

Trends and challenges in international pediatric emergency medicine

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Purpose of review

Pediatric emergency care internationally is practiced in a wide variety of local contexts, and the quality of care varies. International pediatric emergency medicine refers to the spectrum of care provided to children with serious illnesses and injuries globally. This article serves as the first of its kind to characterize current trends and challenges in this area.

Recent findings

Current trends in international pediatric emergency medicine include international dissemination of pediatric emergency medicine guidelines, pediatric-specific disaster relief training, increasing numbers of pediatric emergency medicine research collaboratives, interest groups and training programs, and increasing numbers of spaces dedicated to pediatric emergency care. Current challenges to the field include inequalities in access to medical research and information, various nonmedical barriers and lack of reports describing approaches to the delivery of pediatric emergency care.

Summary

While there are many recent advances in the state of pediatric emergency medicine internationally, there still exist many barriers to the improvement in its quality. Many of these obstacles are not specific to pediatric emergency medicine, but reflect overall disparities between the developing and developed worlds. One first step to overcoming pediatric emergency medicine practiced in isolation is a formal organization of the field of international pediatric emergency medicine.

Keywords

emergency medicine, international, pediatrics

Introduction

Throughout the world, those involved with pediatric emergency medicine (PEM) seek to improve the quality of care of children with serious illnesses and injuries. Reflecting the global inequalities of medical care, the context in which PEM exists is a spectrum ranging from resource-rich areas with mature, comprehensive healthcare systems to resource-poor areas without access to basic emergency care. Situations across this spectrum require the knowledge and skills of practitioners trained in the diagnosis, treatment and management of pediatric emergencies, including emergency medicine-boarded and PEM-boarded physicians.

While international PEM (IPEM) is often used to refer to a developed nation's efforts to improve pediatric emergency care outside its borders, we feel that IPEM should refer to the collection of all efforts across the world to address and solve local and regional challenges facing pediatric emergency care. This definition more reflects the benefits that can be gained by all parties during international collaborations to improve pediatric emergency care.

Critical to the improvement in quality is the dissemination of both necessary knowledge and skills. Practically speaking, such knowledge is not widely disseminated, and neither are those practitioners who possess and utilize it. Worldwide, specialists in PEM are rare. Instead, subspecialists may assume responsibility for their particular aspect of the emergency care of children, and most of them have little basic pediatric experience [1]. The places in which emergency care takes place range from the community (for those with no access to organized medical care) to state-of-the-art pediatric emergency departments. The scope ranges from care of the individual patient to populations of children involved in natural and manmade disasters.

To our knowledge, this is the first attempt to describe current trends and challenges within PEM internationally.

Current trends

The following are recent trends in IPEM that we have identified, combining knowledge from a review of international emergency medicine and PEM literature, other relevant sources and anecdotal information from those active in the field. While this is not an exhaustive list, it is a starting point for further discussion.

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Abbreviations

IPEM international pediatric emergency medicine
PEM pediatric emergency medicine

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Development and spread of pediatric practice guidelines

A recent trend has been the international spread of pediatric practice guidelines [2]. In [2], the authors present an invaluable resource for those looking to understand the status of international emergency medicine, including a review of the development of emergency medicine as a specialty. Most of the concepts reviewed are applicable, more specifically, to IPED. In 2005, the International Liaison Committee on Resuscitation (with members from 18 countries) released updated guidelines on pediatric and neonatal resuscitation. One method of dissemination was through publication in other journals. We found articles reviewing the guidelines in Icelandic, Dutch, Spanish, German, Croatian and Chinese [3–8].

Another method of dissemination – and a popular opportunity for involvement in PEM collaborations – is the teaching of pediatric life support in regions with immature pediatric emergency care. Researchers have shown that teaching of adult resuscitation guidelines benefits clinical outcomes [2]. Teaching of pediatric resuscitation is likely to have the same effect.

