.gov/mis/mis-c/hcp/provider-resources/index.html).***

# Materials for Parents and Outpatient HCPs: *Fact Sheets for Parents*



Multisystem Inflammatory Syndrome in Children (MIS-C)

WHAT PARENTS NEED TO KNOW

MIS-C is a rare, but serious complication associated with COVID-19. It occurs in children, adolescents and young adults in which different body parts can become inflamed.

1. Recognize Signs and Symptoms

Watch for MIS-C symptoms, especially if your child had COVID-19, or has been in close contact with someone who had COVID-19, within the past 6 weeks.

2. Seek Medical Attention

Even if you aren't sure your child had COVID-19, call a doctor right away if your child is showing signs and symptoms of MIS-C.

3. Work with Your Healthcare Team

If MIS-C is suspected, healthcare providers will do tests to look for signs of the condition. These may include:

- Blood Tests
- Chest X-rays
- Heart Ultrasound (Echocardiogram)
- Abdominal Ultrasound

SYMPTOMS OF POSSIBLE MIS-C

Ongoing fever PLUS more than one of the following:

- Abdominal Pain
- Vomiting
- Diarrhea
- Dizziness and Lightheadedness
- Rash
- Bloodshot Eyes

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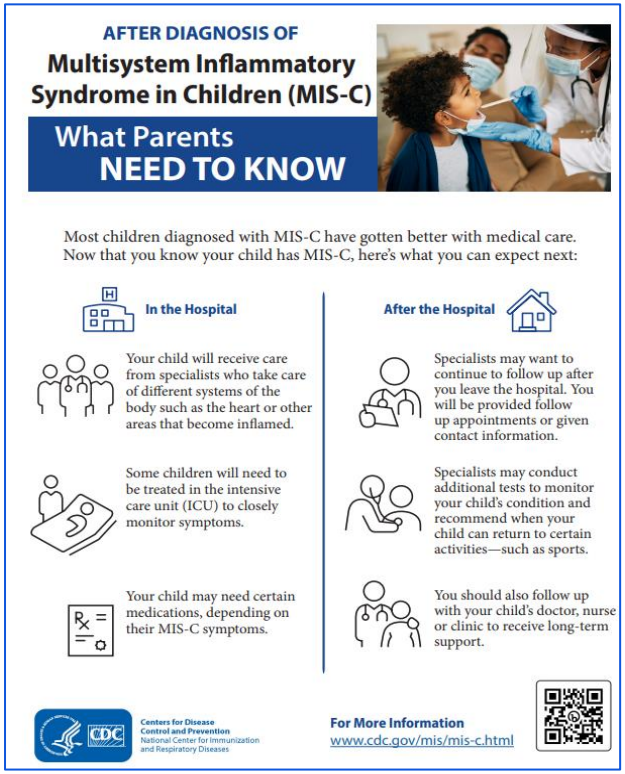

AFTER DIAGNOSIS OF

Multisystem Inflammatory Syndrome in Children (MIS-C)

What Parents NEED TO KNOW

Most children diagnosed with MIS-C have gotten better with medical care. Now that you know your child has MIS-C, here's what you can expect next:

In the Hospital

Your child will receive care from specialists who take care of different systems of the body such as the heart or other areas that become inflamed.

Some children will need to be treated in the intensive care unit (ICU) to closely monitor symptoms.

Your child may need certain medications, depending on their MIS-C symptoms.

After the Hospital

Specialists may want to continue to follow up after you leave the hospital. You will be provided follow up appointments or given contact information.

Specialists may conduct additional tests to monitor your child's condition and recommend when your child can return to certain activities—such as sports.

You should also follow up with your child's doctor, nurse or clinic to receive long-term support.

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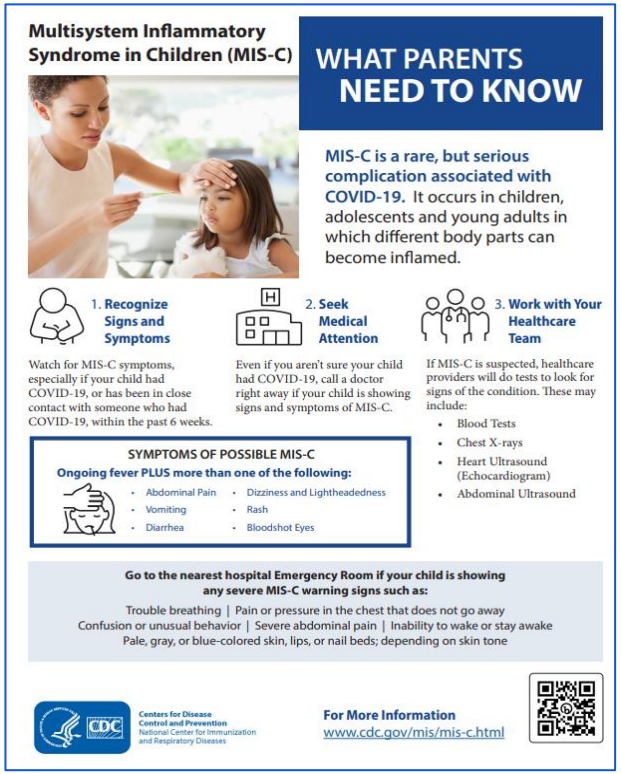

Multisystem Inflammatory Syndrome in Children (MIS-C)

WHAT PARENTS NEED TO KNOW

MIS-C is a rare, but serious complication associated with COVID-19. It occurs in children, adolescents and young adults in which different body parts can become inflamed.

