

Low Body Temperature Among 5- to 8-Week-Old Infants Is a Modest Predictor of Bacterial Infections

Team A: Kersten Bartelt, RN; Mohammed Sayeem, MD; Joe Deckert, PhD

Team B: Sam Butler, MD; Grant Keane

Last updated 06 January 2026 • Check for updates at EpicResearch.org

Key Findings:

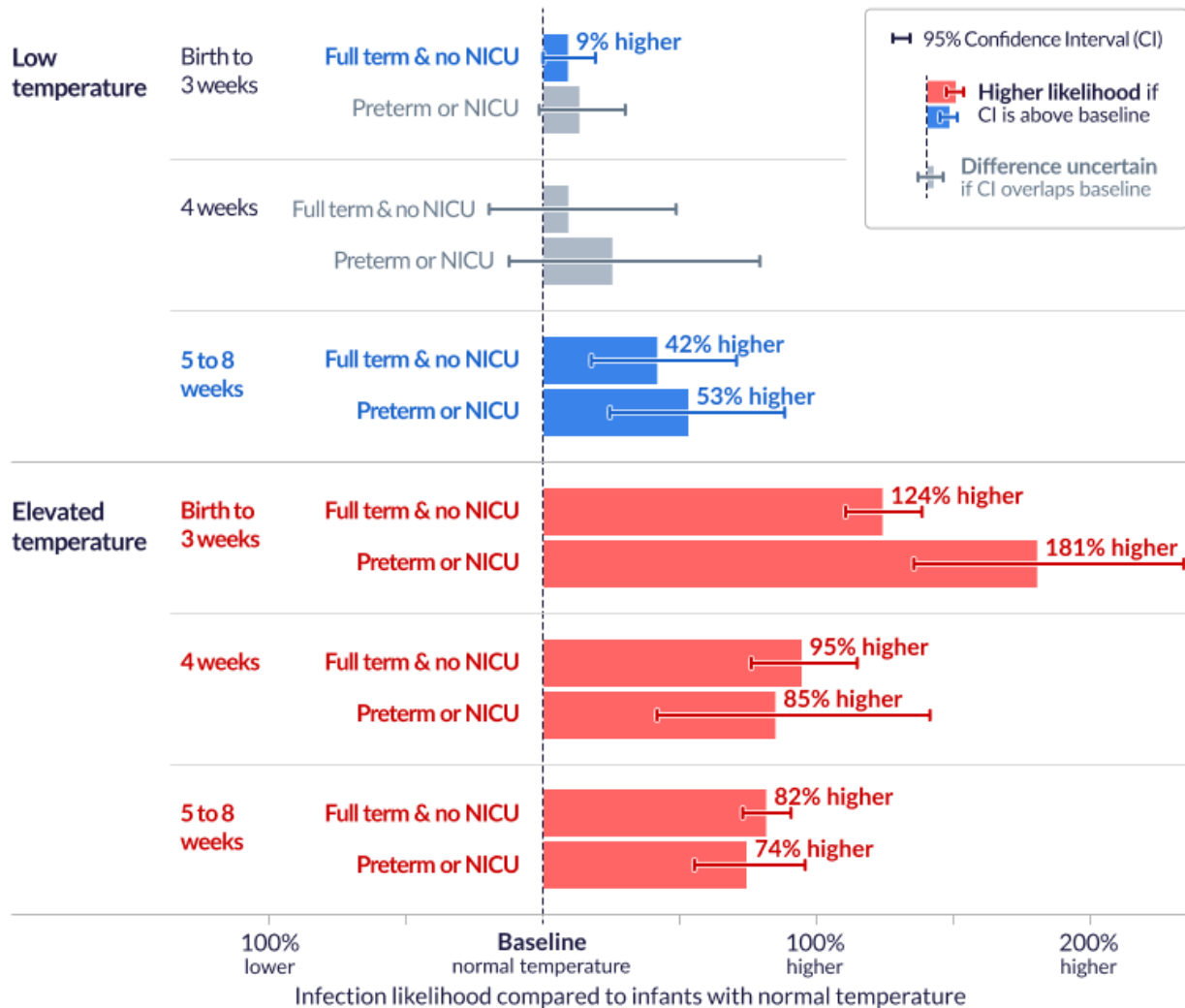
- Infants 5 to 8 weeks old with a low body temperature were 42% to 53% more likely to have a bacterial infection compared to infants of the same age with a normal temperature.
- Infants who were younger than 5 weeks old who had a low body temperature did not have a significantly different likelihood of having a bacterial infection.

