

When Do Minutes Matter?

Prioritizing 911 calls when demand exceeds availability



EMS AGENCIES ARE FEELING THE STRAIN.

In recent years, agencies across the U.S. have seen an increase in EMS call volume and a decrease in personnel and ambulance availability.^{1,2,3,4} This rise in demand and lack of resources have put a strain on agencies, leaving systems with the difficult decision of determining which calls to prioritize first, which to defer, and which to refer to alternative care such as telemedicine or secondary nurse triage.^{5,6}

Most standardized dispatch response prioritization systems are designed to determine a call's acuity and urgency assuming an immediate response. Nevertheless, in the absence of other guiding data, many EMS systems are turning to dispatch acuity Determinant levels to help guide response timing.^{7,8,9,10}

A team of researchers from ESO and Johns Hopkins partnered with a group of eight EMS agencies to begin looking deeper into the relationship between the output associated with a widely used dispatch system and time-critical illness. The primary goal was to start creating a data-driven framework for informing 911 response prioritization. The eight participating systems all had dispatch centers that were accredited by the International Academies of Emergency Dispatch (IAED) and used Medical Priority Dispatch System (MPDS). MPDS includes **Dispatch Protocols** and **Determinant Levels**, which the research team used to evaluate time-critical intervention and hospital outcomes. The research team reviewed 1.7 million incidents that occurred between January 1, 2021 and June 30, 2023.

DISPATCH PROTOCOL: a numeric code representing the clinical condition (chief complaint).

DETERMINANT LEVELS: letter codes ranging from OMEGA to ECHO represent acuity and help guide response, use of lights and sirens, and resources.

DISPATCH DETERMINANT LEVELS AND NEMSIS DISPATCH PRIORITY (PATIENT ACUITY)

A multi-round survey was sent to each EMS agency to create consensus on time-critical EMS interventions and emergency department (ED) outcomes.

IN THE MULTI-ROUND SURVEY:

Cardiac arrest after EMS arrival and patient death in the ED were predefined as time-critical and were automatically included.

≥75%

Items identified by 75% or more of respondents in the first round were immediately classified as time-critical.

25% - 74%

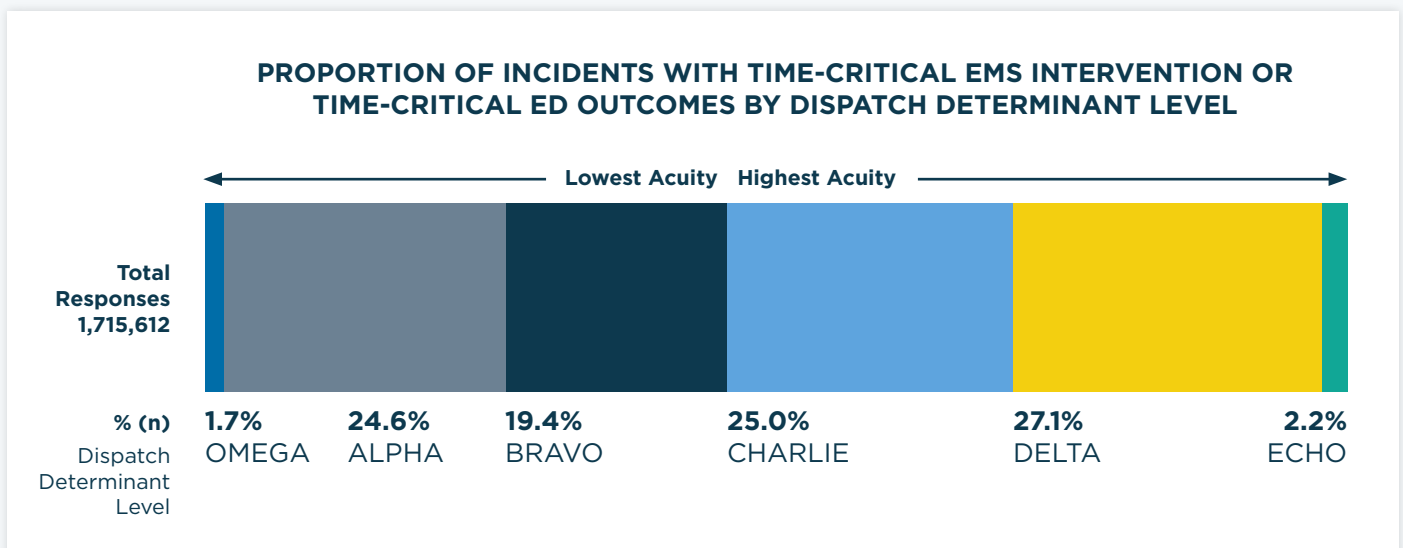
Items with 25% to 74% of votes underwent a second round of voting, with those receiving at least 50% included.

