

Resource-Poor Settings: Response, Recovery, and Research

Care of the Critically Ill and Injured During Pandemics and Disasters: CHEST Consensus Statement

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e-Appendix 1.

CONSENSUS STATEMENT ON CARE OF THE CRITICALLY ILL AND INJURED DURING DISASTERS AND PANDEMICS: RESOURCE POOR SETTINGS PAPER 1 AND 2

LITERATURE SEARCH

Search conducted: 12/19/12 & 1/3/13

Database searched: MEDLINE/PubMed & Scopus

Search limits used: No limits used.

Search strategy used: *Search terms used were primarily suggested by Topic Team POC, the Dunser articles and from review of key articles.*

NOTE: the sections highlighted in this search strategy comprised the initial planned divisions for the paper on Resource Poor Settings. Based upon literature findings, the paper was further divided into two, roughly aligned with disaster phases of mitigation, preparation, response and recovery. The search strategy listed below was used for Definition, Infrastructure and Capacity Building, Resources Necessary to Enhance Capacity, and Reconstitution/Recovery/Disengagement from Host Nation. A refined search strategy was used for the response section and highlighted below.

MEDLINE/PubMed

General

("low income country" OR "middle income country" OR "developing country" OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) AND ("Terrorism"[Mesh] OR terrorism[tiab] OR "mass casualty incident" OR "Mass Casualty Incident"[mesh] OR "mass casualties" OR bombing[tiab]) = 174

*this was a good strategy. Still irrelevant results, but pretty good at retrieving relevant articles to a developing country setting

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("low income country" OR "middle income country" OR "developing country" OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) AND ("capacity building" OR mitigation OR mitigate OR "system strengthen" OR preparedness) AND ("severe illness" OR "critical care"[tiab] OR "Critical Care"[majr] OR "intensive care"[tiab] OR "Intensive Care"[majr] OR trauma[tiab] OR Trauma[majr] OR "major surgery" OR "mass critical care"[tiab]) = 20

*better strategy w/these variations

Recovery/reconstitution/rebuilding

("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) AND ("Geological Processes"[Mesh] OR hurricane OR tornado OR earthquake OR flood OR tsunami OR wildfire OR "Terrorism"[Mesh] OR "Disasters"[Mesh:noexp] OR disaster*[tiab] OR "Weapons of Mass Destruction"[MeSH] OR "Power Plants"[Mesh] OR catastrophe[tiab] OR catastrophic[tiab] OR catastrophes[tiab] OR "public health emergency"[tw] OR "Mass Casualty"[tiab] OR "Mass Casualties"[tiab] OR "Mass Casualty Incidents"[tw]) AND (Health Care Facilities, Manpower, and Services [mesh] OR "health care facility" OR "healthcare facilities" OR hospital[tiab] OR Hospitals[mesh]) AND ("severe illness" OR "critical care"[tiab] OR "Critical Care"[majr] OR "intensive care"[tiab] OR "Intensive Care"[majr] OR trauma[tiab] OR Trauma[majr] OR "major surgery" OR "mass critical care"[tiab]) = 101

*use this search strategy as it is specific to critical care and very good with retrieval

("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) AND ("Geological Processes"[Mesh] OR hurricane OR tornado OR earthquake OR flood OR tsunami OR wildfire OR "Terrorism"[Mesh] OR "Disasters"[Mesh:noexp] OR disaster*[tiab] OR "Weapons of Mass Destruction"[MeSH] OR "Power Plants"[Mesh] OR catastrophe[tiab] OR catastrophic[tiab] OR catastrophes[tiab] OR "public health emergency"[tw] OR "Mass Casualty"[tiab] OR "Mass Casualties"[tiab] OR "Mass Casualty Incidents"[tw]) AND ("severe illness" OR "critical care"[tiab] OR "Critical Care"[majr] OR "intensive care"[tiab] OR "Intensive Care"[majr] OR "intensive care units"[majr] OR "intensive care unit"[tiab] OR ICU[tiab] OR trauma[tiab] OR Trauma[majr] OR "major surgery" OR "mass critical care"[tiab]) = 169