1. Recognize Signs and Symptoms

Watch for MIS-C symptoms, especially if your child had COVID-19, or has been in close contact with someone who had COVID-19, within the past 6 weeks.

2. Seek Medical Attention

Even if you aren't sure your child had COVID-19, call a doctor right away if your child is showing signs and symptoms of MIS-C.

3. Work with Your Healthcare Team

If MIS-C is suspected, healthcare providers will do tests to look for signs of the condition. These may include:

- Blood Tests
- Chest X-rays
- Heart Ultrasound (Echocardiogram)
- Abdominal Ultrasound

SYMPTOMS OF POSSIBLE MIS-C

Ongoing fever PLUS more than one of the following:

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- Dizziness and Lightheadedness
- Rash
- Bloodshot Eyes

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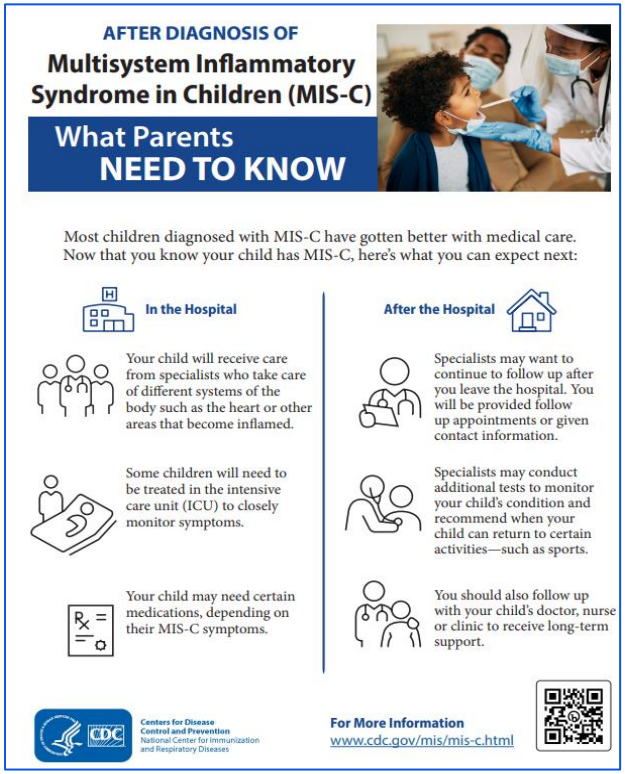

AFTER DIAGNOSIS OF

Multisystem Inflammatory Syndrome in Children (MIS-C)

What Parents NEED TO KNOW

Most children diagnosed with MIS-C have gotten better with medical care. Now that you know your child has MIS-C, here's what you can expect next:

In the Hospital

Your child will receive care from specialists who take care of different systems of the body such as the heart or other areas that become inflamed.

Some children will need to be treated in the intensive care unit (ICU) to closely monitor symptoms.

Your child may need certain medications, depending on their MIS-C symptoms.

After the Hospital

Specialists may want to continue to follow up after you leave the hospital. You will be provided follow up appointments or given contact information.

Specialists may conduct additional tests to monitor your child's condition and recommend when your child can return to certain activities—such as sports.

You should also follow up with your child's doctor, nurse or clinic to receive long-term support.

Centers for Disease Control and Prevention
National Center for Immunization and Respiratory Diseases

For More Information
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***How to use:***
Reference when talking to parents/ caregivers and offer as a resource for families to take home

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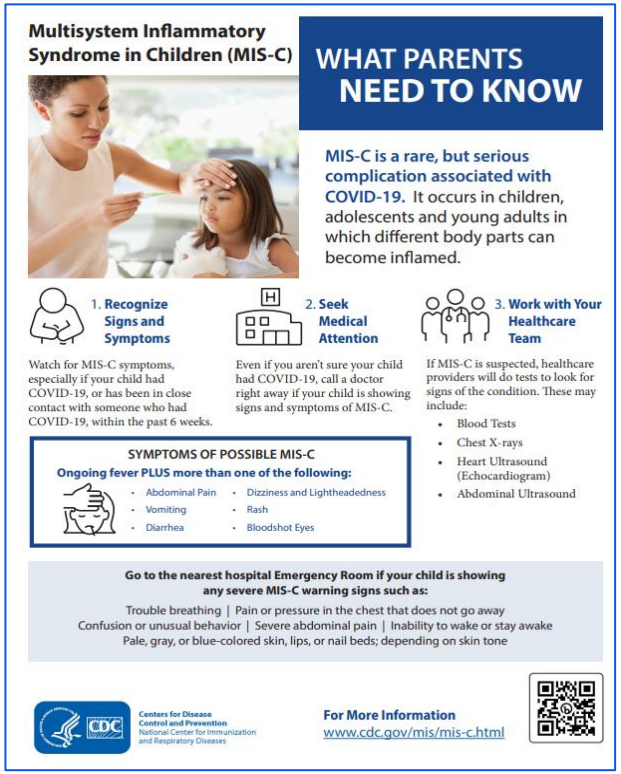

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2. Seek Medical Attention

Even if you aren't sure your child had COVID-19, call a doctor right away if your child is showing signs and symptoms of MIS-C.

