Supplemental Online Content

Funk AL, Florin TA, Kuppermann N, et al; Pediatric Emergency Research Network-COVID-19 Study Team. Outcomes of SARS-CoV-2–positive youths tested in emergency departments: the global PERN–COVID-19 study. JAMA Netw Open. 2022;5(1):e2142322. doi:10.1001/jamanetworkopen.2021.42322

eTable 1. Cumulative Outcomes, Up to 14 Days Following the Index ED Visit, Among 3221 SARS-CoV-2 Positive Children

eTable 2. Reasons for Return to Care Among 320 SARS-CoV-2 Positive Children Discharged on day 0 With Complete Follow-up

eTable 3. Cumulative Outcomes, Up to 14 Days Following the Index ED Visit, Among 2510 SARS-CoV-2 Positive Children Who Were Discharged to Home From the Index Emergency Department Visit

eTable 4. Association of Demographic Factors (Including Race and Ethnicity) and Medical History With Severe Outcomes Among the 2001 SARS-CoV-2 Positive Children From the United States With Complete Covariate Data

eTable 5. Comparison of Baseline Characteristics, SARS-CoV-2 Positive and SARS-CoV-2 Negative Participants Enrolled in the PERN-COVID-19 Cohort Study

eTable 6. Severe Outcomes in SARS-CoV-2 Negative and SARS-CoV-2 Positive Children, Stratified by Chronic Condition and Country of Enrollment

eFigure. Flow of SARS-CoV-2 Negative Study Participants Including Outcomes and Follow-up

This supplemental material has been provided by the authors to give readers additional information about their work.
eTable 1: Cumulative outcomes, up to 14 days\(^a\) following the index ED visit, among 3221\(^b\) SARS-CoV-2 positive children. Data are n (%) [95%CI or one-sided 97.5%CI] unless otherwise stated.