Questioning of the economic appropriateness in all areas, the misconception of their benefits, and a fundamental lack of knowledge are all potential barriers to the establishment and adoption of internationally-sanctioned practice guidelines. As an example, because of an under-appreciation of trauma as a global ‘illness’, there are currently no international guidelines for the initial care of pediatric trauma [9]. In [9], the only review of its kind, various international pediatric trauma systems are highlighted and the authors provide a discussion of challenges to the development of pediatric trauma programs internationally.

While guidelines originating in more mature healthcare systems may not directly apply to areas in the developing world, they can be a starting point for adaptation for local use. Guidelines proposed by the World Health Organization that address triage and initial resuscitation of acutely ill children, for example, reflect a growing move toward clinical practice guidelines applicable to places with limited resources [10].

Focus on pediatric victims of disasters

In complex emergency situations, such as floods, earthquakes and armed conflict, children are particularly vulnerable to human rights violations, disease, death and displacement. Addressing all their specific needs, including healthcare, is critical to the success of relief efforts and requires child-specific, effective and coordinated interventions [11•]. For instance, after the 2005 earthquake in the Kashmir region of Pakistan, it is estimated that half of the 70 000 earthquake victims

were children, many of whom were in school at the time [12].

One method to address the need for more pediatric training has been through programs, such as that developed by the Rainbow International Center for Child Health, that aim to improve the pediatric skills of those who already respond to international humanitarian needs [13]. Mobilization of those with pediatric disaster relief training is accomplished by such registries as the CHILDisaster Network, which lists child health professionals from over 60 countries who can respond at short notice [14]. Increasingly, by virtue of shift work, schedule flexibility and broad clinical training, emergency medicine is being drawn on for physician volunteers needed during humanitarian crises [15•]. In fact, emergency physicians already have experience in making difficult decisions in stressful environments, planning for mass casualty events, rapidly triaging patients, working in and managing teams, and dealing with law enforcement and the media [16]. Humanitarian relief is a progressively more common way for PEM physicians to involve themselves on a global scale.

Pediatric emergency medicine research collaboratives

PEM research, especially that originating in the developing world, is limited. A literature survey by the authors showed that recent PEM research in the developing world is focused on populations from less than half of its members. The majority of the research is observational in nature, with only a few interventional studies performed. Articles primarily focus on infectious diseases and injuries. This research reflects the leading causes of morbidity and mortality of children in the developing world, but it neglects many other important PEM topics (D. Walker, V. Tolentino, S. Teach, unpublished work).

One way to improve the quality and quantity of research in areas with fewer resources is to facilitate research collaborations between researchers and centers within and across borders. This may address some of the challenges facing PEM research, such as rare serious outcomes and limited funding, by increasing the number of patients and pooling resources and personnel.

Currently, several organizations exist for the collaboration between multiple centers of pediatric research (Table 1) [17•]. One example is PREDICT, a research network formed in 2004 between 11 participating institutions comprising emergency departments at tertiary children’s hospitals and mixed adult/pediatric emergency departments based in Australia and New Zealand. The vision of PREDICT is ‘to establish an evidence base and improve emergency care for children and adolescents through rigorous multicentre research’ [18].

Table 1 International pediatric emergency medicine research collaboratives and websites

Research collaborative	Country
Pediatric Emergency Research Canada (PERC) http://www.perc-canada.ca	Canada
Collaborative Research Committee of the American Academy of Pediatrics (PEM-CRC) http://www.aap.org	United States
Pediatric Emergency Care Applied Research Network (PECARN) http://www.pecarn.org	United States
Research in European Paediatric Emergency Departments (REPEDS) http://www.pemdatabase.org	Sites in Belgium, France, Great Britain, Hungary, Israel, Italy, Northern Ireland, Saudi Arabia, Spain, Sweden, Turkey
Paediatric Research in Emergency Departments International Collaborative (PREDICT) http://www.pems.org.au	Australia, New Zealand

Spread of advanced training in pediatric emergency medicine

There has been an increase in the number of PEM training fellowships in countries outside the US, where the majority of programs currently exist. This trend demonstrates a more global desire for the improvement of pediatric emergency care. An article by Babl *et al.*, for example, describes nine currently accredited programs in Canada, 10 in the UK and 10 in Australia [19]. There is also a PEM fellowship with three trainees at the King Faisal Specialist Hospital and Research Centre in Saudi Arabia [20]. Programs may exist in other countries, but no centralized accessible information is available.

