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# International Emergency Medicine: A Review of the Literature From 2009

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## Abstract

As the specialty of emergency medicine evolves in countries around the world, and as interest in international emergency medicine (IEM) grows within the United States, the IEM Literature Review Group recognizes an ongoing need for a high-quality, consolidated, and easily accessible evidence base of literature. The IEM Literature Review Group produces an annual publication that strives to provide readers with access to the highest quality and most relevant IEM research from the previous year. This publication represents our fifth annual review, covering the top 24 IEM research articles published in 2009. Articles were selected for the review according to explicit, predetermined criteria that emphasize both methodologic quality and impact of the research. It is our hope that this annual review acts as a forum for disseminating best practices, while also stimulating further research in the field of IEM.

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In 2009, the H1N1 influenza pandemic captured the attention of practitioners of international emergency medicine (IEM) and the public at large. As the virus overwhelmed initial attempts at containment, the medical and public health communities responded with an explosion of research on the virus, vaccine development, and preparation for future pandemics.<sup>1</sup> Together with this “swine flu” pandemic, natural disasters and complex emergencies, such as the Australian bushfires<sup>2</sup> and Sri Lankan conflict,<sup>3</sup> continued to fuel interest in the growing field of IEM, which now offers 25 fellowships in the United States.<sup>4</sup> The year 2009 also witnessed spikes in violence and acute

undernutrition in sites of chronic humanitarian crises such as the Democratic Republic of Congo,<sup>5</sup> Sudan,<sup>6</sup> and Somalia,<sup>7</sup> underscoring the need for attention to humanitarian response, improvement in provision of emergency care in resource-limited settings, and support for the development of EM throughout the world.

As the specialty of IEM continues to evolve, the IEM Literature Review Group strives to provide readers with summaries of the highest quality and most relevant IEM research. Our review, now in its fifth year, annually compiles a diverse array of articles that have the potential to impact some aspect of IEM. This publication is neither intended to serve as a systematic review for clinical guidance, nor is it a comprehensive repository of all literature relevant to IEM. Rather, we hope that this review will help IEM academicians and practitioners stay up to date on the latest research in the field, while spurring ideas for further research and collaboration.

This year, defining the boundaries of the field of IEM remained one of our greatest challenges. With the arrival of the H1N1 pandemic, the volume of articles published that could be categorized as related to pandemic response rose exponentially. To prevent this vast new literature from overwhelming our review, we chose to only include pandemic response articles directly related to one of the three core areas of IEM as we have defined it: disaster and humanitarian response, emergency care in resource-limited settings, or EM development. Disaster and humanitarian response

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International Emergency Medicine Literature Review Group members are listed in Appendix A.

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encompasses several different domains, including disaster assessment; organizational response; treatment guidelines; mitigation, monitoring, and evaluation; and delivery of care in refugee or internally displaced person camp settings. Emergency care in resource-limited settings includes the provision of care for acute conditions at the hospital, clinic, and community levels in low- and middle-income countries. EM development covers interventions in countries outside of the United States at the local and national level to systematize and professionalize the delivery of emergency services, in both the prehospital and the hospital arenas.

## METHODS

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Each year we review and adjust our search and selection process to produce the most comprehensive and appropriate search possible. As in prior years, our search included both a list of “international” terms, including *world health, developing countries, international, global, tropical medicine, third world, middle income countries, and low income countries*, as well as a set of “emergency” terms, including *emergency medicine, emergency medical services, prehospital, acute disease, critical illness, emergencies, injuries, relief work, rescue work, disasters, refugees, disease outbreaks, multiple trauma, triage, humanitarian, war, vulnerable populations, conflict, and emergency treatment*. The one term removed from the list this year was *wound*, which was found in prior years to yield few additional articles with relevance to the field of IEM.

We performed PubMed searches for each half of 2009, first for articles published between January 1, 2009, and June 30, 2009, and later for articles published between July 1, 2009, and December 31, 2009. The searches were conducted for articles containing at least one “international” term and one “emergency” term. We limited our search to articles published in English, French, German, Spanish, Italian, and Japanese, based on the language capabilities of our team of reviewers. The search from the first half of the year produced 17,861 articles, up dramatically from prior years’ searches. In the second half of the year, we limited our PubMed search to human research and excluded news articles, yielding 8,263 articles. Of the 26,124 articles retrieved through these searches, 24,648 were in English, 470 were in French, 519 were in German, 121 were in Japanese, 304 were in Spanish, and 62 were in Italian.