3. Work with Your Healthcare Team

If MIS-C is suspected, healthcare providers will do tests to look for signs of the condition. These may include:

- Blood Tests
- Chest X-rays
- Heart Ultrasound (Echocardiogram)
- Abdominal Ultrasound

SYMPTOMS OF POSSIBLE MIS-C

Ongoing fever PLUS more than one of the following:

- Abdominal Pain
- Vomiting
- Diarrhea
- Dizziness and Lightheadedness
- Rash
- Bloodshot Eyes

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Pale, gray, or blue-colored skin, lips, or nail beds; depending on skin tone

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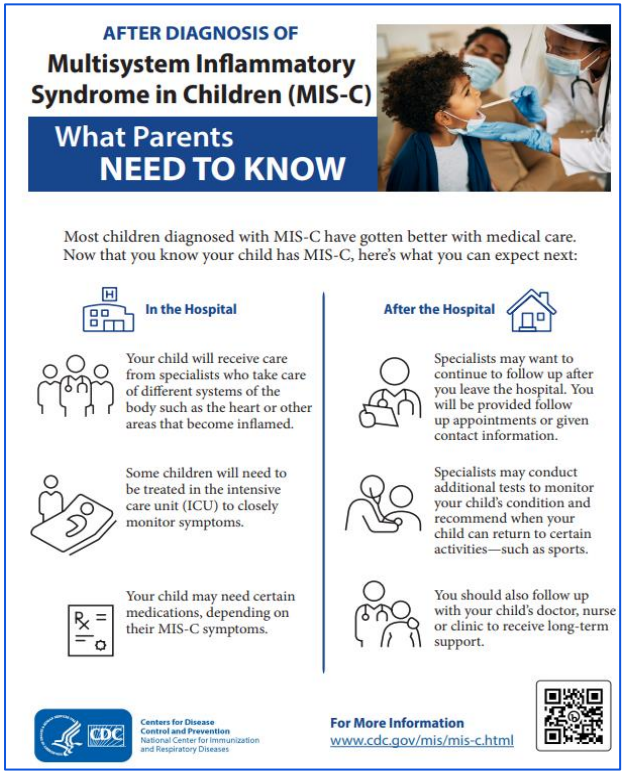

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Your child may need certain medications, depending on their MIS-C symptoms.

After the Hospital

Specialists may want to continue to follow up after you leave the hospital. You will be provided follow up appointments or given contact information.

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***How to use:***
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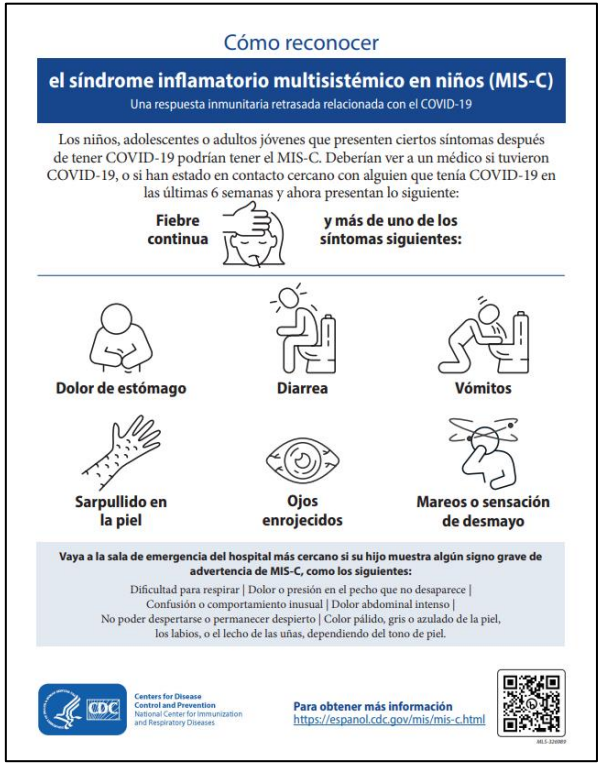
***Find this resource at CDC's [MIS-C healthcare provider resource page](#).***

# Spanish Versions of Materials



Cómo reconocer

**el síndrome inflamatorio multisistémico en niños (MIS-C)**

Una respuesta inmunitaria retrasada relacionada con el COVID-19

Los niños, adolescentes o adultos jóvenes que presenten ciertos síntomas después de tener COVID-19 podrían tener el MIS-C. Deberían ver a un médico si tuvieron COVID-19, o si han estado en contacto cercano con alguien que tenía COVID-19 en las últimas 6 semanas y ahora presentan lo siguiente:

**Fiebre continua** **y más de uno de los síntomas siguientes:**

**Dolor de estómago** **Diarrea** **Vómitos**

**Sarpullido en la piel** **Ojos enrojecidos** **Mareos o sensación de desmayo**

**Vaya a la sala de emergencia del hospital más cercano si su hijo muestra algún signo grave de advertencia de MIS-C, como los siguientes:**

Dificultad para respirar | Dolor o presión en el pecho que no desaparece | Confusión o comportamiento inusual | Dolor abdominal intenso | No poder despertarse o permanecer despierto | Color pálido, gris o azulado de la piel, los labios, o el lecho de las uñas, dependiendo del tono de piel.