Training in international pediatric emergency medicine

International emergency medicine fellowships have been established to provide emergency physicians with opportunities for gaining knowledge and skills valuable to a career in international health [21]. While initially intended for emergency medicine residency graduates, international emergency medicine (IEM) fellowships have recently had the flexibility to accommodate pediatrics-boarded physicians. The IEM fellowship at Loma Linda University, for example, recently enlisted a fellow boarded in pediatrics and PEM [22]. The Baylor College of Medicine/Texas Children's Hospital offers a 4-year combined PEM/IPEM fellowship based in Houston, Texas. It is open to graduates of both pediatrics and emergency medicine residencies and is the only program of its kind [23].

Since training in PEM already involves 2–3 years of postresidency training in the US, an additional 1–2 years of IEM fellowship training is certainly a barrier to those interested in structuring a career around a focus in IPEM. While many PEM fellowship programs in the US may offer international experiences to trainees, there is no published consensus regarding an international curriculum or a consistency of experiences among trainees. There is currently no accessible information on international experiences offered. Combined fellowships such as that offered at Baylor may prove to be the most efficient to train physicians interested in IPEM.

Dissemination and exchange of information

The number of venues for the exchange of information across borders has greatly increased in recent years. These include international journals, listserves and websites, international conferences and practitioner exchange programs. These result in dissemination of research findings and information from the country of origin to the rest of the world. PubMed currently lists 73 journals with some form of the words 'emergency', 'trauma', 'resuscitation' or 'injury' in the title. The majority originate in the US. *Pediatric Emergency Care* and *Clinical Pediatric Emergency Medicine*, published in the US, are the two journals dedicated solely to PEM. *Pediatric Emergency Care* lists a seven-member international editorial board representing Australia, Uruguay, Chile, England, Bulgaria, Costa Rica and Israel [24].

PEM-Database.org is a web-based database platform for professionals practicing PEM. It is a not-for-profit organization created in 2000 by Dr Itai Shavit from the Alberta Children's Hospital. The website scans publications and categorizes articles by PEM topics. The editorial board of the website lists multiple international PEM members. Listserves, including the International Pediatric Emergency Group (IPEG) [25] and the Pediatric Emergency Medicine Discussion List [26], are examples of forums for collaboration that are open to PEM physicians worldwide. PEM-related conferences are increasing in number, as well as PEM-related curricula at general emergency medicine and international child health, trauma and disaster conferences.

Pediatric emergency medicine interest groups worldwide

PEM interest groups provide a venue to attract practitioners with an interest in PEM to engage in group discussion and education. PEM-Database.org [27] publishes a list of PEM interest groups, mostly in developed countries where the organized practice of PEM is more prevalent (Table 2).

Dedicated pediatric emergency facilities

There is no comprehensive published inventory of pediatric emergency departments worldwide. Nonetheless, a growing commitment to PEM can be seen

Table 2 International pediatric emergency medicine interest groups and websites

PEM interest group	Country
Pediatric Emergency Medicine Society of Australia and New Zealand (PEMS) http://www.pems.org.au	Australia, New Zealand
PEM Section, Canadian Association of Emergency Physicians (CAEP) http://www.caep.ca	Canada
Groups Francophone de Réanimation & Urgences Pédiatriques (GRFUP) http://www.gfrup.com	France
Pediatric Emergency Medicine Israel (PEMI) http://www.pemi.org.il	Israel
Società Italiana di Medicina di Emergenze e Urgenze Pediatriche (SIMEUP) http://www.simeup.it	Italy
Asociación Mexicana de Urgenciólogos Pediatras http://www.amup.org.mx	Mexico
Sociedad Española de Urgencias de Pediatría (SEUP) http://www.seup.org	Spain
Çocuk Acil Tıp ve Yoğun Bakım Derneği http://www.acilpediatri.com	Turkey
Section on Emergency Medicine, American Academy of Pediatrics (AAP) http://www.aap.org	United States
PEM Interest Group, Society for Academic Emergency Medicine (SAEM) http://www.saem.org	United States
Pediatrics Special Interest Group, American Academy of Emergency Medicine (AAEM) No website	United States
PEM Section, American College of Emergency Physicians (ACEP) http://www.acep.org	United States