In addition, our reviewers performed a hand search of all the articles published in *Academic Emergency Medicine, Annals of Emergency Medicine, Bulletin of the World Health Organization, Emergency Medicine Journal, Journal of Emergency Medicine, Lancet, and Prehospital and Disaster Medicine* in 2009. These journals were selected for detailed investigation because, in the prior years of our review, each of these journals had published more than five articles that were selected for full review. This hand search identified 2,898 articles, some of which were also found in the PubMed searches.

The 26,124 unique articles captured by our searches were divided among our 20 reviewers, with each

citation and abstract reviewed by at least two reviewers. A total of 384 articles deemed by at least one reviewer to be relevant to the field of IEM were abstracted for full text review.

Each article selected for full text review was categorized as either an original research article or as an editorial or review article. We followed comparable scoring systems for grading each of the two categories of articles. A score from one to five in five areas (three methodologic criteria and two impact criteria) was assigned to each article (Table 1).<sup>8-10</sup> The total scores (out of a maximum of 25 points) for each article from the two separate reviewers were then averaged to create a final mean score for each article.

For our final review, we included articles with a final score of 22.5 or higher. Twenty-two articles met this criterion. All articles with more than a five-point difference in score between the two reviewers and at least one score above 22.5 were rescored by a review editor with extensive experience in the field of IEM. Only eight articles met these criteria, of which two were given a score of 22.5 or greater by an editor and included in our review. This brought the final list for full review to 24 articles (Table 2).

Mean scores for each reviewer were calculated using STATA 8.0 (StataCorp, College Station, TX) and compared to the overall mean to ensure consistency among reviewers. The mean scores for each reviewer were all within one standard deviation of the overall mean for all articles, indicating that no significant outliers existed among the reviewers who were scoring the articles.

## RESULTS

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The 24 articles chosen for final review are listed in Table 2 below and the references section.<sup>11-34</sup> An annotated bibliography including final summary and critical analysis of each article can be found in Data Supplement S1 (available as supporting information in the online version of this paper).

## DISCUSSION

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The top 24 articles in IEM in 2009 demonstrate the breadth of IEM research, which aims to improve the lives of people suffering from emergent medical conditions throughout the world. Across the specialty, themes from the year included applied technology in emergency settings, human resource management, effectiveness of therapeutic interventions, and education of current and future medical professionals. The experimental and statistical rigor found in this year’s articles indicates ongoing maturation of the science of IEM and the field of academic IEM.

Disaster and humanitarian response produced the largest number of top articles in IEM in 2009. Cavey et al.<sup>11</sup> and Yang et al.<sup>12</sup> reported on the utility of enhanced telecommunications in disasters—a disaster hotline in Mississippi and mobile phone reporting after the 2008 Sichuan earthquake, respectively. Chaffee<sup>13</sup> and Jannech et al.<sup>14</sup> analyzed human resources in disaster and humanitarian contexts, describing reasons

Table 1  
Review Criteria

Quality and Importance	Original Research Articles	Review or Editorial Articles
Clarity	Does the study have a clear hypothesis or specific purpose?	Does the study have a clear hypothesis or specific purpose?
Study design and statistics/breadth and depth	How strong was the study design (RCT vs. prospective cohort vs. cross-sectional survey)? What types and degree of bias were present in the study? Were the statistical tests used appropriately for the study design?	Does the article provide enough context and background information? Does the article provide sufficient detail to allow the reader to gain expertise in the subject?
Ethics/bias	Does the study adhere to the Declaration of Helsinki? Adequacy of consent procedures? Confidentiality? Study subject protection? Was the study approved by a local or international IRB or both?	Does the article provide a balanced perspective on the topic?
Importance	What is the importance of the study objective? Are the results of the study generalizable to a wide variety of settings?	Is the objective of the article meaningful and relevant to global health and IEM? Is the information provided generalizable to a wide range of settings?
Impact	Would NGOs, UN agencies, or individual IEM physicians change their practice based on these results?	Would NGOs, UN agencies, or individual IEM physicians change their practice based on these results?
IEM = international emergency medicine; IRB = institutional review board; NGO = nongovernmental organization; RCT = randomized controlled trial; UN = United Nations.		