| Chronic condition\(^c\) | All children | Male | Female | < 1 yr | 1-2 yr | 2-5 yr | 5-10 yr | 10-18 yr | No | Yes |
|--------------------------|--------------|------|--------|--------|--------|--------|---------|---------|----|-----|
| N=3221                   | N=1693       | N=1528 | N=828  | N=425  | N=576  | N=551  | N=842   | N=2733  | N=484|
| **Severe respiratory illness or ventilatory support** | 73 (2.3) [1.8-2.8] | 39 (2.3) [1.6-3.1] | 34 (2.2) [1.5-3.1] | 9 (1.1) [0.5-2.1] | 5 (1.2) [0.4-2.7] | 13 (2.4) [1.3-4.0] | 12 (2.1) [1.1-3.6] | 34 (4.0) [2.8-5.6] | 43 (1.6) [1.1-2.1] | 30 (6.2) [4.2-8.7] |
| Acute respiratory distress syndrome | 20 (0.6) | 12 (0.7) | 8 (0.5) | 5 (0.6) | 1 (0.2) | 5 (0.9) | 2 (0.3) | 7 (0.8) | 13 (0.5) | 7 (1.4) |
| Respiratory failure | 40 (1.2) | 23 (1.4) | 17 (1.1) | 5 (0.6) | 4 (0.9) | 6 (1.1) | 7 (1.2) | 18 (2.1) | 21 (0.8) | 19 (3.9) |
| Pleural effusion or pneumothorax\(^x\) | 6 (0.2) | 4 (0.2) | 2 (0.1) | 0 (0) | 0 (0) | 0 (0) | 2 (0.3) | 4 (0.5) | 4 (0.1) | 2 (0.4) |
| Positive pressure ventilation | 43 (1.3) | 22 (1.3) | 21 (1.4) | 3 (0.4) | 3 (0.7) | 8 (1.5) | 9 (1.6) | 20 (2.4) | 23 (0.8) | 20 (4.1) |
| Chest drainage procedure | 6 (0.2) | 4 (0.2) | 2 (0.1) | 0 (0) | 0 (0) | 2 (0.4) | 1 (0.2) | 3 (0.4) | 3 (0.1) | 3 (0.6) |
| **Inotropic support** | 34 (1.1) [0.7-1.5] | 21 (1.2) [0.8-1.9] | 13 (0.9) [0.5-1.5] | 2 (0.2) [0-0.9] | 6 (1.4) [0.5-3.0] | 2 (0.4) [0-1.3] | 9 (1.6) [0.7-2.9] | 15 (1.8) [1.0-2.9] | 26 (1.0) [0.6-1.4] | 8 (1.7) [0.7-3.2] |
| Cardiovascular illness | 9 (0.3) [0.1-0.5] | 9 (0.5) [0.2-1.0] | 0 (0) [0-0.2] | 0 (0) [0-0.4] | 1 (0.2) [0-1.3] | 0 (0) [0-0.7] | 2 (0.3) [0-1.2] | 6 (0.7) [0.3-1.5] | 7 (0.3) [0.1-0.5] | 2 (0.4) [0.1-1.5] |
| Cardiac arrest | 1 (0.03) | 1 (0.06) | 0 (0) | 0 (0) | 1 (0.2) | 0 (0) | 0 (0) | 1 (0.04) | 0 (0) | 0 (0) |
| Heart failure | 2 (0.06) | 2 (0.1) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 2 (0.2) | 1 (0.04) | 1 (0.2) |
| Stroke | 1 (0.03) | 1 (0.06) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 1 (0.1) | 1 (0.04) | 0 (0) |
| Myocarditis, endocarditis, pericarditis | 6 (0.2) | 6 (0.4) | 0 (0) | 0 (0) | 0 (0) | 2 (0.3) | 4 (0.5) | 5 (0.2) | 1 (0.2) |
| **Other severe illness, intervention** | 22 (0.7) [0.4-1.0] | 11 (0.6) [0.3-1.2] | 11 (0.7) [0.4-1.3] | 3 (0.4) [0.1-1.1] | 2 (0.5) [0.1-1.7] | 6 (1.1) [0.4-2.4] | 5 (0.9) [0.3-2.0] | 6 (0.7) [0.3-1.5] | 18 (0.7) [0.4-1.0] | 4 (0.8) [0.2-2.1] |
| Meningitis or encephalitis | 5 (0.2) | 3 (0.2) | 2 (0.1) | 1 (0.1) | 0 (0) | 2 (0.4) | 1 (0.2) | 1 (0.1) | 5 (0.2) | 0 (0) |
|                     | 11 (0.3) | 4 (0.2) | 7 (0.5) | 1 (0.1) | 2 (0.5) | 2 (0.3) | 3 (0.5) | 3 (0.4) | 10 (0.4) | 1 (0.2) |
|---------------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Septic shock        |          |         |         |         |         |         |         |         |         |         |
| Sepsis with bacteremia | 5 (0.2) | 4 (0.2) | 1 (0.07) | 1 (0.1) | 0 (0) | 1 (0.2) | 1 (0.2) | 0 (0) | 0 (0) | 2 (0.1) | 0 (0) |
| Renal replacement therapy | 4 (0.1) | 1 (0.06) | 1 (0.07) | 0 (0) | 1 (0.2) | 1 (0.2) | 0 (0) | 0 (0) | 2 (0.3) | 2 (0.2) | 2 (0.1) | 3 (0.6) |
| Death               | 50 (1.6) | 30 (1.8) | 20 (1.3) | 2 (0.2) | 4 (0.9) | 12 (2.2) | 23 (4.0) | 9 (1.1) | 45 (1.6) | 5 (1.0) |
| MIS-C or Kawasaki   | 16 (0.5) | 11 (0.6) | 5 (0.3) | 0 | 2 (0.5) | 2 (0.3) | 7 (1.3) | 5 (0.6) | 15 (0.5) | 1 (0.2) |

a May extend to 4 weeks for children hospitalized within 2 weeks, whose hospitalization extends past the 2-week follow-up time-point.

b No outcome information is known for the 1/322 children without any emergency department discharge/hospitalization information.

c Chronic condition is missing for 5/3221.