PEM, pediatric emergency medicine.

through new emergency facilities dedicated to pediatric care. This is truly an international phenomenon, as recent reports make references to the ramping up of pediatric emergency infrastructure in both developed and developing regions. At the Queen Elizabeth Central Hospital in Blantyre, Malawi, for example, a pediatric emergency care service was established to expedite and organize the large numbers of pediatric emergency patients [28]. The service sees up to 800 patients per day; since its inception, the inpatient case fatality rate has dropped from 10–15% to 5–8%. The website of the US Agency for International Development [29^{*}] recounts the opening of a state-of-the-art pediatric emergency center in Tbilisi, Georgia. In the US, a recent article describes the opening of new pediatric emergency centers at Stanford Hospital in California and Baptist Hospital of Miami, Florida in response to demand for pediatric-specific, child-friendly emergency care [30^{*}].

Current challenges

Our examination of the state of PEM internationally has also revealed current and potential obstacles to the improvement of the care of seriously ill or injured children. Again, we do not present a comprehensive list, but discuss those challenges that were most evident from a review of the literature and other important sources.

Nonmedical barriers

While an in-depth discussion of resource flows is beyond the scope of this article, it is important to note a recent report from the Global Health Council that suggests the existence of a \$7 billion gap between current spending for child health programs and estimated need [31^{*}]. Such a financial burden can hamper efforts against preventable causes of morbidity and mortality relevant to PEM internationally.

Aside from economics, other nonmedical factors also provide challenges to the spread of improved pediatric emergency care. These include, but are not limited to, geography, history, political systems and cultural values [2]. For instance, the nation of the Philippines comprises

7107 separate islands. The highest concentration of practitioners trained in pediatric trauma and resuscitation are located in major metropolitan centers such as Manila. To reach these practitioners, it is sometimes necessary to cross multiple islands and bodies of water. While trained practitioners are available, access to them is hampered by clear geographic obstacles.

Another challenge is the social context of the international collaboration, vital to improvement in pediatric emergency care, which reflects deepening inequality between rich and poor. Volunteers and researchers often travel from resource-rich countries to ‘do good’ in resource-poor areas of the world. As an example, there are thousands of research projects linking affluent universities in developed countries with slums and villages in the less-developed world. As the noted medical anthropologist Paul Farmer has written, ‘... Such research is a reminder that some populations are not really developing, but rather being left behind by the same global economic processes that enable powerful universities to do research in poor countries’ [32]. Practitioners and researchers in IPED in the developed world must be sensitive to this issue and see their international efforts as ‘an exchange of ideas and a sharing of common endeavors, rather than as a “one-way” activity that aims to export their model to the rest of the world’ [33].

Lack of descriptive information

There are few published reviews describing PEM in the developing world. Khan and Rubin published a review of the epidemiology and practice of pediatric emergency care at the Pristina University Hospital, the main academic medical center in Kosovo [1]. This was the first attempt to comprehensively describe the systems involved in PEM in a developing area. In their article, they also highlighted problems in pediatric emergency care and potential solutions for further consideration. The state of emergency medicine, generally, in various countries, has been documented in several series of articles appearing in emergency medicine journals [34^{*},35–37]. While helpful to emergency medicine

development overall, there is little focus in these articles on PEM specifically.

Those interested should continue to publish reports describing the delivery of pediatric emergency care in their home medical center, region or country. The main benefit of these descriptive studies is a dissemination of successful approaches to specific challenges to PEM and a formal recognition of particular limitations restricting its improvement.