Centers for Disease Control and Prevention
National Center for Immunization and Respiratory Diseases

**Para obtener más información**
https://espanol.cdc.gov/mis/mis-c.html

**Síndrome inflamatorio multisistémico en niños (MIS-C)**

**Lo que los padres NECESITAN SABER**

**El MIS-C es una complicación rara, pero grave, asociada al COVID-19.** Se presenta en niños, adolescentes y adultos jóvenes, cuyas partes del cuerpo pueden inflamarse.

**1. Reconozca los signos y síntomas**

Esté atento a los síntomas de MIS-C, especialmente si su hijo tuvo COVID-19 o ha estado en contacto cercano con alguien que tenía COVID-19 en las últimas 6 semanas.

**2. Busque atención médica**

Aunque no esté seguro de que su hijo tuvo COVID-19, llame al médico de inmediato si su hijo está mostrando signos y síntomas de MIS-C.

**3. Trabaje con su equipo de atención médica**

Si se sospecha la presencia de MIS-C, los proveedores de atención médica harán pruebas para detectar signos de la afección. Estas pueden incluir:

- Análisis de sangre
- Radiografía de tórax
- Ecografía del corazón (ecocardiograma)
- Ecografía del abdomen

**SÍNTOMAS DE POSIBLE MIS-C**

**Fiebre continua Y más de uno de los siguientes síntomas:**

- Dolor abdominal
- Vómitos
- Diarrea
- Mareos y sensación de desmayo
- Sarpullido
- Ojos enrojecidos

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**DESPUÉS DEL DIAGNÓSTICO DE**

**Síndrome inflamatorio multisistémico en niños (MIS-C)**

**Lo que los padres NECESITAN SABER**

La mayoría de los niños que recibieron el diagnóstico de MIS-C han mejorado con atención médica. Ahora que usted sabe que su hijo tiene MIS-C, esto es lo que puede esperar:

**En el hospital**

Su hijo recibirá atención médica de especialistas que se ocupan de diferentes sistemas del cuerpo, como el corazón u otras áreas que se inflamaron.

Algunos niños tendrán que recibir tratamiento en la unidad de cuidados intensivos (UCI) para que se vigilen sus síntomas de cerca.

Su hijo podría necesitar ciertos medicamentos, según los síntomas de MIS-C que tenga.

**Después del hospital**

Es posible que los especialistas quieran hacer un seguimiento después de que deje el hospital. A usted se le darán citas de seguimiento o información de contacto.

Es posible que los especialistas hagan pruebas adicionales para vigilar la afección de su hijo y recomendar cuándo podrá volver a ciertas actividades, como los deportes.

Usted también debería hacer un seguimiento con el médico, enfermero o centro médico de su hijo para recibir apoyo a largo plazo.

Centers for Disease Control and Prevention
National Center for Immunization and Respiratory Diseases

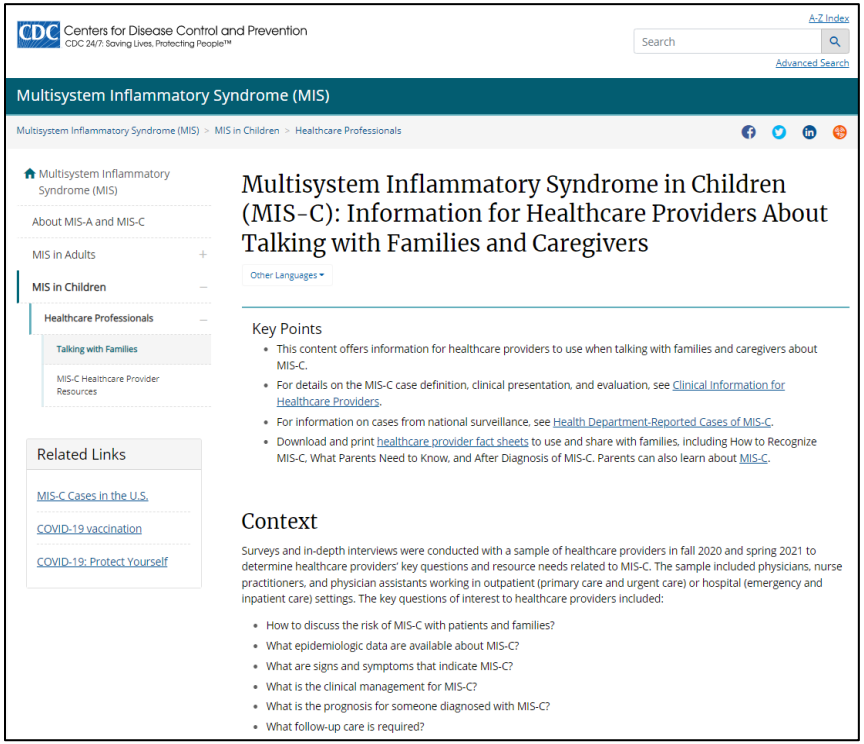
**Para obtener más información**
https://espanol.cdc.gov/mis/mis-c.html