d A child may have multiple diagnoses / interventions (categories are not mutually exclusive).

e requiring drainage.
eTable 2: Reasons for return to care among 320 SARS-CoV-2 positive children discharged on day 0 with complete follow-up.

| Reason for return                                      | n (%)          |
|--------------------------------------------------------|----------------|
| Return to ED/hospital, reason unknown a                 | 151/320 (47.2) |
| Worsening or persistent symptoms general                | 18/320 (5.6)   |
| Specific reason given for return b                      | 151/320 (47.2) |
|   Fever                                                 | 47/151 (31.1)  |
|   Cough                                                 | 42/151 (27.8)  |
|   Other reason (presumed linked to COVID-19) c           | 28/151 (18.5)  |
|   Difficulty breathing                                 | 25/151 (16.6)  |
|   Rash (not specific to hands/feet)                     | 21/151 (13.9)  |
|   Vomiting                                              | 19/151 (12.6)  |
|   Diarrhea                                              | 10/151 (6.6)   |
|   Abdominal pain                                        | 10/151 (6.6)   |
|   Dehydration                                           | 6/151 (4.0)    |
|   Rash on hands                                         | 6/151 (3.5)    |
|   Rash on feet                                          | 2/151 (1.2)    |

aQuestion asked as ‘return related to initial reason for ED visit or possible complications of illness?’, 36/151 of these children were hospitalized.

bChildren may have more than one reason noted.

cSymptom presumed by guardian/caregiver to be possibly linked to COVID-19.
eTable 3: Cumulative outcomes, up to 14 days\(^a\) following the index ED visit, among 2510\(^b\) SARS-CoV-2 positive children who were discharged to home from the index emergency department visit. Data are n (%) [95\%Cl or one-sided 97.5\% CI] unless otherwise stated.

| All children | Sex | Age group | Chronic condition\(^c\) |
|--------------|-----|-----------|------------------------|
|              | Male | Female | < 1 yr | 1-<2 yr | 2-<5 yr | 5-<10 yr | 10-<18 yr | No | Yes |
| N=2510       | N=1306 | N=1204 | N=647 | N=362 | N=432 | N=449 | N=620 | N=2204 | N=303 |
| **Returned to care** (new symptoms, worsening condition, or persistent symptoms) | 320 (12.7) [11.5-14.1] | 167 (12.8) [11.0-14.7] | 153 (12.7) [10.9-14.7] | 107 (16.5) [13.8-19.6] | 49 (13.5) [10.2-17.5] | 44 (10.2) [7.5-13.4] | 37 (8.2) [5.9-11.2] | 83 (13.4) [10.8-16.3] | 270 (12.3) [10.9-13.7] | 50 (16.5) [12.5-21.2] |
| **Hospitalized** | 50 (2.0) [1.5-2.6] | 28 (2.1) [1.4-3.1] | 22 (1.8) [1.1-2.8] | 16 (2.5) [1.4-4.0] | 9 (2.5) [1.1-4.7] | 8 (1.9) [0.8-3.6] | 4 (0.9) [0.2-2.3] | 13 (2.1) [1.1-3.6] | 36 (1.6) [1.1-2.3] | 14 (4.6) [2.5-7.6] |
| **Severe outcome** | 8 (0.3) [0.2, 0.7] | 1 (0.1) [0.0-0.5] | 7 (0.6) [0.3-1.3] | 0 [0-0.7] | 0 [0-1.2] | 1 (0.2) [0.01-1.5] | 1 (0.2) [0.01-1.4] | 6 (0.2) [0.01-1.4] | 4 (0.2) [0.06-0.5] | 4 (1.3) [0.4, 3.6] |
| **Severe respiratory illness** | 12 (0.5) [0.2-0.8] | 3 (0.2) [0-0.7] | 9 (0.7) [0.3-1.4] | 2 (0.3) [0-1.1] | 0 [0-1.0] | 2 (0.5) [0.1-1.7] | 1 (0.2) [0-1.2] | 7 (1.1) [0.5-2.3] | 6 (0.3) [0.1-0.6] | 6 (2.0) [0.7-4.3] |
| Inotropic support | 1 (0.04) | 0 | 1 (0.1) | 0 | 0 | 1 (0.2) | 0 | 1 (0.05) | 0 |
| Myocarditis | 1 (0.04) | 1 (0.1) | 0 |
| Sepsis with bacteremia | 1 (0.04) | 0 | 1 (0.1) | 0 | 0 | 1 (0.2) | 0 | 1 (0.05) | 0 |
| Coagulation abnormality | 1 (0.04) | 0 | 1 (0.1) | 0 | 0 | 0 | 0 | 1 (0.2) | 0 | 1 (0.3) |