that health care workers might hesitate to report to duty after a disaster and exploring the potential value of task-shifting in both acute and chronic humanitarian settings. The Centers for Disease Control and Prevention (CDC) reported on the utility of the updated World Health Organization (WHO) growth standard, which was found to increase recognition of acute undernutrition in Darfur, but at significantly increased cost and without clear improvement in outcomes.<sup>15</sup> McQueen et al.<sup>16</sup> demonstrated the feasibility of reporting surgical outcomes from humanitarian missions, reporting quality similar to that seen in developed countries. Mataria et al.<sup>17</sup> characterized the quality of life of Palestinians living in chronic conflict using a modified version of an established assessment tool, while Wen et al.<sup>18</sup> characterized the risk factors for death of inpatients after the 2008 Sichuan earthquake, adding to our understanding of the dynamics of both chronic and acute disasters. Richards et al.<sup>19</sup> and Kahn et al.,<sup>20</sup> respectively, evaluated specific humanitarian interventions, showing that an intensive malaria program could successfully reduce malaria prevalence in a small population of internally displaced persons in eastern Myanmar and that START triage identified the most critical patients for transport after a 2002 train crash with high sensitivity, although with significant overtriage. Cairns et al.,<sup>21</sup> Dara and Farmer,<sup>22</sup> and Lin and Anderson-Shaw<sup>23</sup> published articles with broad educational and theoretical relevance, discussing retrospective statistical methodology in humanitarian emergencies, a summary and lessons learned from recent disasters and conflicts, and ethical considerations in rationing of limited resources in disaster situations.

Improvement in emergency care in resource-limited settings requires understanding of the unique burden of disease in low- and middle-income countries, evidence regarding the effectiveness of health interventions in

such settings, and introduction of appropriate technology and procedures currently standard in high-income countries. Antai and Antai<sup>24</sup> and Macharia et al.<sup>25</sup> provided epidemiologic data showing that women living in active conflict zones are at greater risk for intimate partner violence and that road traffic injuries disproportionately affect young men from poor backgrounds in Kenya. Mwaniki et al.<sup>26</sup> and Shah et al.<sup>27</sup> provided evidence that introduction of relatively low cost technologies can make a significant impact. Mwaniki et al. reported that screening for hypoxemia in pediatric patients in a Kenyan district hospital is more effective than clinical indicators and identifies many diagnoses other than pneumonia, while Shah et al. reported that ultrasound skills were quickly acquired by local clinicians and altered management in many cases in a rural Rwandan hospital, especially among pregnant women. Fournier et al.<sup>28</sup> also studied an intervention directed toward pregnant patients, describing the national program in emergency obstetric services that was found to decrease the risk of maternal mortality in rural Mali. Infectious disease interventions were evaluated by Kiboneka et al.<sup>29</sup> and Ly et al.,<sup>30</sup> who found that combination antiretroviral therapy for HIV patients displaced by conflict in northern Uganda was feasible and produced outcomes comparable to those seen in peaceful regions of the country and that topical benzoate was more effective than oral ivermectin at curing human scabies in Senegal. Reda et al.<sup>31</sup> focused on health care providers, finding that many health care workers in Ethiopia did not practice universal precautions and were often exposed to potentially infectious bodily fluids, although almost all were interested in learning more about protecting themselves while at work. Becker et al.<sup>32</sup> called for action by reviewing the current state of sepsis care in low- and middle-income countries, offering recommendations for how it might be improved,

