

Scarlet Fever Rates Rose Sharply After the Pandemic and Were Associated with Higher Complication Risk Than Strep Throat Alone

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Key Findings:

- Scarlet fever diagnoses among pediatric patients dropped sharply during the COVID-19 pandemic and then surged well above pre-pandemic levels, peaking around 47 per 100,000 pediatric patients who had a visit in Q1 2023 and Q1 2024, nearly double the pre-pandemic seasonal peak of 24 per 100,000 in Q1 2019. By Q1 2025, the peak was down to 18.9 per 100,000.
- Children diagnosed with scarlet fever were 21% more likely to experience a strep-related complication within six weeks compared to those diagnosed with strep throat alone.

Strep throat is a contagious infection that is common among children and is caused by a type of bacteria called group A Streptococcus.¹ In some cases, these bacteria release toxins that cause a red, sandpaper-like rash known as scarlet fever.² Both conditions are treatable with antibiotics, but if not treated promptly, they can lead to serious complications such as rheumatic fever (which can damage the heart), kidney inflammation, deep tissue infections, and abscesses.^{2,3} In late 2022, the World Health Organization and the CDC identified a sharp rise in serious strep infections among children, likely driven in part by reduced exposure to common infections during the COVID-19 pandemic.^{4,5}

To understand how scarlet fever rates changed among children from 2018 through 2025 and whether children diagnosed with scarlet fever were more likely to develop complications than those with strep throat alone, we studied 61 million pediatric patients who had encounters between January 2018 and December 2025.

Before the COVID-19 pandemic, scarlet fever rates among pediatric patients followed a consistent seasonal pattern, peaking between 19 and 24 per 100,000 patients with a visit in Q1 each year. Rates plummeted during the pandemic, falling to fewer than 3 per 100,000 through 2020 and 2021. By 2023, Q1 rates rebounded sharply, rising to around 47 per 100,000 in 2023 and 2024. Rates declined substantially by 2025 with the Q1 peak reaching only 18.9 per 100,000.