***Find this resource at CDC's [MIS-C healthcare provider resource page](https://www.cdc.gov/mis/mis-c/hcp/provider-resources/index.html): https://www.cdc.gov/mis/mis-c/hcp/provider-resources/index.html.***

# MIS-C Resources

Talking with Parents

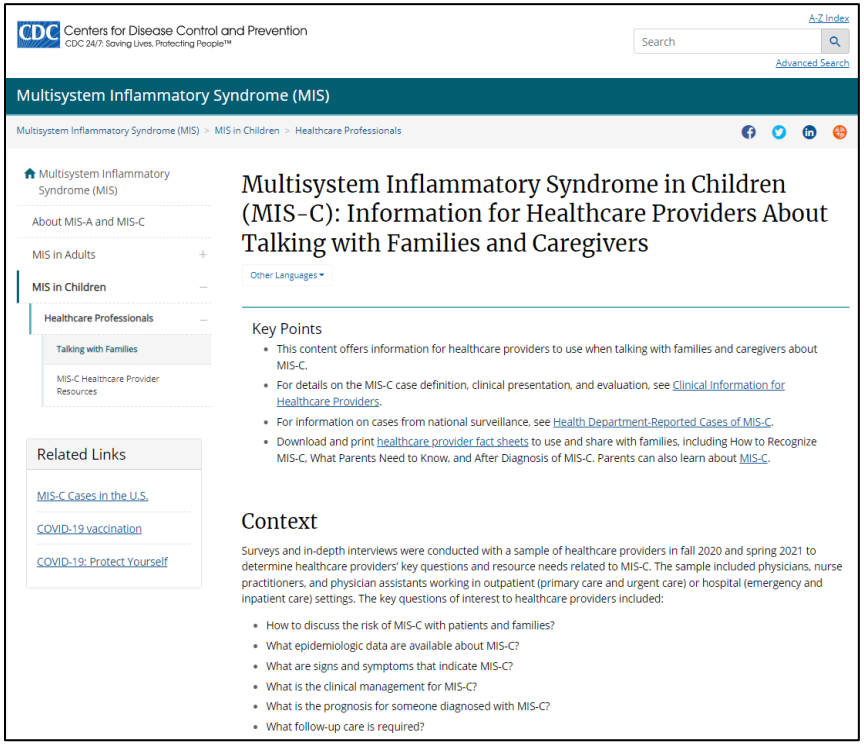
# Resources on Talking with Parents




**Key informational categories to assist healthcare professionals in talking with parents include:**

- Risk Factors
- Incidence
- Symptoms
- During Hospitalization
- Follow-up and Long-Term Effects

# Resources on Talking with Parents: Address Concerns




**Key informational categories to assist healthcare professionals in talking with parents include:**

- Risk Factors
- Incidence
- Symptoms
- During Hospitalization
- Follow-up and Long-Term Effects

***How to use:***
*Use prior to or during conversations to help answer some of the most common MIS-C questions from parents/caregivers.*

***Find this resource at CDC's [MIS-C healthcare provider page for talking with families](https://www.cdc.gov/mis/mis-c/hcp/provider-families.html) https://www.cdc.gov/mis/mis-c/hcp/provider-families.html.***

# Dissemination and Partner Engagement *Phase 4*

- MIS-C materials were shared on the CDC website and via CDC social media channels, CDC Clinician Outreach and Communication Activity (COCA) network, and HCP medical associations (see sub bullets)

- 13 partner organizations shared MIS-C information with their members
  - ✓ American Academy of Family Physicians
  - ✓ American Academy of Pediatrics
  - ✓ American Academy of Physician Assistants
  - ✓ American College of Cardiology
  - ✓ American College of Rheumatology
  - ✓ American Hospital Association
  - ✓ American Nurses Association
  - ✓ Council of State and Territorial Epidemiologists
  - ✓ Infectious Diseases Society of America (Real Time Learning Network)
  - ✓ Pediatric Infectious Diseases Society
  - ✓ Society for Healthcare Epidemiology of America
  - ✓ Society for Physician Assistants in Pediatrics
  - ✓ Urgent Care Association

# COVID-19 Vaccination and MIS-C

# COVID-19 Vaccination and MIS-C

- Clinical considerations for use of COVID-19 vaccines in people who have had MIS-C and have not yet been vaccinated
- Reporting of MIS-C in people who had received COVID-19 vaccine before onset of MIS-C
- COVID-19 vaccine effectiveness in preventing MIS-C

# CDC Interim Clinical Considerations for Use of COVID-19 Vaccines in People With a History of MIS-C Who Have Not Received COVID-19 Vaccine

- Given the lack of data on the safety of COVID-19 vaccines in people with a history of MIS-C or MIS-A, a conversation between the patient, their guardian(s), and their clinical team or a specialist (e.g., specialist in infectious diseases, rheumatology, or cardiology) is strongly encouraged to assist with decisions about the use of COVID-19 vaccines