Hypothermia, or low body temperature, is concerning in infants, and there are a number of potential causes. It can be difficult to determine if the low temperature is due to inadequate temperature regulation, environmental exposure, or an underlying bacterial infection.¹ The strength of low temperature's association with true bacterial illness has remained uncertain in previous literature.^{2,3} Understanding whether low temperature meaningfully predicts bacterial infection, especially in relation to key developmental age groups, is important for informing evaluation pathways and avoiding unnecessary testing.

We studied 128,979 U.S. infants younger than 8 weeks old who had an emergency department (ED) visit between January 1, 2017, and September 30, 2025, and who had a blood, cerebrospinal fluid, or urine culture performed; a documented temperature during the visit; and a birth record in Cosmos. Infants were classified as having a low temperature (<36°C), normal temperature (36–38°C), or elevated temperature (>38°C) based on the lowest or highest temperature recorded during the visit. We then looked for an abnormal blood, cerebrospinal fluid, or urine culture as confirmation of a bacterial infection. Infants were grouped into those who were born prematurely (<37 weeks) or who had a NICU stay near the time of birth and those who were full term without a NICU stay. We accounted for social vulnerability based on residence, rurality based on residence, demographics, ED acuity level, census region of residence, and age group (birth to 3 weeks, 4 weeks, 5 to 8 weeks). Clinical guidelines for managing newborns with an abnormal temperature vary based on the infant's age.⁴

Across all age groups, elevated temperature was a strong predictor of bacterial infection, whereas low temperature demonstrated an age-dependent pattern, as shown in Figure 1. Among 5- to 8-week-old infants, those with a low temperature were 42% more likely to have a bacterial infection if they were full term without a NICU stay and 53% more likely if they were preterm or had a NICU stay, compared with infants who had a normal temperature. Among 4-week-old infants, low temperature was not associated with a significant change in infection likelihood in either group. Among the youngest infants (birth to 3 weeks old), there was no clinically meaningful increase in infection likelihood with low temperature, which was associated with only a 9% increase in likelihood for full term infants without a NICU stay and a statistically insignificant increase for infants who were premature or had a NICU stay.

Likelihood of Bacterial Infection by Temperature, Age, and Risk



N=128,979 infants

"Likelihood of Bacterial Infection by Temperature, Age, and Risk," 2026. EpicResearch.org

Figure 1. The likelihood of an infant having a bacterial infection by their age, whether they were preterm or had a NICU stay, and their body temperature.

These findings suggest that low body temperature might be a meaningful predictor of bacterial infections for infants starting at 5 weeks old.

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 1,800 hospitals and more than 41,000 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, in collaboration with a researcher from UPMC Children's Hospital of Pittsburgh. The two teams came to similar conclusions. Graphics by Brian Olson.