Quarterly Scarlet Fever Rate for Pediatric Patients

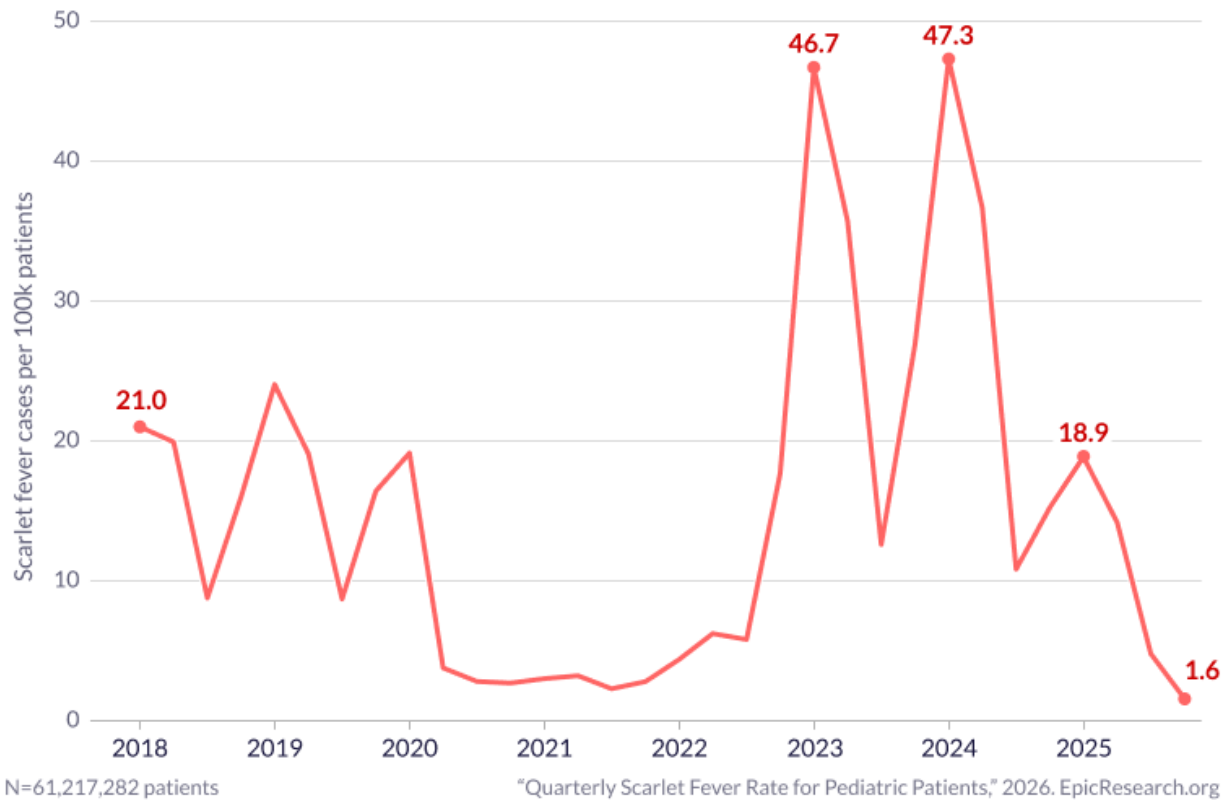


Figure 1. The quarterly rate of scarlet fever per 100,000 pediatric patients who had visits from Q1 2018 to Q4 2025.

Next, we evaluated the relationship between scarlet fever and strep-related complications, such as rheumatic fever and meningitis. We accounted for demographics, rurality and social vulnerability based on the patient's most recently documented address, and relevant comorbidities.

Compared to children diagnosed with strep throat who did not have scarlet fever, those diagnosed with scarlet fever were 21% more likely to experience a strep-related complication within six weeks, as seen in Figure 2.

Strep Complication Likelihood Following Scarlet Fever Compared to Strep Throat

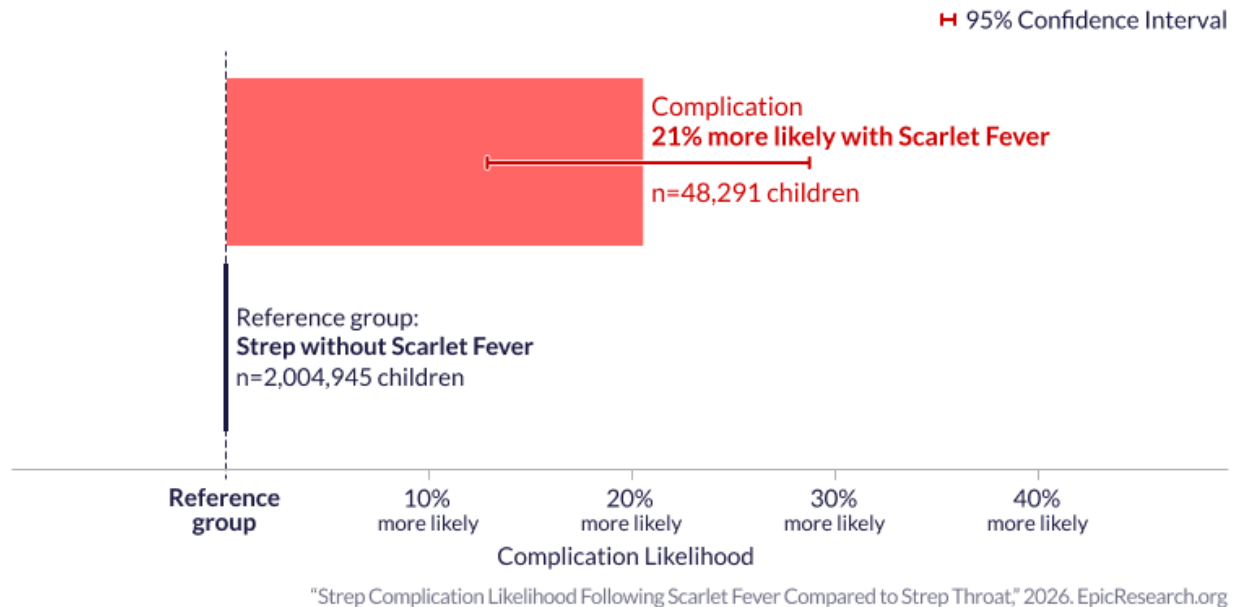


Figure 2. The likelihood of a child developing a group A strep complication following scarlet fever compared to strep throat.