\(a\) May extend to 4 weeks for children hospitalized within 2 weeks, whose hospitalization extends past the 2 week follow-up time-point.

\(b\) Outcomes were censored (and not presented here) for 26/2536 children who were discharged at Day 0 but were lost-to-follow-up.

\(c\) Chronic condition information is missing for 3/2536.

\(d\) Missing length of stay for 8 hospitalized children.

\(e\) A child may have multiple diagnoses / interventions (categories are not mutually exclusive).

\(f\) Includes use of positive pressure ventilation or diagnosis of respiratory failure or diagnosis of acute respiratory distress syndrome.

© 2022 Funk AL et al. JAMA Network Open.
Table 4: Association of demographic factors (including race and ethnicity) and medical history with severe outcomes among the 2001 SARS-CoV-2 positive children from the United States with complete covariate data. The following table reflects the final parsimonious model.

|                      | n/N       | Adjusted Odds Ratio | 95% Confidence Interval | P-value |
|----------------------|-----------|---------------------|-------------------------|---------|
| **Sex**              |           |                     |                         |         |
| Female               | 32/975    | ref                 |                         |         |
| Male                 | 49/1026   | 1.65                | 0.96 – 2.83             | 0.07    |
| **Age category**     |           |                     |                         |         |
| < 1 year             | 10/478    | ref                 |                         |         |
| 1 - <2 years         | 7/223     | 1.52                | 0.69 – 3.35             | 0.30    |
| 2 - <5 years         | 11/302    | 1.51                | 0.72 – 3.19             | 0.28    |
| 5 - <10 years        | 13/353    | 1.56                | 0.99 – 2.45             | 0.06    |
| 10 - <18 years       | 40/645    | 2.69                | 1.32 – 5.47             | 0.006   |
| **Ethnicity and race** |         |                     |                         |         |
| Hispanic             | 30/789    | ref                 |                         |         |
| Non-Hispanic Black   | 30/736    | 1.00                | 0.47 – 2.13             | >0.99   |
| Non-Hispanic White   | 14/324    | 0.92                | 0.50 – 1.69             | 0.79    |
| Non-Hispanic Other   | 7/152     | 1.26                | 0.38 – 4.20             | 0.71    |
| **Chronic condition** |         |                     |                         |         |
| No                   | 53/1696   | ref                 |                         |         |
| Yes                  | 28/305    | 2.51                | 1.56 – 4.06             | <0.001  |
| **Previous pneumonia** |       |                     |                         |         |
| No                   | 62/1838   | ref                 |                         |         |
| Yes                  | 19/163    | 2.86                | 1.57 – 5.19             | 0.001   |
| **Asthma**           |           |                     |                         |         |
| No                   | 66/1670   | ref                 |                         |         |
| Yes                  | 15/331    | 0.60                | 0.31 – 1.15             | 0.13    |
| **Symptom duration before testing** | | | | |
| Asymptomatic         |           | 1.35                | 0.48 – 3.79             | 0.57    |
| 0-3 days             | 25/886    | ref                 |                         |         |
| 4-7 days             | 30/484    | 2.41                | 1.28 – 4.55             | 0.007   |
| 8+ days              | 8/144     | 1.79                | 0.70 – 4.60             | 0.23    |
| Unknown              | 18/487    | 1.21                | 0.66 – 2.21             | 0.54    |
| **Date of SARS-CoV-2 infection** | | | | |
| Mar 7 – May 31, 2020 | 14/195    | 1.72                | 0.58 - 5.06            | 0.33    |
| Jun 1 – Aug 31, 2020 | 22/538    | ref                 |                         |         |
| Sept 1 – Nov 30, 2020| 20/474    | 0.80                | 0.42 – 1.52             | 0.49    |
| Dec 1, 2020 – Feb 28, 2021 | 15/491 | 0.57                | 0.29 – 1.16             | 0.12    |
| Mar 1 – June 15, 2021 | 10/303    | 0.68                | 0.30 – 1.54             | 0.36    |