References

1. Ramgopal S, Lo YHJ, Potisek NM, Money NM, Halvorson EE, Cruz AT, Rogers AJ. Current Evidence on the Care of Young Infants With Hypothermia in the Emergency Department. *Pediatr Emerg Care*. 2025 Feb 1;41(2):146-151. doi: 10.1097/PEC.0000000000003259. PMID: 39883795.
2. Ramgopal S, Walker LW, Vitale MA, Nowalk AJ. Factors associated with serious bacterial infections in infants ≤ 60 days with hypothermia in the emergency department. *Am J Emerg Med*. 2019;37(6):1139-1143. doi:10.1016/j.ajem.2019.04.015
3. Ramgopal S, Noorbakhsh KA, Pruitt CM, Aronson PL, Alpern ER, Hickey RW. Outcomes of young infants with hypothermia evaluated in the emergency department. *J Pediatr*. 2020;221:132-137.e2. doi:10.1016/j.jpeds.2020.03.002
4. Fever in infants 0 to 60 days. Children's Hospital Colorado. <https://www.childrenscolorado.org/health-professionals/clinical-resources/clinical-pathways/fever-in-infants-0-to-60-days/>. Accessed December 18, 2025.

Data Definitions

Term	Definition
Study period	1/1/2017 to 9/30/2025
Study population: inclusion	Infants: <ul style="list-style-type: none"> • Aged <57 days at the start of an encounter with a type of emergency or emergency to inpatient • With a blood culture, CSF, or urine culture lab performed • With a birth record in Cosmos • With a temperature reading during the ED visit • With a U.S. address
Study population: exclusion	Infants: <ul style="list-style-type: none"> • With an encounter or billing diagnosis of drowning with ICD-10-CM code W65*-W70*, W73*-W74*, or T75.1* • With a temperature classified as hypothermia and another classified as hyperthermia while in the ED • With a history of antibiotics: a medication with an order type of prescription or administration and ATC code J01* • With a history of antivirals: a medication with an order type of prescription or administration and ATC code J05A*
Exposure	Hypothermia: Temperature of <36 degrees Celsius while in the ED Normothermic: Temperature of 36–38 degrees Celsius while in the ED Hyperthermia: Temperature of >38 degrees Celsius while in the ED
Stratifications	Age in days: <ul style="list-style-type: none"> • Birth to 3 weeks (0 to 21 days) • 4 weeks (22 to 28 days) • 5 to 8 weeks (29 to 56 days) Prematurity: <37 weeks' gestation Prior NICU stay: ICU stay within seven days of birth
ICU stay	An encounter indicated as an ICU stay in Cosmos
Confounders	Social Vulnerability Index quintile RUCA Legal sex Race and ethnicity

Acuity level

Census division:

- New England
- Middle Atlantic
- East North Central
- West North Central
- South Atlantic
- East South Central
- West South Central
- Mountain
- Pacific

Outcomes

Abnormal lab result based on abnormal flag for one of the following:

