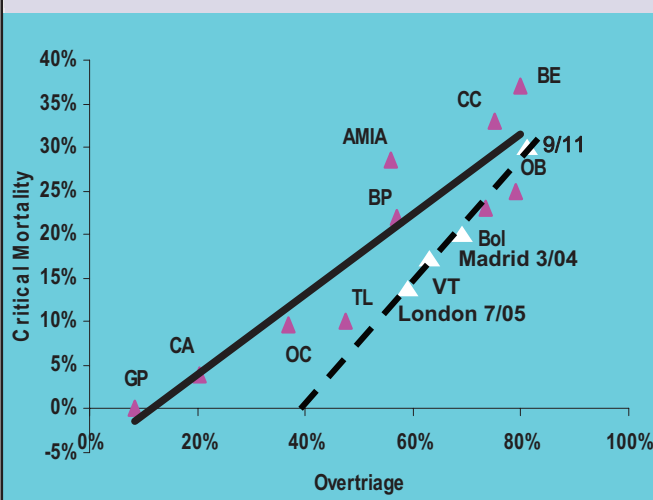


FIGURE 1

Relationship of overtriage rate to critical mortality rate in 10 (1969–1995) vs 4 (2001–2007) terrorist events. Note shift of curve to left.



GP = Guildfordpubs; CA = Craigavon; OC = Oklahoma City bombing; TL = Tower of London; BP = Birmingham pubs; Bol = Bologna; AMIA = Buenos Aires; OB = Old Bailey; CC = Cu Chi; BE = Beirut; VT = 2007 Virginia Tech shooting. Adapted from Frykberg ER. Medical management of disasters and mass casualties from terrorist bombing: how can we cope? *J Trauma*. 2002;53:201–212.

greater tolerance of triage errors as they are caught and corrected at successive levels of care.

Is this kind of modeling study helpful? Yes. Despite some obvious limitations, the article generates a fruitful discussion surrounding a core question in disaster medicine: how does overtriage influence critical mortality? It also emphasizes more broadly the critical role that triage plays in determining outcome, and therefore, the importance of intensive training in triage among medical providers who may be confronted by the unique challenges of mass casualty care. In analyzing its flaws, we are reminded that “planning should take into consideration how people and organizations are likely to act, rather than expecting them to change their behavior to conform to the plan.”⁵ In essence, the article becomes a call for more research in triage, focused on an insightful combination of theoretical modeling with evidence from real-life experience.

About the Authors

Dr Armstrong is Assistant Professor of Acute Care Surgery, University of Florida; Dr Hammond is director of the trauma center at the Robert Wood Johnson Medical School, University of Medicine and Dentistry of New Jersey; Dr Hirshberg is Associate Professor of Surgery, Baylor College of Medicine; and Dr Frykberg is Chief, Division of General Surgery, University of Florida.

Correspondence and reprint requests to Dr John H. Armstrong, 1600 SW Archer Rd, Box 100286, Gainesville, FL 32610-0286 (e-mail: john.armstrong@surgery.ufl.edu).

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REFERENCES

- Hupert N, Hollingsworth E, Xiong W. Is overtriage associated with increased mortality? Insights from a simulation model of mass casualty trauma care. *Disaster Med Public Health Preparedness*. 2007;1:S14–S24.
- Auf der Heide E. The importance of evidence-based disaster planning. *Ann Emerg Med*. 2006;47: 34–49.
- Gutierrez de Ceballos JP, Turegano-Fuentes F, Perez-Diaz D et al. March 2004: the terrorist bomb explosions in Madrid, Spain—an analysis of the logistics, injuries sustained and clinical management of casualties treated at the closest hospital. *Crit Care*. 2005;9:104–111.
- Ashkenazi I, Kessel B, Khashan T et al. Precision of in-hospital triage in mass-casualty incidents after terror attacks. *Prehosp Disaster Med*. 2006; 21: 20–23.
- Quarantelli EL. *Organization Behavior in Disasters and Implications for Disaster Planning, Report series 18*. Newark, DE: Disaster Research Center, University of Delaware; 1985.

Response to Armstrong et al

Nathaniel Hupert, MD, MPH,
Eric Hollingsworth, BS, and Wei Xiong, PhD

We are pleased that the thought leaders and originators of this line of research consider our article¹ to be a useful contribution to ongoing discussions about improving mass casualty trauma care. Our approach focused on the tripartite, dynamic relationship among patient selection resulting from triage decisions, trauma system treatment capability, and time-dependent mortality. Our main finding is that, for most mass casualty incidents, triage accuracy has less impact on outcomes than does the relative proportion of critical casualties to treatment capability, with the corollary that focusing on the rate of overtriage (ie, getting triage “wrong” in the direction of overcrowding) may obscure other drivers of critical outcomes.

As noted by Armstrong et al² in this issue, our model did produce “a positive correlation between overtriage and critical mortality when the number of noncritical casualties increases” but this relationship is both nonlinear and dependent on the ratio of critical casualties to treatment bays. For all of its limitations, this model represents a conceptual framework that begins to reflect the complex relationships among actions, resources, and patient outcomes, and we will continue our efforts to improve its fidelity to the realities of trauma care in both the field and hospital settings.

About the Authors

All of the authors are with the Department of Public Health, Weill Medical College, Cornell University.

Address correspondence and reprint requests to Dr Nathaniel Hupert, Department of Public Health, Weill Medical College, Cornell University, 411 E 69th St, Room KB-313, Box 74, New York, NY 10021 (e-mail: nah2005@med.cornell.edu).

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REFERENCES

1. Hupert N, Hollingsworth E, Xiong W. Is overtriage associated with increased mortality? Insights from a simulation model of mass casualty trauma care. *Disaster Med Public Health Preparedness*. 2007;1:S14–S24.
2. Armstrong JH, Hammond J, Hirshberg A, Frykberg ER. Is overtriage associated with increased mortality? The evidence says ‘yes.’ *Disaster Med Public Health Preparedness*. 2008;2:xx–xx.