Table 2  
Top 24 IEM Articles of 2009

Category	First Author	Title	Journal	
Disaster and Humanitarian Response	Cairns <sup>21</sup>	Cross-sectional survey methods to assess retrospectively mortality in humanitarian emergencies.	<i>Disasters</i>	
	Cavey <sup>11</sup>	Mississippi's infectious disease hotline: a surveillance and education model for future disasters.	<i>Prehospital and Disaster Medicine</i>	
	CDC <sup>15</sup>	Impact of new WHO growth standards on the prevalence of acute malnutrition and operations of feeding programs—Darfur, Sudan, 2005-2007.	<i>Morbidity and Mortality Weekly Report</i>	
	Chaffee <sup>13</sup>	Willingness of health care personnel to work in a disaster: an integrative review of the literature.	<i>Disaster Medicine and Public Health Preparedness</i>	
	Dara <sup>22</sup>	Preparedness lessons from modern disasters and wars.	<i>Critical Care Clinics</i>	
	Janneck <sup>14</sup>	Human Resources in Humanitarian Health Working Group report.	<i>Prehospital and Disaster Medicine</i>	
	Kahn <sup>20</sup>	Does START triage work? An outcomes assessment after a disaster.	<i>Annals of Emergency Medicine</i>	
	Lin <sup>23</sup>	Rationing of resources: ethical issues in disasters and epidemic situations.	<i>Prehospital and Disaster Medicine</i>	
	Mataria <sup>17</sup>	The quality of life of Palestinians living in chronic conflict: assessment and determinants.	<i>The European Journal of Health Economics</i>	
	McQueen <sup>16</sup>	Application of outcome measures in international humanitarian aid: comparing indices through retrospective analysis of corrective surgical cases.	<i>Prehospital and Disaster Medicine</i>	
	Richards <sup>19</sup>	Cross-border malaria control for internally displaced persons: observational results from a pilot programme in eastern Burma/Myanmar.	<i>Tropical Medicine and International Health</i>	
	Wen J <sup>18</sup>	Risk factors of earthquake inpatient death: a case control study.	<i>Critical Care</i>	
	Yang <sup>12</sup>	Use of mobile phones in an emergency reporting system for infectious disease surveillance after the Sichuan earthquake in China.	<i>Bulletin of the World Health Organization</i>	
	Emergency Care in Resource-Limited Settings	Antai <sup>24</sup>	Collective violence and attitudes of women toward intimate partner violence: Evidence from the Niger Delta.	<i>BMC International Health and Human Rights</i>
		Becker <sup>32</sup>	Surviving sepsis in low-income and middle-income countries: new directions for care and research.	<i>Lancet Infectious Diseases</i>
Mwaniki <sup>26</sup>		Emergency triage assessment for hypoxaemia in neonates and young children in a Kenyan hospital: an observational study.	<i>Bulletin of the World Health Organization</i>	
Fournier <sup>28</sup>		Improved access to comprehensive emergency obstetric care and its effect on institutional maternal mortality in rural Mali.	<i>Bulletin of the World Health Organization</i>	
Kiboneka <sup>29</sup>		Combination antiretroviral therapy in population affected by conflict: outcomes from large cohort in northern Uganda.	<i>British Medical Journal</i>	
Ly <sup>30</sup>		Ivermectin versus benzyl benzoate applied once or twice to treat human scabies in Dakar, Senegal: a randomized controlled trial.	<i>Bulletin of the World Health Organization</i>	
Macharia <sup>25</sup>		Severe road traffic injuries in Kenya, quality of care and access.	<i>African Health Sciences</i>	
Reda <sup>31</sup>		HIV/AIDS and exposure of health care workers to body fluids in Ethiopia: attitudes toward universal precautions.	<i>Journal of Hospital Infection</i>	
Shah <sup>7</sup>	Impact of the introduction of ultrasound services in a limited resource setting: rural Rwanda 2008.	<i>BMC International Health and Human Rights</i>		

Table 2  
(Continued)

Category	First Author	Title	Journal
Emergency Medicine Development	Hobgood <sup>33</sup>	International Federation for Emergency Medicine model curriculum for medical student education in emergency medicine.	<i>International Journal of Emergency Medicine</i>
	Wongyingsinn <sup>34</sup>	A prospective observational study of tracheal intubation in an emergency department in a 2300-bed hospital of a developing country in a one-year period.	<i>Emergency Medicine Journal</i>

CDC = Centers for Disease Control and Prevention; IEM = international emergency medicine; WHO = World Health Organization.

and setting priorities for research on sepsis in resource-limited settings.

Development of the field of EM outside of the United States remains the third major area of expertise in the IEM literature. The development of EM is studied and promoted in countries of all income levels and at all levels of maturity of the specialty. One key area of focus is incorporation of EM into medical student education. In 2009, Hobgood et al.<sup>33</sup> reported on the effort by the International Federation for Emergency Medicine to create an international model curriculum in EM for medical students around the world.<sup>3</sup> Another crucial topic is development of EM skills among already practicing clinicians. Wongyingsinn et al.<sup>34</sup> demonstrated progress on this front by studying emergency department intubations by EM residents and EM staff physicians at a tertiary academic medical center in Thailand, finding success rates comparable to those in developed countries, despite areas for improvement including low rates of utilization of neuromuscular blockade, high rates of soft tissue injury, and no use of awake fiberoptic techniques.

## CONCLUSIONS

The studies included in our review span the breadth of the evolving field of international emergency medicine. Three categories of international emergency medicine focus have been identified: disaster and humanitarian response, emergency care in resource-limited settings, and emergency medicine development. With this review, we do not intend to provide a complete repository of all important IEM literature published in 2009. In particular, we again acknowledge the wealth of online sources that may not have been captured by a PubMed-based search, such as the CDC's emerging diseases website and the *Lancet* international collections. Nevertheless, we anticipate that our review will provide IEM practitioners with information on the most recent evidence in their field and ideas for new research and collaboration.

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## Appendix A

### International Emergency Medicine Literature Review Group (alphabetical order):

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**Data Supplement S1.** Disaster and humanitarian response.

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