

Applying Research Evidence to Prehospital and Disaster Medicine

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The health and medicine professions rely on science and rational evidence to separate them from mysticism and the practice of magic. Research based on scientific methods with elimination of subjective bias is the foundation of “evidence-based” health and medicine. Enthusiastic pursuit of non-biased research supports the development and professionalism of health and medicine. Most important is that knowledge derived from non-biased research provides public credibility for the health and medical professions.

But do the health and medical professions change community and patient care when new scientific evidence becomes available?

A recently published article by Timbie and co-authors in the journal *Health Affairs* has become a sentinel exploration of the reasons that studies fail to change patient care and clinical outcomes.¹ For the paper, a comprehensive literature review was conducted, with identification of five root causes for poor application of scientific evidence to actual health and medical practice. The reasons provided in the article are relevant for all fields of applied health, including prehospital and disaster medicine.

“Misalignment of financial incentives” is the first reason the Timbie researchers found for lack of transfer of research evidence into clinical practice. Incentives that maximize economic advantage are often favored over scientific evidence that may support a less financially opportune practice. This phenomenon has been described in recent issues of *Prehospital and Disaster Medicine* with exploration of humanitarian organization responses to the 2010 Haiti Earthquake event.² During the response to the earthquake, uncoordinated flooding of Haiti with both formally organized and informal humanitarian responders occurred. Often, response occurred despite lack of demonstrated need for the resource. This response was often a means to garner donations and local governmental funding. The chaos generated by the uncoordinated responses crowded the local airport and led to competition for victims. Financial and political incentives appear to have pushed providers to respond prior to assessment of need for response.

A second factor for limiting application of research evidence is “ambiguity of results.” Control of variables for both prehospital and disaster research is difficult, and despite careful research design, studies often fail to produce definitive results. For example, prehospital pediatric endotracheal intubation is considered a standard of care despite studies that show no benefit for the procedure over the more basic bag-valve-mask ventilation methods.^{3,4} While studies show questionable benefit for endotracheal intubation in management of prehospital pediatric cardiopulmonary arrest, the results are ambiguous in that they show a trend (not statistically significant) toward better outcome for bag-valve-mask only or supraglottic ventilation. This result ambiguity leads to competing interpretations of the

data, making it difficult to act on the evidence and to remove pediatric intubation from prehospital practice.

“Failure to address the needs of end users” is another inhibitor described by Timbie and co-authors. Many disaster studies focus on decision making, but at points late in the response pattern that do not take into account the appropriate end user. In the situation where final procedures or processes are examined, a more appropriate research question is whether there should have been an analysis of the “end user” who decided to refer a victim for a procedure or decided to deploy a process. This is illustrated by studies of amputation during the 2010 Haiti Earthquake.⁵ Often, victims were moved to surgical sites with the decision already made to amputate when the more appropriate decision point would have been medical management versus surgical management, a decision made prior to movement to the surgical arena.

“Limited use of decision support” is another limitation for application of research evidence to practice. While prehospital care often uses decision algorithms and treatment guidelines to support medical management decisions, this is not true for disaster medicine. Other than the Incident Command System structure and triage protocols such as the Simple Triage and Rapid Treatment (START) system, there is little that has been developed to aid or support decision making for health emergency response. Development of disaster management tools and algorithms based on scientific evidence would potentially allow for coordinated and effective response efforts.

“Cognitive biases in interpreting new information” is a final and powerful deterrent to applying research evidence to prehospital and disaster medicine. Timbie and co-authors explain that there are three common biases that affect the processing of new information. First is conformational bias, which is the tendency to accept evidence that supports preconceived ideas. Second is pro-interventional bias or the desire to choose action over inaction, even when the action taken has been shown to be of negligible benefit. A third bias is for application of technology or the tendency to accept that newer technology is superior to what currently is the basis for management and care.

Timbie and his co-authors are to be congratulated for their paper exploring the limitations for applying science to practice. For the fields of prehospital and disaster medicine, there are a number of ways to overcome these limitations. One is for improved research, with better design that employs well-focused study objectives and non-biased study design. Improved research decreases ambiguity of results, which facilitates applying the evidence to practice. Uniform standards and developing professionalism in the humanitarian and disaster fields is a current focus of leaders in these areas, and should be supported as a means for improving evidence-based practice. Finally, financial incentives must be aligned to allow for evidence-based

prehospital and disaster medicine. Current financial incentives seem driven more by political advantage, publicity seeking, donation

mongering, and self-promotion, with marginal acceptance of current scientific evidence or the need to support further research.

References

1. Timbie JW, Schneider EC, Van Busum K, Fox DS. Five reasons that many comparative effectiveness studies fail to change patient care and clinical practice. *Health Affairs*. 2012;31(10):2168-2175.
2. Lind K, Gerdin M, Wladis A, Westman L, von Schreeb J. Time for order in chaos! A health system framework for foreign medical teams in earthquakes. *Prehosp Disaster Med*. 2012;27(1):90-93.
3. Gausche M, Lewis RJ, Stratton SJ, et al. Effect of out-of-hospital pediatric endotracheal intubation on survival and neurological outcome: a controlled clinical trial. *JAMA*. 2000;283(6):783-790.
4. Chen L, Hsiao AL. Randomized trial of endotracheal tube versus laryngeal mask airway in simulated prehospital pediatric arrest. *Pediatrics*. 2008;122(2):e294-e297.
5. Knowlton LM, Gosney JE, Chackungal S, et al. Consensus statements regarding the multidisciplinary care of limb amputation patients in disasters or humanitarian emergencies: report of the 2011 Humanitarian Action Summit Surgical Working Group on amputations following disasters or conflict. *Prehosp Disaster Med*. 2011;26(6):438-448.

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