- Several experts consider the benefits of COVID-19 vaccination (i.e., reduced risk of severe disease including potential recurrence of MIS-C after SARS-CoV-2 reinfection) to outweigh a theoretical risk of an MIS-like illness or the risk of myocarditis following COVID-19 vaccination for people who meet certain criteria

**There is more information on COVID-19 vaccination and SARS-CoV-2 infection on CDC's website: https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html.**

# CDC Interim Clinical Considerations for Use of COVID-19 Vaccines in People With a History of MIS-C Who Have Not Received COVID-19 Vaccine (continued)

- Several experts suggest administering COVID-19 vaccine to persons with a history of MIS-C when all of the following criteria are met:
  1. Clinical recovery has been achieved, including return to normal cardiac function
  2. It has been ≥90 days since their diagnosis of MIS-C
  3. They are in an area of high or substantial community transmission of SARS-CoV-2 or otherwise have an increased risk for SARS-CoV-2 exposure and transmission
  4. Onset of MIS-C occurred before any COVID-19 vaccination
- Additional factors when considering individual benefits and risks may include:
  - Increased personal risk of severe COVID-19 (e.g., age, underlying conditions)
  - Timing of immunomodulatory therapies (ACIP's general best practice guidelines for immunization can be consulted for more information)

**There is more information on Interim Clinical Considerations for Use of COVID-19 Vaccines: https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html and ACIP General Best Practice Guidelines for Immunization: https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html on CDC's website.**

# Reporting of MIS-C in People Who Had Received COVID-19 Vaccine Before Onset of MIS-C

- As part of the US COVID-19 vaccine safety monitoring plan:
  - MIS following COVID-19 vaccination was one of the pre-specified Adverse Events of Special Interest

- Vaccination providers are required to report MIS that occurs after COVID-19 vaccination to VAERS, under the EUA

**Vaccine Adverse Event Reporting System (VAERS) (hhs.gov): https://vaers.hhs.gov/**

## Reporting of vaccine adverse events

Adverse events that occur in a recipient following COVID-19 vaccination should be reported to VAERS. Vaccination providers are required by the FDA to report the following that occur after COVID-19 vaccination under EUA:

- Vaccine administration errors
- Serious adverse events
- Cases of Multisystem Inflammatory Syndrome
- Cases of COVID-19 that result in hospitalization or death

Reporting is encouraged for any other clinically significant adverse event, even if it is uncertain whether the vaccine caused the event. Information on how to submit a report to VAERS is available at https://vaers.hhs.gov or by calling 1-800-822-7967.

In addition, CDC has developed a new voluntary, smartphone-based tool, **v-safe**. This tool uses text messaging and web surveys to provide near real-time health check-ins after patients receive COVID-19 vaccination. Reports to **v-safe** indicating a medically significant health impact, including pregnancy, are followed up by the CDC/**v-safe** call center to collect additional information to complete a VAERS report, if appropriate.

# Surveillance Investigation December 2020 – August 2021: MIS-C in People Aged 12-20 Years in the United States Who Had Received COVID-19 Vaccine Before Onset of MIS-C

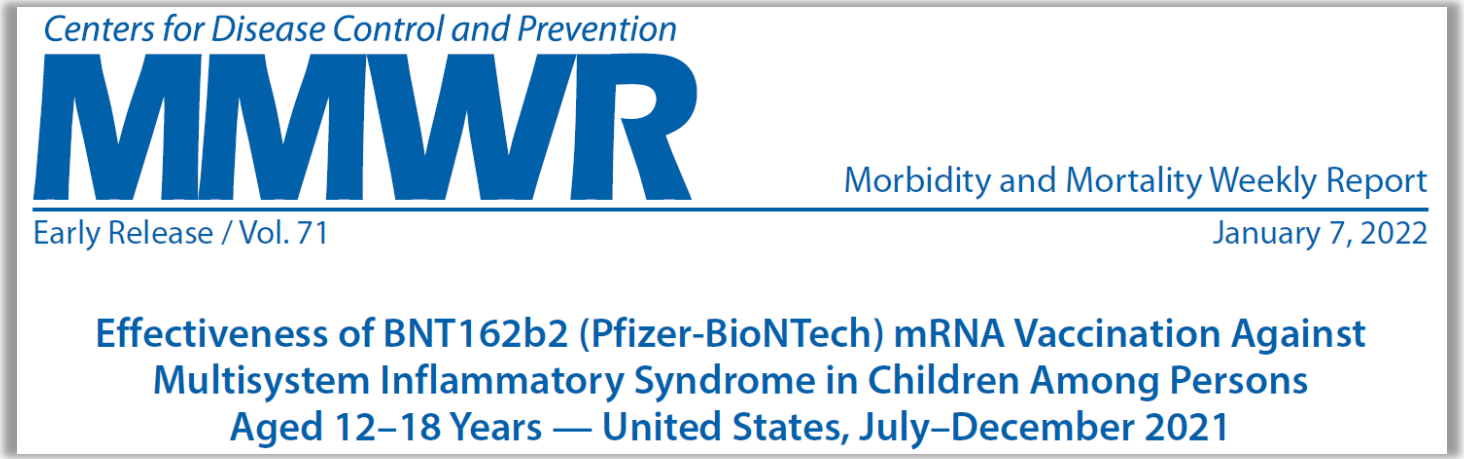
- MIS-C after COVID-19 vaccination is rare (overall reporting rate 1 case per million vaccinated people)
- Potential contribution of COVID-19 vaccination, if any, to the development of these illnesses is unknown
- Most people with MIS-C after COVID-19 vaccination identified in this investigation also had laboratory evidence of past or recent SARS-CoV-2 infection
- When evaluating people with potential MIS-C after COVID-19 vaccination, anti-nucleocapsid antibody testing may be helpful to identify those who have had SARS-CoV-2 infection
- Report potential cases to the Vaccine Adverse Event Reporting System (VAERS) (hhs.gov)