Unequal access to information

Another challenge, not as specific to PEM, is the transfer of information to those who need it the most but can afford it the least. There is an inherent inequality between 'information-rich' countries in which emergency medicine and PEM are maturing compared with information-poor countries in which PEM and pediatric emergency care are underdeveloped [2]. This inequality manifests itself in these latter countries as an inability to purchase PEM textbooks, subscribe to emergency medicine and pediatric journals and attend PEM conferences. Lack of access to medical literature hampers the ability to participate in further research, as well as the ability to incorporate evidence-based medicine into clinical practice.

The World Health Organization established the Health Information Access to Research Initiative (HINARI) in 2002, which offers free online access to scientific journals to local, not-for-profit institutions in developing countries [38]. Currently, over 3500 journals are available to readers in 113 countries. Access to this resource obviously requires internet connectivity.

Prehospital care and transport

Accessing emergency care, the provision of first aid in the community and treatment during transportation are challenges for PEM internationally. As is well known, the more time that elapses before recognition and treatment of a serious illness or injury, the greater the likelihood of morbidity, mortality or disability. The presence and quality of prehospital systems vary widely, as does their capacity for ill or injured pediatric patients. Some systems provide only transportation while others provide a level of care ranging from basic first aid to advanced care by paramedics, nurses or physicians. Some models provide care in an ambulance and release patients without transport [39••].

There are several approaches to easing access to emergency medical care: primary prevention, public education about how and when to seek care, telephone access numbers, community education programs in basic first aid or cardiopulmonary resuscitation and transport communication systems for medical consultation [26]. All of these can be applied to pediatric patients to

improve care for children in the prehospital arena. Prehospital care and transport for children need to evolve along with, and be integrated into, broader emergency medical services in developing countries so that the special needs of children, especially those with serious illness and injury, can be addressed [9]. Improved organization and planning for emergency care can be done at a reasonable cost and lead to more appropriate use of resources, improved care, and better outcomes [40•].

There are no recent published examples of prehospital systems' approaches to handling pediatric patients in developing countries. A shared knowledge of the condition of prehospital care systems, how they are integrated into healthcare systems as a whole and how they accommodate pediatric patients would be beneficial to everyone taking on this challenge.

Conclusion

An expansion of and improvement in pediatric emergency care is occurring worldwide. This is demonstrated by development and spread of pediatric practice guidelines, increased attention paid to pediatric victims of humanitarian disasters, and an increase in pediatric-dedicated emergency facilities. There is also evidence that research, information exchange and knowledge transfer is taking place in pockets of the world through collaboration between practitioners and institutions.

Although there are many recent advances in IPEM, there still exist many barriers to its spread, some of which we have discussed above. We offer this article as a leadpoint for further discussions aimed at defining the state of IPEM and the challenges before it. Crucial to a broader dialogue intended to reach solutions, is the undertaking to organize the field of IPEM. As an organization, it can act to define the scope and status of PEM clinical practice and research and identify its stakeholders, including healthcare systems, individual practitioners or governmental and nongovernmental organizations. Further, an IPEM organization can improve coordination and collaboration on educational, clinical and research activities. It can also serve to maintain and disseminate descriptive information on the delivery of PEM worldwide to identify best practice models. An IPEM organization should also have a role in advocacy for the spread of PEM and in the development of sound public policy aimed at addressing challenges related to access and improvement in pediatric emergency care. As an unintended side effect, organization will reduce barriers to participation in PEM-related humanitarian, clinical and research opportunities by easing access to information for those interested. As with any other discipline, the establishment as an academic field will serve as an incentive to further attract talented individuals to focus on IPEM as a career.

References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 364).