<25%

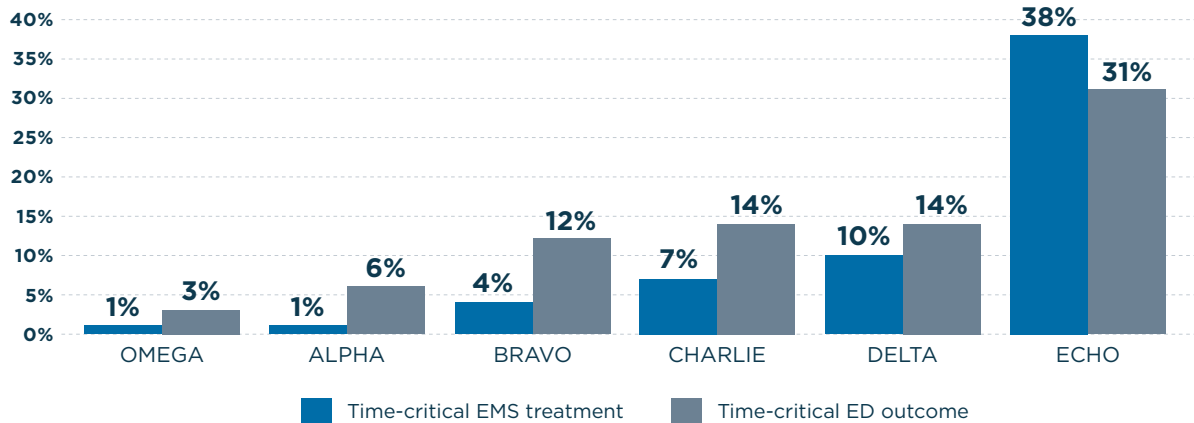
Items receiving 25% or fewer votes were excluded from the definition.

THE RESULTS

The table below shows the overall Determinant levels of EMS responses in the study. The DELTA (critical) level was the most common, making up 27% of calls, followed by CHARLIE (emergent) and ALPHA (low acuity), each around 25%. The OMEGA (non-acute) level, indicating the least urgent calls, was the least common at 2%.

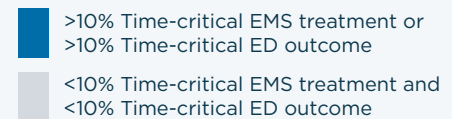
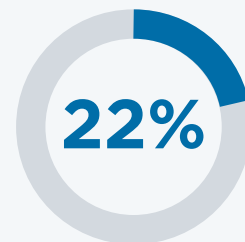


TIME CRITICAL OUTCOMES BY DETERMINANT LEVELS



Overall, time-critical EMS intervention or ED diagnosis increased with dispatch Determinant levels—meaning as a call’s Determinant level increased, the more time-critical treatments and outcomes were documented. However, there was a small portion of lower acuity Determinant level protocols with a high proportion of time-critical intervention or outcomes. As an example, 7/32 (22%) included ALPHA protocols had >10% of responses involving a time critical EMS intervention or outcome.

NOT ALL LOW ACUITY DETERMINANT LEVELS (ALPHAs) ARE “SAFE TO HOLD”



KEY TAKEAWAYS

6%

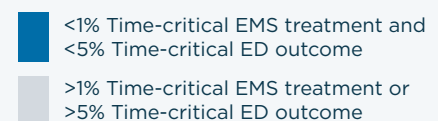
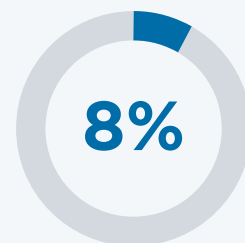
of all responses involved time-critical interventions by EMS.

12%

of patients transported had time-critical conditions diagnosed in the ED.

These findings may help inform prioritization frameworks. For example, if a system set a threshold of <1% time-critical EMS intervention and <5% time-critical ED diagnosis, 8% of EMS requests could be safely referred to alternative resources or deferred for non-emergent dispatch.

CALLS ELIGIBLE FOR ALTERNATIVE DISPOSITION



WHAT CAN WE LEARN FROM THIS?

The findings highlight the need to consider both the chief complaint and the acuity of dispatch to ensure the right calls are prioritized and met with the right resource. Here are a few other recommendations to help your system keep your community safe:

1

Update dispatch protocols to ensure serious conditions are quickly recognized and prioritized no matter the code.

2

Use basic life support more effectively to better manage resources without compromising response quality.

3

Avoid using the dispatch determinant level in isolation to determine if a call is safe to hold.

THE WORK'S JUST GETTING STARTED

Due to the small number of lower acuity Determinant levels that meet criteria for being unsafe to hold, it's important for the industry to find ways to bring flexibility into their approach in determining dispatch prioritization while considering both Protocol and Determinant level factors. In order for us to fully optimize our prediction process in determining which responses to defer and which need immediate attention, more research is necessary.

