



LETTER TO THE EDITOR

Google Trends as sentinel for foodborn Botulism: lessons in early diagnosis and treatment

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Dear Editor,

Foodborne botulism is a rare but potentially fatal neuroparalytic disease that requires prompt clinical recognition and treatment. In early August 2025, Italian media reported a suspected foodborne botulism cluster in Calabria Region following consumption of ready-to-eat sandwiches (1). While details are still under investigation, we used Google Trends to contextualize public attention around the outbreak. Google Trends data were retrieved using the search term 'botulinum toxin', selected because it was the expression predominantly used in national media reports describing the event. We observed a sharp, geographically localized increase in searches temporally aligned with the news cycle (**Figure 1**). Beyond this descriptive signal, we wish to emphasize clinical lessons on early recognition and treatment, which ultimately determine outcomes in botulism. Google Trends normalises query volume (0–100) by time and place, thus enabling rapid comparison of relative interest. While not definitive indicators, such signals can play a complementary role in surveillance and risk communication when integrated with clinical vigilance. Google Trends has been identified as a

potentially valuable resource, offering a free and easily accessible means of accessing large population search data, with the potential to derive meaningful insights into population behaviour and its association with health and healthcare (2). The approach employed in this study was a simple one, previously utilised for other events (3,4), with the interpretation of findings being limited to temporal correlation and geographic localisation.

Botulism should be suspected in adults with acute, afebrile, bilateral cranial neuropathies (ptosis, diplopia, dysarthria, dysphagia) followed by descending symmetric weakness and potential respiratory compromise. Misdiagnosis as stroke, Guillain–Barré syndrome, myasthenia gravis, or brainstem pathology is frequent. Case reports indicate that delayed recognition is not uncommon, with early cases often overlooked or attributed to other neurological syndromes (5). The pattern (symmetry, bulbar predominance, autonomic features such as dry mouth, constipation) and exposure history (home-preserved foods, oil-preserved vegetables, delicatessen spreads) are pivotal. Current clinical guidelines underscore that diagnosis is fundamentally



clinical, with laboratory confirmation often delayed relative to therapeutic decision-making. Management hinges on immediate supportive care (airway/ventilation) and prompt administration of heptavalent equine botulinum antitoxin (HBAT) based on clinical suspicion, without waiting for laboratory confirmation. Clinical guidelines and observational evidence converge on a time-critical effect: earlier antitoxin administration is associated with shorter ICU and hospital stay, reduced duration or need for mechanical ventilation, and improved outcomes (5,6).

Rapid case finding, product traceback, and access to antitoxin through designated hubs remain essential. Recent outbreaks demonstrate the value of structured clinical algorithms and inter-agency logistics; clinician awareness of local antitoxin pathways should be routinely maintained and rehearsed (7,8). Public attention generated by outbreaks may be transient, but the consequences of delayed diagnosis are not. Digital surveillance tools can enhance situational awareness and support risk communication; however, favorable patient outcomes ultimately depend on clinicians' ability to promptly recognize the characteristic clinical syndrome and initiate antitoxin therapy without waiting for laboratory confirmation (9).

Conflict of Interest

The authors declare no conflicts of interest related to this letter.

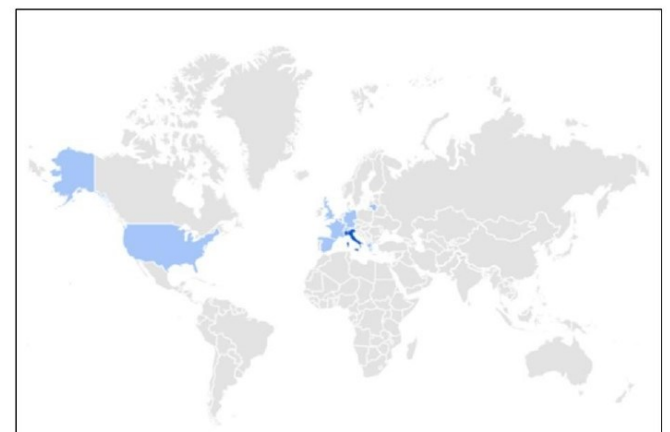
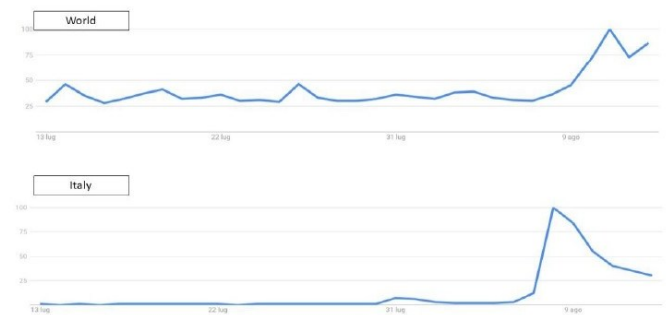