- 1 Khan A, Rubin DH. International pediatric emergency care: establishment of a new specialty in a developing country. *Pediatr Emerg Care* 2003; 19:181–184.
 - 2 Arnold JL, Corte DF. International emergency medicine: recent trends and future challenges. *Eur J Emerg Med* 2003; 10:180–188.
 - 3 Bjornsson HM, Amar DO. The new international guidelines for cardiopulmonary resuscitation and emergency cardiovascular care [in Icelandic]. *Laeknabladid* 2006; 92:115–123.
 - 4 Rodriguez NA, Carrillo AA. International consensus and recommendations on cardiopulmonary resuscitation (2005) [in Spanish]. *An Pediatr (Barc)* 2006; 65:93–96.
 - 5 Wenzel V, Russo S, Arntz HR, *et al*. The new 2005 resuscitation guidelines of the European Resuscitation Council: comments and supplements [in German]. *Anaesthetist* 2006; 55:958–979.
 - 6 Hunyadi-Anticevic S, Bosan-Kilibarda I, Colak Z, *et al*. European Resuscitation Council guidelines for cardiopulmonary resuscitation in 2005 [in Croatian]. *Lijec Vjesn* 2006; 128:3–12.
 - 7 Brand HS. New guidelines for basic life support [in Dutch]. *Ned Tijdschr Tandheekd* 2006; 113:243–246.
 - 8 Shen H, Jiang J. Review of 2005 revised international guidelines for cardiopulmonary resuscitation: concerning the problems of CPR in China [in Chinese]. *Zhongguo Wei Zhong Bing Ji Jiu Yi Xue* 2006; 18:193–194.
 - 9 Inon AE, Haller JA. Caring for the injured children of our world: a global perspective. *Surg Clin North Am* 2002; 82:435–445.
 - 10 World Health Organization. Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. Geneva: World Health Organization; 2005.
 - 11 World Health Organization. Child Health in Emergencies. 2005. <http://www.who.int/childadolescenthealth/publications/pubemergencies.htm>. (Accessed 15 January 2007).
- WHO's resource guide to address the needs of children in humanitarian emergencies.
- 12 UNICEF Humanitarian Action Report 2006. http://www.unicef.org/emerg/files/HAR_2006_final.pdf. (Accessed 15 January 2007).
 - 13 Olness K, Sinha M, Herran M, *et al*. Training of healthcare professionals on the special needs of children in the management of disasters: experience in Asia, Africa, and Latin America. *Ambul Pediatr* 2005; 5:244–248.
 - 14 American Academy of Pediatrics. CHILDisaster Network. <http://www.aap.org/disaster/index.htm>. (Accessed 15 January 2007).
 - 15 Berger E. Emergency medicine goes global: specialty steps up humanitarian role. *Ann Emerg Med* 2006; 47:344–347.
- Mr Berger examines the role of the emergency physician in global health tragedies. He uses case reports of physician volunteers to describe the breadth and depth of participation. He also comments on the positive effect of international Emergency Medicine fellowships.
- 16 VanRooyen M, Venugopal R, Greenough PG. International humanitarian assistance: where do emergency physicians belong? *Emerg Med Clin North Am* 2005; 23:115–131.
 - 17 Pediatric Emergency Medicine Database. <http://www.pemdatabase.org>. (Accessed 15 January 2007).
- This internet reference organizes recent research relevant to PEM by topic. The website also lists international PEM interest groups and research collaboratives and provides a link to an IPEM listserve.
- 18 PEMS. Introduction and goals. 2004. <http://www.pems.org.au/ModCoreFrontEnd/template.asp?PageID=134>. (Accessed 15 January 2007).
 - 19 Babl FE, Weiner DL, Bhanji F, *et al*. Advanced training in pediatric emergency medicine in the United States, Canada, United Kingdom, and Australia: an international comparison and resources guide. *Ann Emerg Med* 2005; 45:269–275.
 - 20 King Faisal Specialist Hospital and Research Centre Fellowship Website. 2006. <http://www.kfshrc.edu.sa/aape/Our%20Fellows%201.html>. (Accessed 15 January 2007).
 - 21 Anderson PD, Aschkenasy M, Lis J. International emergency medicine fellowships. *Emerg Med Clin N Am* 2005; 23:199–215.