TO REQUEST THE FULL STUDY, VISIT

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- Charleston County EMS, Charleston, SC
- Johnston County EMS, Smithfield, NC
- Guilford County EMS, Greensboro, NC
- Office of the Medical Director, Johnson County EMS System, Olathe, KS
- Lee County EMS, Fort Myers, FL
- Wake County EMS, Raleigh, NC

When multiple calls come in simultaneously, there's a likelihood that some are from individuals facing more severe health crises. By prioritizing the sickest patients, we ensure that ambulance resources are allocated first where they're needed most.

- Jeff Williams
Deputy Medical Director of
Wake County Department
of EMS

This program has truly been a game-changer for us in Austin, especially during peak demand periods. Austin is a big hub for events, we often get an influx of out of towners, so it's crucial to maintain our resources appropriately.

- Dr. Heidi Abraham
Chief Deputy Medical
Director for Austin-Travis
County EMS

By validating our data through ESO, we are confident that our expanded triage program aligns with the study findings.

- Dr. Heidi Abraham
Chief Deputy Medical
Director for Austin-Travis
County EMS

REFERENCES

1. Cannuscio CC, Davis AL, Kermis AD, Khan Y, Dupuis R, Taylor JA. A Strained 9-1-1 System and Threats to Public Health. *J Community Health*. 2016 Jun;41(3):658-66. doi: 10.1007/s10900-015-0142-x. PMID: 26704911; PMCID: PMC4842216.
2. Herr D, Bhatia S, Breuer F, Poloczek S, Pommerenke C, Dahmen J. Increasing emergency number utilisation is not driven by low-acuity calls: an observational study of 1.5 million emergency calls (2018-2021) from Berlin. *BMC Med*. 2023 May 16;21(1):184. doi: 10.1186/s12916-023-02879-7. PMID: 37193989; PMCID: PMC10186279.
3. Matinrad N, Reuter-Oppermann M. A review on initiatives for the management of daily medical emergencies prior to the arrival of emergency medical services. *Cent Eur J Oper Res*. 2022;30(1):251-302. doi: 10.1007/s10100-021-00769-y. Epub 2021 Sep 18. PMID: 34566490; PMCID: PMC8449697.
4. Lowthian JA, Cameron PA, Stoelwinder JU, Curtis A, Currell A, Cooke MW, McNeil JJ. Increasing utilisation of emergency ambulances. *Aust Health Rev*. 2011 Feb;35(1):63-9. doi: 10.1071/AH09866. PMID: 21367333.
5. Andersen MS, Johnsen SP, Sørensen JN, Jepsen SB, Hansen JB, Christensen EF. Implementing a nationwide criteria-based emergency medical dispatch system: a register-based follow-up study. *Scand J Trauma Resusc Emerg Med*. 2013 Jul 9;21:53. doi: 10.1186/1757-7241-21-53. PMID: 23835246; PMCID: PMC3708811.
6. Abdul-Aziz Qawwas, L., Ali Algaribi, S., Al Haliq, S. A., Almufareh, B., & Mohammed Almakhalas, K. (2022). An analysis of cost and time for non-emergency calls: a retrospective study on the Emergency Medical Services resources management. *Journal of Emergency Medicine, Trauma & Acute Care*, 2022(2), 10.https://doi.org/10.5339/jemtac.2022.10.7. Medical Priority Dispatch System. https://www.emergencydispatch.org/the-science Assessed 8 February 2024.
7. Sporer KA, Johnson NJ, Yeh CC, Youngblood GM. Can emergency medical dispatch codes predict prehospital interventions for common 9-1-1 call types? *Prehosp Emerg Care*. 2008 Oct-Dec;12(4):470-8. doi: 10.1080/10903120802290877. PMID: 18924011.
8. Andersen MS, Johnsen SP, Sørensen JN, Jepsen SB, Hansen JB, Christensen EF. Implementing a nationwide criteria-based emergency medical dispatch system: a register-based follow-up study. *Scand J Trauma Resusc Emerg Med*. 2013 Jul 9;21:53. doi: 10.1186/1757-7241-21-53. PMID: 23835246; PMCID: PMC3708811. Accepted Manuscript
9. Stipulante S, Tubes R, El Fassi M, Donneau AF, Van Troyen B, Hartstein G, D'Orio V, Ghuyssen A. Implementation of the ALERT algorithm, a new dispatcher-assisted telephone cardiopulmonary resuscitation Protocol, in non-Advanced Medical Priority Dispatch System (AMPDS) Emergency Medical Services centres. *Resuscitation*. 2014 Feb;85(2):177-81. doi: 10.1016/j.resuscitation.2013.10.005. Epub 2013 Oct 18. PMID: 24140993. 33