Figure 1. Google Trends interest in the World and in Italy for the search term "botulinum toxin" during the period 13 July–13 August 2025. The term was selected because it was predominantly used in national media reports describing the outbreak



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1. ANSA. Intossicati dal botulino, un morto e nove ricoverati [italian] Available from: https://www.ansa.it/calabria/notizie/2025/08/07/intossicati-dal-botulino-un-morto-e-nove-ricoverati_52ec44b1-9b92-4636-b30f-d44225910723.html (last access 08/12/2025)
2. Nuti, S. V., Wayda, B., Ranasinghe, I., Wang, S., Dreyer, R. P., Chen, S. I., & Murugiah, K. The use of google trends in health care research: a systematic review. *PLoS one*, 2014;9(10), e109583. <https://doi.org/10.1371/journal.pone.0109583>
3. Giusti GD, Ramacciati N. Self-Tracheostomy: Analysis of Google Trends. *Journal of emergency nursing*, 2024;50(4), 482–483. <https://doi.org/10.1016/j.jen.2024.03.005>
4. Giusti GD, Ramacciati, N. The story of Christian Eriksen. To close the loop, *Emergency Care Journal*, 2024;20(4). doi: <https://doi.org/10.4081/ecj.2024.12746>
5. Palma, N. Z., da Cruz, M., Fagundes, V., & Pires, L. Foodborne Botulism: Neglected Diagnosis. *European journal of case reports in internal medicine*, 2019;6(5), 001122. https://doi.org/10.12890/2019_001122
6. Rao, A. K., Sobel, J., Chatham-Stephens, K., & Luquez, C. Clinical Guidelines for Diagnosis and Treatment of Botulism, 2021. *MMWR. Recommendations and reports : Morbidity and mortality weekly report. Recommendations and reports*, 2021;70(2), 1–30. <https://doi.org/10.15585/mmwr.mm7002a1>
7. Vohra R, Barash JR, Karmarkar EN, Koch-Kumar S, Sanchez N, Gore M, Michel K, Rangel M, Armstrong E, Pimentel L, Kraushaar V, Kimura A, Stainken C, Nat A, Nat RS, Cherukupalli S, Schneider D, Vugia DJ, Solis T, Zweifler J, Huntington S, Prado J, Luchini D, Al Saghbini S. Foodborne Botulism Outbreak After Consumption of Home-Canned Cactus (Nopales) - Fresno County, California, June 2024. *MMWR Morb Mortal Wkly Rep*. 2025 Jul 3;74(24):408-413. doi: <https://doi.org/10.15585/mmwr.mm7424a1>
8. Miao T, Li X, Hu B, Zhang H, Xu L, Zhang D, Sui M, Han X, Li L, Zhuang D, Yu D, Yang Z, Zhang J. An Outbreak of Foodborne Botulism Caused by *Clostridium botulinum* BoNT/A3 in Pickled Eggs - Weihai City, Shandong Province, China, July 2024. *China CDC Wkly*. 2024 Dec 20;6(51):1375-1380. doi: <https://doi.org/10.46234/ccdcw2024.273>





9. Richardson JS, Parrera GS, Astacio H, Sahota H, Anderson DM, Hall C, Babinchak T. Safety and Clinical Outcomes of an Equine-derived Heptavalent Botulinum Antitoxin Treatment for Confirmed or Suspected Botulism in the United States. *Clin Infect Dis*. 2020 Apr 15;70(9):1950-1957. doi: <https://doi.org/10.1093/cid/ciz515>