*Race and ethnicity data were missing for 4 children from the United States.

*Chronic condition, previous pneumonia, and asthma data were missing for 2 children from the United States.
eTable 5: Comparison of baseline characteristics, SARS-CoV-2 positive and SARS-CoV-2 negative participants enrolled in the PERN-COVID-19 cohort study.

|                                | SARS-CoV-2 positive N=3222 | SARS-CoV-2 negative N=7160 | P-value |
|--------------------------------|-----------------------------|-----------------------------|---------|
| Male                           | 1694 (52.6)                 | 3833 (53.5)                 | 0.37    |
| Age group                      |                             |                             |         |
| <1 year                        | 829 (25.7)                  | 1426 (20.1)                 | <0.001  |
| 1 - <2 year                    | 425 (13.2)                  | 1291 (18.0)                 |         |
| 2 - <5 years                   | 551 (17.1)                  | 1616 (22.6)                 |         |
| 5 - <10 years                  | 576 (17.9)                  | 1371 (19.1)                 |         |
| 10 - <18 years                 | 841 (26.1)                  | 1446 (20.2)                 |         |
| Country                        |                             |                             | <0.001  |
| Argentina                      | 28 (0.9)                    | 61 (0.9)                    |         |
| Australia                      | 0 (0)                       | 199 (2.8)                   |         |
| Canada                         | 532 (16.5)                  | 2402 (33.5)                 |         |
| Costa Rica                     | 420 (13.0)                  | 516 (7.2)                   |         |
| Italy                          | 18 (0.6)                    | 3 (0)                       |         |
| New Zealand                    | 0 (0)                       | 106 (1.5)                   |         |
| Paraguay                       | 35 (1.1)                    | 21 (0.3)                    |         |
| Singapore                      | 30 (0.9)                    | 40 (0.6)                    |         |
| Spain                          | 152 (4.7)                   | 259 (3.6)                   |         |
| United States                  | 2007 (62.3)                 | 3553 (49.6)                 |         |
| Previous pneumonia*            | 227 (7.1)                   | 767 (10.7)                  | <0.001  |
| Asthma*                        | 423 (13.1)                  | 1011 (14.1)                 | 0.17    |
| Chronic condition*             | 484 (15.0)                  | 1512 (21.2)                 | <0.001  |
| Clinical presentation*         |                             |                             |         |
| Asymptomatic                   | 172 (5.3)                   | 377 (5.3)                   | 0.89    |
| Symptomatic                    | 3048 (94.7)                 | 6768 (94.7)                 |         |
| Fever                          | 2125 (66.0)                 | 4289 (59.9)                 | <0.001  |
| Respiratory*                   | 2325 (72.2)                 | 4143 (57.9)                 | <0.001  |
| Gastrointestinal*              | 1338 (43.1)                 | 3383 (47.2)                 | <0.001  |
| Other*                         | 2176 (67.5)                 | 5343 (74.6)                 | <0.001  |
| Date of infection              |                             |                             | <0.001  |
| Mar 7 – May 31, 2020           | 235 (7.3)                   | 2079 (29.0)                 |         |
| Jun 1 – Aug 31, 2020           | 851 (26.4)                  | 2749 (38.4)                 |         |
| Sept 1 – Nov 30, 2020          | 769 (23.9)                  | 923 (12.9)                  |         |
| Dec 1, 2020 – Feb 28, 2021     | 734 (22.8)                  | 719 (10.0)                  |         |
| Mar 1 – June 15, 2021          | 633 (19.7)                  | 690 (9.6)                   |         |

