

Rethinking Mass-Casualty Triage

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Prehospital mass-casualty and disaster triage tools designed to save maximal lives utilize a concept that, despite decades of research and training, has proven to be difficult, elusive, and arguably, of limited pragmatic value.¹ Despite this, there have been many triage systems implemented world-wide, often without addressing the many limitations inherent in them.²

Several attempts have been made to standardize or refine various triage systems,³ yet many are not supported by robust evidence-based research and lack scientific and methodological bases.^{4–6} A recent study done on the Dutch Field Triage protocol has shown poor accuracy, significant under- and over-triage rates, and was deemed to be of little value in the field.⁷

The vast majority of the more commonly used systems also do not take into consideration the surrounding medical resources available, or the magnitude of the mass-casualty incidents. Both of these factors are critical in determining how much resources can be dedicated to the critically injured, and whether they should be prioritized or de-prioritized.⁸ Additionally, triage systems often do not differentiate between the mechanisms of injury, age, and baseline physiology of each patient, all of which are important prognostic factors that should be considered when determining transport or treatment priorities.⁹ Of the triage tools specifically designed for pediatric or elderly patients, no conclusive evidence has been shown in terms of accuracy or net clinical benefits.^{6,10}

The goal of effective prehospital triage is that it can be easily taught, quick to perform under duress, and has high sensitivity and specificity backed by robust evidence in its efficacy, while taking into account the resources available in each incident. To date, no prehospital triage system has come close to achieving these goals, and triage systems have often been abandoned, altered, or not used in real-life mass-casualty events.^{4,11} The flaws and limitations of each proposed system ultimately become a hindrance to achieving the primary goal of maximizing lives saved.

Operational logistics aside, all triage systems also have an ethical aspect to consider. At their core, all triage systems rely on an intentional prioritization and de-prioritization of a certain population cohort as determined by the system. This in itself can be problematic as we strive for equitable distribution of health resources.¹² The ethical ramifications of triage choices impact not only patients, but also triage providers, often many of whom are the least experienced and least prepared to make these difficult decisions.

By continually appraising our prehospital triage, care, and transport capabilities, several questions should come to the forefront: how do the operational or clinical benefits of current and newly developed systems justify the resources spent thus far? Would a simple triage system such as “mobile, dead, or alive” be more effective at prioritizing patients on scene?⁴ Do “accepted” under- or over-triage rates of various systems and operator errors under high-stress situations negate the benefits of these tools as a whole, or can new emerging technologies such as artificial intelligence finally help overcome some of the hurdles of the past?^{13,14} Should the focus instead be on life-saving, on-scene interventions and the rapid transfer of patients to higher levels of care? While it is undisputed that matching the right patient to the right care facility is of benefit to all, is the pursuit of an optimum triage system merely an academic indulgence with little operational value? Finally, would more robust pre-disaster local transport surge capacity, patient distribution plans, and the reliance on experienced first responders’ judgment to facilitate the rapid transfer of patients to a better resourced environment achieve better outcomes?¹⁵

As we pivot into an era of evidence-based medicine and emerging technologies, old concepts and practices with little in the way of evidence should be rethought from the ground up. Given the amount of time, effort, academic resources, training, and education that goes into the search of a universal system that will likely forever remain elusive, it may be time to

de-emphasize the search for an all-encompassing prehospital triage system and focus our resources on evidence-based interventions that have proven to impact patient prognosis. Of course, technology and evidence-based medicine are not without their limitations,

especially in the world of disasters, but with little scientific or anecdotal success as a mass-casualty tool, disaster medicine specialists and prehospital operators need to perhaps rethink the need and method for mass-casualty triage.

References

1. Van Rein EAJ, Houwert RM, Gunning AC, Lichtveld RA, Leenen LPH, van Heijl M. Accuracy of prehospital triage protocols in selecting severely injured patients. *J Trauma Acute Care Surg.* 2017;83(2):328–339.
2. Bazyar J, Farrokhi M, Khankeh H. Triage systems in mass casualty incidents and disasters: a review study with a worldwide approach. *Open Access Maced J Med Sci.* 2019;7(3):482–494.
3. Lerner EB, Cone DC, Weinstein ES, et al. Mass casualty triage: an evaluation of the science and refinement of a national guideline. *Disaster Med Public Health Prep.* 2011;5(2):129–137.
4. US Department of Health and Human Services (HHS), Office of the Assistant Secretary for Preparedness and Response (ASPR), Technical Resources, Assistance Center, and Information Exchange (TRACIE). *Mass Casualty Trauma Triage-Paradigms and Pitfalls.* Washington, DC USA: ASPR TRACIE; 2019.
5. Kahn CA, Schultz CH, Miller KT, Anderson CL. Does START triage work? An outcomes assessment after a disaster. *Ann Emerg Med.* 2009;54(3):424–430.
6. Gianola S, Castellini G, Biffi A, et al. Accuracy of pre-hospital triage tools for major trauma: a systematic review with meta-analysis and net clinical benefit. *World J Emerg Surg.* 2021;16(1):31.
7. Voskens FJ, van Rein EAJ, van der Sluijs R, et al. Accuracy of prehospital triage in selecting severely injured trauma patients. *JAMA Surg.* 2018;153(4):322–327.
8. Granholm F, Tin D, Ciottone GR. Mass casualty CPR: flawed, futile or a first responder mandate? *Resuscitation.* 2022;181:132.
9. Romero Pareja R, Castro Delgado R, Turégano Fuentes F, Jhon Thissard-Vasallo I, Sanz Rosa D, Arcos González P. Prehospital triage for mass casualty incidents using the META method for early surgical assessment: retrospective validation of a hospital trauma registry. *Eur J Trauma Emerg Surg.* 2020;46(2):425–433.
10. Boulton AJ, Peel D, Rahman U, Cole E. Evaluation of elderly specific pre-hospital trauma triage criteria: a systematic review. *Scand J Trauma Resusc Emerg Med.* 2021;29(1):127.
11. Pepper M, Archer F, Moloney J. Triage in complex, coordinated terrorist attacks. *Prehosp Disaster Med.* 2019;34(4):442–448.
12. Eyal N. Ethical Issues in Disaster Medicine. In: *Ciottone's Disaster Medicine.* Amsterdam, The Netherlands: Elsevier Inc.; 2016:67–74.
13. Weisberg EM, Chu LC, Fishman EK. The first use of artificial intelligence (AI) in the ER: triage not diagnosis. *Emerg Radiol.* 2020;27(4):361–366.
14. Farahmand S, Shabestari O, Pakrah M, Hossein-Nejad H, Arbab M, Bagheri-Hariri S. Artificial Intelligence-based triage for patients with acute abdominal pain in emergency department: a diagnostic accuracy study. *Adv J Emerg Med.* 2017;1(1):e5.
15. Considine J, Botti M, Thomas S. Do knowledge and experience have specific roles in triage decision-making? *Acad Emerg Med.* 2007;14(8):722–726.