Reported Cases of Multisystem Inflammatory Syndrome in Children (MIS-C) Aged 12–20 Years in the United States Who Received COVID-19 Vaccine, December 2020 through August 2021. Anna R. Yousaf et al. Rxiv 2022.01.03.22268681; doi: https://doi.org/10.1101/2022.01.03.22268681

# Effectiveness of Pfizer-BioNTech COVID-19 Vaccine Against MIS-C Among People Aged 12-18 Years July 1 – December 9, 2021

- Test-negative case-control design
- Full vaccination defined as receipt of 2 doses of Pfizer-BioNTech COVID-19 vaccine, with receipt of the second dose ≥28 days before hospital admission
- Included 102 MIS-C case-patients and 181 hospitalized controls from 24 pediatric hospitals in the Overcoming COVID-19 Network

Zambrano LD, Newhams MM, Olson SM, et al. Effectiveness of BNT162b2 (Pfizer-BioNTech) mRNA Vaccination Against Multisystem Inflammatory Syndrome in Children Among Persons Aged 12–18 Years — United States, July–December 2021. MMWR Morb Mortal Wkly Rep 2022;71:52–58. DOI: http://dx.doi.org/10.15585/mmwr.mm7102e1




- Vaccine effectiveness of two doses of the Pfizer-BioNTech vaccine against MIS-C was **91% (95% CI = 78-97%)**
- 97/102 (95%) of hospitalized children with MIS-C were unvaccinated
- None of the five fully vaccinated MIS-C patients required respiratory or cardio-vascular life support (invasive mechanical ventilation, vasoactive infusions, or ECMO), compared with 39% of unvaccinated MIS-C patients who did

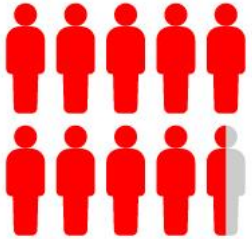
Zambrano LD, Newhams MM, Olson SM, et al. Effectiveness of BNT162b2 (Pfizer-BioNTech) mRNA Vaccination Against Multisystem Inflammatory Syndrome in Children Among Persons Aged 12–18 Years — United States, July–December 2021. MMWR Morb Mortal Wkly Rep 2022;71:52–58. DOI: http://dx.doi.org/10.15585/mmwr.mm7102e1

# COVID-19 vaccination protects against multisystem inflammatory syndrome in children (MIS-C) among 12–18 year-olds hospitalized during July–December 2021

**Vaccination reduced likelihood of MIS-C by:**


**ADOLESCENTS HOSPITALIZED WITH MIS-C**

**95%** unvaccinated



**No vaccinated MIS-C patients required life support**

## COVID-19 VACCINATION IS THE BEST PROTECTION AGAINST MIS-C

* Case-control study, 238 patients in 24 pediatric hospitals—20 U.S. states
† 2 doses of Pfizer-BioNTech vaccine received ≥28 days before hospital admission

bit.ly/MMWR7102

MMWR

Zambrano LD, Newhams MM, Olson SM, et al. Effectiveness of BNT162b2 (Pfizer-BioNTech) mRNA Vaccination Against Multisystem Inflammatory Syndrome in Children Among Persons Aged 12–18 Years — United States, July–December 2021. MMWR Morb Mortal Wkly Rep 2022;71:52–58. DOI: http://dx.doi.org/10.15585/mmwr.mm7102e1

# Self Knowledge Check: Which of the following are criteria to be considered when making decisions about starting COVID-19 vaccination in an unvaccinated child who has a history of MIS-C? All criteria are true EXCEPT:

A. Clinical recovery has been achieved, including return to normal cardiac function
B. It has been ≥90 days since their diagnosis of MIS-C
C. When they are in an area of high or substantial community transmission of SARS-CoV-2 or otherwise have an increased risk for SARS-CoV-2 exposure and transmission
D. Duration of hospitalization

# Answer: Which of the following are criteria to be considered when making decisions about starting COVID-19 vaccination in an unvaccinated child who has a history of MIS-C? All criteria are true EXCEPT:

A. Clinical recovery has been achieved, including return to normal cardiac function

B. It has been ≥90 days since their diagnosis of MIS-C

C. When they are in an area of high or substantial community transmission of SARS-CoV-2 or otherwise have an increased risk for SARS-CoV-2 exposure and transmission