* Missing for 4 SARS-CoV-2 positive children, and 15 SARS-CoV-2 negative children.
* Missing for 4 SARS-CoV-2 positive children, and 15 SARS-CoV-2 negative children.
* Missing for 4 SARS-CoV-2 positive children, and 16 SARS-CoV-2 negative children.
* Children may have more than one specific chronic condition.
* Missing for 2 SARS-CoV-2 positive children, and 15 SARS-CoV-2 negative children.
* Includes cough, rhinorrhea/congestion, difficulty breathing, sore throat, chest pain, wheeze, sputum production, apnea.
* Includes vomiting, diarrhea, abdominal pain.
Includes headache, seizure, loss of smell or taste, myalgia, arthralgia, drowsiness or lethargy, anorexia, oedema of extremities, irritability, conjunctivitis, skin rash, oral symptoms.
eTable 6: Severe outcomes in SARS-CoV-2 negative and SARS-CoV-2 positive children, stratified by hospitalization status on day 0.

| Country            | All children | Hospitalized on Day 0 | Discharged on Day 0<sup>a</sup> |
|--------------------|--------------|-----------------------|----------------------------------|
|                    | SARS-CoV-2 status |                      | SARS-CoV-2 status |                      | SARS-CoV-2 status |                      |
|                    | Positive  | Negative  | P-Value | Positive  | Negative  | P-Value | Positive  | Negative  | P-Value |
| All children       | 107/3221 (3.3) | 195/7156 (2.7) | 0.09     | 95/685 (13.9) | 182/1820 (10.0) | 0.006 | 12/2510 (0.5) | 13/5336 (0.2) | 0.09     |
| Country            |                |                      |                      |                      |                      |                      |                      |
| Argentina          |                |                      |                      |                      |                      |                      |                      |
|                    | 0/28 (0) | 2/61 (3.3) | >0.99    | 0/25 (0) | 2/54 (3.7) | >0.99 | 0/3 | 0/7 | - |
| Australia          | - | 0/199 | - | - | 0/70 | - | - | 0/129 | - |
| Canada             | 2/532 (0.4) | 20/2402 (0.8) | 0.41     | 1/33 (3.0) | 15/171 (8.8) | 0.48 | 1/498 (0.2) | 5/2227 (0.2) | >0.99 |
| Costa Rica         | 19/420 (4.5) | 13/516 (2.5) | 0.09     | 19/127 (15.0) | 13/118 (11.0) | 0.36 | 0/293 | 0/398 | - |
| Italy              | 0/18 (0) | 0/3 (0) | - | 0/12 | 0/1 | - | 0/6 | 0/2 | - |
| New Zealand        | - | 0/106 | - | - | 0/14 | - | - | 0/92 | - |
| Paraguay           | 2/35 (5.7) | 3/21 (14.3) | 0.35     | 2/12 (16.7) | 3/13 (23.1) | >0.99 | 0/23 | 0/8 | - |
| Singapore          | 0/30 (0) | 0/40 (0) | - | 0/30 | 0/5 | - | - | 0/35 | - |
| Spain              | 3/152 (2.0) | 6/259 (2.3) | >0.99 | 3/45 (6.7) | 6/131 (4.6) | 0.70 | 0/107 | 0/128 | - |
| United States      | 81/2007 (4.0) | 151/3553 (4.2) | 0.70     | 70/401 (17.5) | 143/1243 (11.5) | 0.002 | 11/1606 (0.7) | 8/2310 (0.4) | 0.16     |

<sup>a</sup>Excludes 26 and 31 SARS-CoV-2 positive and negative children, respectively, who were lost to follow-up.

<sup>b</sup>Chronic condition information missing for 4 SARS-CoV-2 positive children and 12 SARS-CoV-2 negative children.
eFigure. Flow of SARS-CoV-2 negative study participants including outcomes and follow-up.