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 300 million patient records from 2,000 hospitals and more than 4,000 clinics from all 50 U.S. states, Canada, Lebanon, and Saudi Arabia. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Brian Olson.

References

1. About Strep Throat. U.S. Centers for Disease Control and Prevention. January 15, 2026. <https://www.cdc.gov/group-a-strep/about/strep-throat.html>. Accessed March 24, 2026.
2. Clinical guidance for Scarlet fever. U.S. Centers for Disease Control and Prevention. August 5, 2025. <https://www.cdc.gov/group-a-strep/hcp/clinical-guidance/scarlet-fever.html>. Accessed February 17, 2026.
3. Brouwer S, Rivera-Hernandez T, Curren BF, et al. Pathogenesis, epidemiology and control of Group A Streptococcus infection. *Nat Rev Microbiol.* 2023;21(7):431-447. doi:10.1038/s41579-023-00865-7
4. Increased incidence of scarlet fever and invasive Group A Streptococcus infection - multi-country. World Health Organization. <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON429>. Accessed February 17, 2026.
5. Increase in invasive group A strep infections, 2022-2023. U.S. Centers for Disease Control and Prevention. February 2, 2023. https://archive.cdc.gov/www_cdc_gov/groupastrep/igas-infections-investigation.html. Accessed February 17, 2026.

Data Definitions

Term	Definition
Study period	1/1/2018 to 12/31/2025
Study population: inclusion	Pediatric patients (aged <19 by end of the study period) with:

	<ul style="list-style-type: none"> • Their first diagnosis of strep throat or scarlet fever in the study period • A face-to-face encounter 6 weeks to 18 months after their inclusion diagnosis
Exposures	Strep throat or scarlet fever (patients with both are counted toward scarlet fever)
Outcomes	Rate of scarlet fever among patients diagnosed with strep throat Strep complication within six weeks after the initial diagnoses of strep throat or scarlet fever
Face to Face Encounter	Encounter type of Emergency, Office Visit, Well Child, Follow-up, Telemedicine, Urgent care, Walk-in, Routine Prenatal, Postpartum Visit, Fetal Care Consult, Hospital Outpatient Visit, Admission, Emergency to Admission
Confounders	Age <ul style="list-style-type: none"> • 0-4 • 5-12 • 13-18 Legal sex RUCA Social Vulnerability Index quintile Comorbidities prior to the exposure diagnosis: <ul style="list-style-type: none"> • Immunocompromised: • Cancer: a billing or encounter diagnosis with ICD-10-CM code C* • HIV: a billing or encounter diagnosis with ICD-10-CM code B20* • Cystic fibrosis: a billing or encounter diagnosis with ICD-10-CM code E84* • Splenectomy: a billing or encounter diagnosis with ICD-10-CM code Z90.81 • Transplant: a billing, encounter, or problem list diagnosis with SNOMED code 77465005 • Chronic sinusitis: an encounter or billing diagnosis with ICD-10-CM code J32* • Diabetes: an encounter or billing diagnosis with ICD-10-CM code E08*-E13*
Strep throat	A billing or encounter diagnosis with ICD-10-CM code J02.0, J03.00, J03.01 and a positive strep lab within three days of diagnoses
Scarlet fever	A billing or encounter diagnosis with ICD-10-CM code A38* or SNOMED 30242009 and a positive strep lab within three days of diagnoses
Strep lab	A lab result that is “abnormal,” “positive,” or “detected” with LOINC code 11268-0, 76581-8, 101300-2, 60489-2, 68954-7, 6556-5, 18481-2, 78012-2, or 6557-3
Strep complication	One of: <ul style="list-style-type: none"> • Rheumatic fever: encounter or billing diagnosis with ICD-10-CM code I00-I02 • Reactive arthritis: encounter or billing diagnosis with ICD-10-CM code M00.2* • Toxic shock: encounter or billing diagnosis with ICD-10-CM code A48.3 • Post-strep glomerulonephritis: encounter or billing diagnosis with ICD-10-CM code N08 • Abscess: encounter or billing diagnosis with ICD-10-CM code J36, J39.0, or J39.1