D. **Duration of hospitalization**

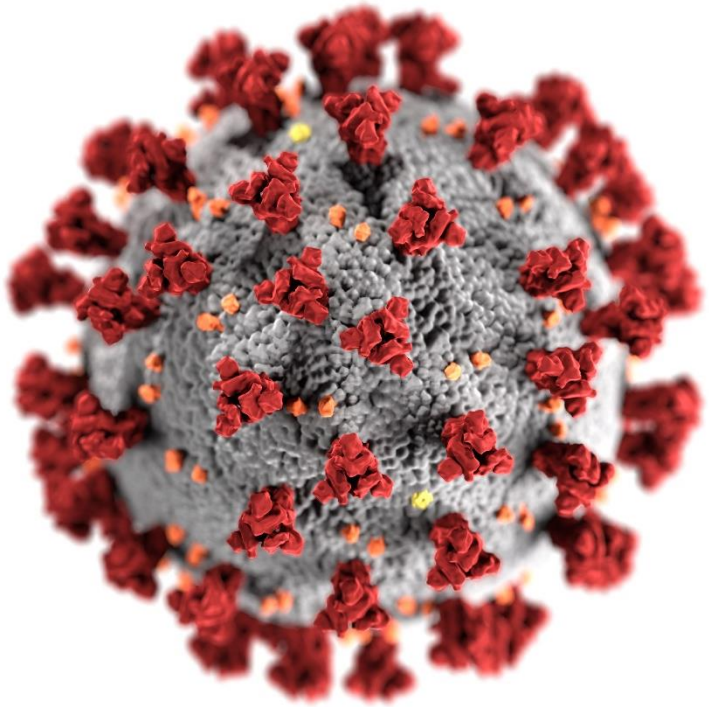
*Rationale:* **Answer is D –** Regardless of duration of hospitalization, time should be allowed for full recovery from MIS-C and a discussion should occur between the family and healthcare professional as to when the right time for vaccination would be.

# Summary

- CDC response to monitoring MIS-C includes both passive and active complementary surveillance systems
  - National health department-reported surveillance
  - Overcoming COVID-19 Network
  - Integrated surveillance for MIS-C after vaccination
- Other focused investigations are ongoing
- MIS-C resources are available to support healthcare professionals
  - Handouts on MIS-C symptoms and what caregivers need to know
  - Key points for healthcare professionals to use when talking with families and caregivers about MIS-C
  - Clinical considerations regarding COVID-19 vaccination

# Resources

- COVID Data Tracker – MIS-C | CDC
- Multisystem Inflammatory Syndrome (MIS) | CDC
- MIS-C Healthcare Provider Resources | CDC
- Information for Healthcare Providers about Multisystem Inflammatory Syndrome in Children (MIS-C) | CDC
- For Parents: Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID-19 | CDC
- How to Recognize Multisystem Inflammatory Syndrome in Children (MIS-C) (cdc.gov)
- Multisystem Inflammatory Syndrome in Children (MIS-C) What Parents Need to Know (cdc.gov)
- After Diagnosis of Multisystem Inflammatory Syndrome in Children (MIS-C) What Parents Need to Know | CDC
- Multisystem Inflammatory Syndrome in Children (MIS-C): Information for Healthcare Providers About Talking with Families and Caregivers | CDC
- Multisystem Inflammatory Syndrome in Children (MIS-C) | AAP
- Vaccine Adverse Event Reporting System (VAERS) | HHS
- ACIP General Best Practice Guidelines for Immunization | CDC



For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

# To Ask a Question

- Using the Zoom Webinar System
  - Click on the “Q&A” button
  - Type your question in the “Q&A” box
  - Submit your question

- If you are a patient, please refer your question to your healthcare provider.

- If you are a member of the media, please direct your questions to CDC Media Relations at 404-639-3286 or email media@cdc.gov

# Continuing Education

- All continuing education for COCA Calls is issued online through the CDC Training & Continuing Education Online system at https://tceols.cdc.gov/.

- Those who participate in today's COCA Call and wish to receive continuing education please complete the online evaluation by **March 14, 2022,** with the course code **WC4520-021022**. The access code is **COCA021022.**

- Those who will participate in the on-demand activity and wish to receive continuing education should complete the online evaluation between **March 15, 2022,** and **March 15, 2024,** and use course code **WD4520-021022**. The access code is **COCA021022.**

- Continuing education certificates can be printed immediately upon completion of your online evaluation. A cumulative transcript of all CDC/ATSDR CEs obtained through the CDC Training & Continuing Education Online System will be maintained for each user.

# Today's COCA Call Will Be Available to View On-Demand

- **When:** A few hours after the live call ends*
- **What:** Video recording
- **Where:** On the COCA Call webpage https://emergency.cdc.gov/coca/calls/2022/callinfo_021022.asp

**A transcript and closed-captioned video will be available shortly after the original video recording posts at the above link.*

# Upcoming COCA Calls & Additional COVID-19 Resources

- Continue to visit https://emergency.cdc.gov/coca/ to get more details about upcoming COCA Calls, as COCA intends to host more COCA Calls to keep you informed of the latest guidance and updates on COVID-19.

- Subscribe to receive notifications about upcoming COCA calls and other COCA products and services at emergency.cdc.gov/coca/subscribe.asp.

- Share call announcements with colleagues.

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