- Blood culture: LOINC code 104553-3, 73962-3, 88271-2, 88244-9, 88258-9, 88259-7, 88261-3, 88255-5, 88256-3, 88257-1, 88263-9, 88266-2, 88265-4, 88267-0, 88268-8, 88269-6, 88270-4, 88272-0, 88277-9, 88254-8, 88264-7, 88275-3, 88276-1, 73963-1, 73558-9, 88273-8, 88274-6, 73961-5, 106905-3, 105776-9, 105805-6, 105766-0, 105795-9, 105769-4, 105798-3, 105807-2, 93406-7, 105773-6, 92791-3, 92792-1, 92800-2, 105806-4, 92797-0, 92798-8, 92799-6, 105794-2, 105791-8, 93405-9, 105774-4, 93401-8, 105765-2, 92786-3, 93403-4, 105764-5, 96306-6, 85771-4, 92783-0, 92782-2, 92784-8, 92785-5, 92803-6, 93399-4, 93396-0, 93398-6, 93395-2, 92781-4, 92779-8, 93385-3, 105768-6, 92780-6, 92767-3, 92804-4, 93387-9, 93393-7, 105767-8, 93386-1, 105770-2, 105789-2, 93392-9, 93384-6, 92777-2, 105796-7, 92776-4, 105797-5, 92775-6, 92778-0, 93391-1, 105775-1, 92774-9, 85770-6, 92788-9, 92787-1, 92790-5, 92793-9, 92794-7, 92795-4, 92796-2, 85785-4, 96302-5, 85783-9, 85784-7, 105809-8, 105812-2, 105792-6, 105793-4, 105808-0, 105790-0, 105785-0, 105786-8, 105787-6, 105788-4, 105810-6, 105811-4, 105813-0, 105814-8, 105815-5, 105816-3, 105817-1, 93389-5, 85773-0, 92769-9, 93404-2, 96304-1, 96305-8, 85775-5, 93402-6, 92801-0, 105804-9, 92802-8, 93397-8, 105772-8, 93394-5, 93388-7, 105771-0, 96313-2, 85776-3, 85780-5, 85777-1, 85765-6, 105799-1, 96311-6, 85764-9, 105801-5, 105803-1, 85766-4, 101371-3, 97050-9, 101368-9, 92768-1, 106410-4, 85782-1, 85781-3, 106411-2, 96301-7, 93400-0, 85772-2, 96303-3, 85778-9, 96308-2, 85774-8, 85761-5, 85779-7, 85763-1, 96310-8, 96312-4, 92773-1, 105800-7, 92772-3, 85768-0, 92771-5, 105802-3, 85769-8, 92770-7, 101369-7, 101370-5, 96307-4, 85767-2, 43703-8, 45275-5, 600-7, 5883-4, 90426-8, 90427-6, 48727-2, 48724-9, 601-5, 107186-9, 107187-7, 17928-3, 17934-1, 6309-9, 6429-5, 104349-6, 6330-5, 17929-1, 17935-8, 551-2, 17930-9, 17936-6, 17931-7, 17932-5, 17933-3, 6453-5, 5878-4, 6578-9, 5835-4, 87987-4, 20807-4, 23593-7, 10730-0, 45276-3, 533-0, 64412-0, 14461-8, 90435-9, 90437-5, 97758-7

	<ul style="list-style-type: none"> • CSF: LOINC code 43699-8, 43702-0, 43696-4, 87937-9, 606-4, 5884-2, 569-4, 5839-6, 104347-0, 88236-5, 35419-1, 6454-3, 87990-8, 88623-4, 87945-2, 89599-5, 14462-6, 534-8, 86581-6 • Urine culture: LOINC code 43700-4, 14457-6, 630-4, 40435-0, 13315-7, 17970-5, 17971-3, 17972-1, 17973-9, 17974-7, 44847-2, 44849-8, 100906-7, 88902-2, 35432-4, 38394-3, 6455-0, 5837-0, 49110-0, 59151-1, 541-3, 102104-7
Race and ethnicity	Patients were classified by race and ethnicity that were mapped to standards to flag patients as Hispanic and Black
Model specifications	Logistic regression

Table 1. Likelihood of Bacterial Infection by Temperature, Age, and Risk

Temperature, Age, and Risk Group	Odds Ratio	Lower CI	Upper CI
0 to 21 Days Old Low-risk Hyperthermic	2.2413	2.1061	2.3852
0 to 21 Days Old Low-risk Hypothermic	1.0923	1.0007	1.1923
0 to 21 Days Old High-risk Hyperthermic	2.8057	2.3558	3.3414
0 to 21 Days Old High-risk Hypothermic	1.1333	0.9868	1.3014
22 to 28 Days old Low-risk Hyperthermic	1.9455	1.7616	2.1486
22 to 28 Days old Low-risk Hypothermic	1.0934	0.8040	1.4870
22 to 28 Days old High-risk Hyperthermic	1.8500	1.4176	2.4143
22 to 28 Days old High-risk Hypothermic	1.2540	0.8771	1.7930
26 to 56 Days Old Low-risk Hyperthermic	1.8164	1.7306	1.9065
26 to 56 Days Old Low-risk Hypothermic	1.4182	1.1778	1.7076
26 to 56 Days Old High-risk Hyperthermic	1.7444	1.5540	1.9582
26 to 56 Days Old High-risk Hypothermic	1.5314	1.2451	1.8835