	<ul style="list-style-type: none"> • Necrotizing fasciitis: encounter or billing diagnosis with ICD-10-CM code M72.6 • Septic bacteremia: encounter or billing diagnosis with ICD-10-CM code A40.0 • Bacteremia: encounter or billing diagnosis with ICD-10-CM code R78.81 • Meningitis: encounter or billing diagnosis with ICD-10-CM code G00.2 or G01 • Brain abscess: encounter or billing diagnosis with ICD-10-CM code G06.0 • Chronic tonsillitis: encounter or billing diagnosis with ICD-10-CM code J35
Model specifications	Time series Logistic regression for patient outcomes

Table 1. Quarterly Scarlet Fever Rate for Pediatric Patients

Quarter Start Date	Denominator	Numerator	Rate
1/1/2018	7,378,432	1,550	0.0210%
4/1/2018	7,090,640	1,413	0.0199%
7/1/2018	7,449,537	654	0.0088%
10/1/2018	7,663,850	1,224	0.0160%
1/1/2019	7,969,441	1,915	0.0240%
4/1/2019	7,701,678	1,470	0.0191%
7/1/2019	8,203,543	714	0.0087%
10/1/2019	8,501,304	1,396	0.0164%
1/1/2020	8,194,097	1,568	0.0191%
4/1/2020	5,002,128	189	0.0038%
7/1/2020	7,379,570	208	0.0028%
10/1/2020	7,231,676	195	0.0027%
1/1/2021	7,206,640	217	0.0030%
4/1/2021	8,194,760	264	0.0032%
7/1/2021	9,784,366	224	0.0023%
10/1/2021	9,617,993	270	0.0028%
1/1/2022	9,145,206	401	0.0044%
4/1/2022	9,633,300	600	0.0062%
7/1/2022	10,391,495	604	0.0058%
10/1/2022	11,143,390	1,969	0.0177%
1/1/2023	10,675,418	4,984	0.0467%
4/1/2023	10,691,022	3,817	0.0357%
7/1/2023	11,044,523	1,392	0.0126%
10/1/2023	11,638,170	3,133	0.0269%
1/1/2024	11,657,058	5,508	0.0473%
4/1/2024	11,460,672	4,201	0.0367%

7/1/2024	12,128,762	1,314	0.0108%
10/1/2024	12,620,606	1,923	0.0152%
1/1/2025	12,590,146	2,375	0.0189%
4/1/2025	12,095,118	1,715	0.0142%
7/1/2025	12,821,727	614	0.0048%
10/1/2025	12,772,537	200	0.0016%

Table 2. Strep Complication Likelihood Following Scarlet Fever Compared to Strep Throat

Factor	Odds ratio	Lower CI	Upper CI
Scarlet Fever Diagnosis	1.21	1.1287	1.2873
Age at Diagnosis [14,18]	0.5428	0.5196	0.5671
Age at Diagnosis [5,13]	0.7781	0.7590	0.7978
Sex Male	0.9318	0.9113	0.9527
Census Region NE	0.9811	0.9469	1.0166
Census Region None	1.5054	0.8212	2.7595
Census Region S	0.8146	0.7932	0.8365
Census Region W	1.0923	1.0445	1.1424
SVI Quartile [.2,.4)	1.0305	0.9893	1.0735
SVI Quartile [.4,.6)	1.0637	1.0211	1.1081
SVI Quartile [.6,.8)	1.0693	1.0278	1.1126
SVI Quartile [.8,1]	1.0685	1.0282	1.1103
SVI Quartile Unknown	1.0165	0.7427	1.3914
RUCA Grouping Micropolitan	1.0719	1.0341	1.1110
RUCA Grouping Rural	1.1831	1.1164	1.2538
RUCA Grouping Small Town	1.0811	1.0282	1.1368
RUCA Grouping Unknown	0.6807	0.3520	1.3165
Cancer Diagnosis	1.8436	1.4998	2.2663
Cystic Fibrosis Diagnosis	0.8201	0.4394	1.5307
Splenectomy Diagnosis	3.4658	1.9416	6.1867
Chronic Sinusitis Diagnosis	1.7205	1.6368	1.8085
Transplant Diagnosis	3.2841	2.4571	4.3895