 - 22 Loma Linda IEM Fellowship Website. 2006. <http://www.llu.edu/llumc/emergency/pem/intlfellowshiphurt.html>. (Accessed 15 January 2007).
 - 23 Society of Academic Emergency Medicine Fellowship Website. 2005. <http://www.saem.org/saemdn/ViewByRole/Residents/Fellowships/FellowshipProgramList/tabid/382/Default.aspx#inter>. (Accessed 15 January 2007).
 - 24 Pediatric Emergency Care Editorial Board. 2007. <http://www.peconline.com/pt/re/pec/editorialboard.htm?jsessionid=FsHGLyB00YVpqZJ8Rf2nFpxVFGDZnZrdhTmnhLKfHLpR8ShxKY!12118075020!-949856145!8091!-1>. (Accessed 15 January 2007).
 - 25 International Pediatric Emergency Group. <http://www.pemdatabase.org/IPEG.html>. (Accessed 15 January 2007).
 - 26 Pediatric Emergency Medicine Discussion List. 2004. http://www.brown.edu/Administration/Emergency_Medicine/ped-em-l.html. (Accessed 15 January 2007).
 - 27 Pediatric Emergency Medicine Database. PEM Organizations. <http://www.pemdatabase.org/pemworkinggroups.html>. (Accessed 15 January 2007).
 - 28 Molyneux E, Robertson A. Emergency medicine in differently resourced settings: what can we offer each other? *Emerg Med J* 2002; 19:378–379.
 - 29 USAID website. Telling our story. 2006. http://www.usaid.gov/stories/georgia/ss_ge_er.html (Accessed 15 January 2007).
- This is a one-page news story on the opening of a pediatric emergency room in Tbilisi, Georgia and its effect on hospital mortality and operating costs.
- 30 Landro L. Hospitals beef up pediatric ERs. *The Wall Street Journal* 20 • September 2006; D1.
- This news report describes challenges to the emergency medicine system that are making hospitals consider opening pediatric-specific facilities.
- 31 Global Health Council. Global health opportunities: 2006 Update on priorities and U.S. investments. Washington, DC: Global Health Council; 2006.
- A statement about the current state of global health expenditures and investment needs. It includes a section on child health. While the document is not directed specifically towards PEM, it references many preventable childhood illnesses with acute presentations.
- 32 Farmer P. Can transnational research be ethical in the developing world? *Lancet* 2002; 360:1266.
 - 33 Deloos H. International emergency medicine: the vision of a pioneer, Prof. Dr Peter Safar, on emergency medical care. *Eur J Emerg Med* 2003; 10:163.
 - 34 Garcia-Rosas C, Iserson KV. Emergency medicine in Mexico. *J Emerg Med* • 2006; 31:441–445.
- A status report on emergency medicine in Mexico including future directions for development.
- 35 Swanson RC, Soto NR, Villafuerte AG. Emergency medicine in Peru. *J Emerg Med* 2005; 29:353–356.
 - 36 Partridge R, Roll IJ. Emergency medicine in Cuba: an update. *Am J Emerg Med* 2005; 23:705–706.
 - 37 Ratu Sade K. The status of emergency medicine in Makira Ulawa Province, Solomon Islands. *Emerg Med Australas* 2005; 17:167–169.
 - 38 Aronson B. Improving online access to medical information for low-income countries. *N Engl J Med* 2004; 350:966–968.
 - 39 Anderson P, Petrino R, Halpern P, Tintinalli J. The globalization of emergency medicine and its importance for public health. *Bull World Health Organ* 2006; 84:835–839.
- The authors discuss the value of the worldwide development of emergency medicine as it applies to public health. They also review specific challenges and opportunities for EM development, most of which are applicable to PEM.
- 40 Kobusingye OC, Hyder AA, Bishai D, *et al*. Emergency medical services. In: Jamison DT, Breman JG, Measham AR, *et al*, editors. Disease control priorities in developing countries. New York: Oxford University Press; 2006. pp. 1261–1279.
- A guide for the development of emergency medical services in developing countries, including specific discussions of components and cost analysis. The authors make the point that improved organization and planning for emergency care can be accomplished at a reasonable cost with the benefit of more appropriate use of resources and better outcomes.