*use this search strategy as it is specific to critical care and very good with retrieval

("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) AND ("Geological Processes"[Mesh] OR hurricane OR tornado OR earthquake OR flood OR tsunami OR wildfire OR "Terrorism"[Mesh] OR "Disasters"[Mesh:noexp] OR disaster*[tiab] OR "Weapons of Mass Destruction"[MeSH] OR "Power Plants"[Mesh] OR catastrophe[tiab] OR catastrophic[tiab] OR catastrophes[tiab] OR "public health emergency"[tw] OR "Mass Casualty"[tiab] OR "Mass Casualties"[tiab] OR "Mass Casualty Incidents"[tw]) AND ("severe illness" OR "critical care"[tiab] OR "Critical Care"[majr] OR "intensive care"[tiab] OR "Intensive Care"[majr] OR "intensive care

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units"[majr] OR "intensive care unit"[tiab] OR ICU[tiab] OR trauma[tiab] OR Trauma[majr] OR "major surgery" OR "mass critical care"[tiab]) AND (recovery OR reconstitution OR rebuilding OR rebuild OR post-disaster) = 11

*includes disaster and low income and critical care and recovery

Surge Capacity

("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) AND ("capacity building" OR mitigation OR mitigate OR "system strengthen" OR preparedness) AND ("surge capacity"[tiab] OR "Surge Capacity"[mesh]) = 8

Capacity Building/Mitigation/Preparedness

("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) AND ("capacity building" OR mitigation OR mitigate OR "system strengthen" OR preparedness) AND ("Geological Processes"[Mesh] OR hurricane OR tornado OR earthquake OR flood OR tsunami OR wildfire OR "Terrorism"[Mesh] OR "Disasters"[Mesh:noexp] OR disaster*[tiab] OR "Weapons of Mass Destruction"[MeSH] OR "Power Plants"[Mesh] OR "Disease outbreaks"[Mesh] OR "disease outbreak"[tiab] OR epidemic[TW] OR "Epidemics"[MeSH] OR "pandemic" OR "Pandemics"[Mesh] OR catastrophe[tiab] OR catastrophic[tiab] OR catastrophes[tiab] OR "public health emergency"[tw] OR "Mass Casualty"[tiab] OR "Mass Casualties"[tiab] OR "Mass Casualty Incidents"[tw]) = 374

**this is a good strategy, but a lot of the results are related to pandemic or epidemics, but because this needs to address all types of disasters and many of the SARS articles are pandemic/disease outbreaks, use this search strategy*

SCOPUS

General

****({low income country} OR {middle income country} OR {developing country} OR {developing countries} OR {resource poor} OR {resource limited} OR Africa OR {south America} OR Asia OR {developing world} OR {least developed countries} OR {less developed countries} OR {third world} OR austere) AND (disaster OR disasters OR {disaster planning} OR {rescue work} OR {relief work} OR tornado OR hurricane OR flood OR earthquake OR {mass casualty incident} OR {mass casualties} OR bombing OR {disease outbreak}) AND ({severe illness} OR {critical care} OR {intensive care} OR {intensive care unit} OR trauma* OR {major surgery} OR {mass critical care}) = 278**

**use this search strategy; pretty good and many relevant articles – developing countries, disasters and critical care; omits pandemic/epidemic*

****({low income country} OR {middle income country} OR {developing country} OR {developing countries} OR {resource poor} OR {resource limited} OR Africa OR {south America} OR Asia OR {developing world} OR {least developed countries} OR {less developed countries} OR {third world} OR austere) AND (disaster OR disasters OR {disaster planning} OR {rescue work} OR {relief work} OR tornado OR hurricane OR flood OR earthquake OR {mass casualty incident} OR {mass casualties} OR**

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bombing OR {disease outbreak}) AND ({severe illness} OR {critical care} OR {intensive care} OR {intensive care unit} OR trauma* OR {major surgery} OR {mass critical care}) AND ({Health Care Facilities} OR {health care facility} OR {healthcare facilities} OR hospital* OR {health personnel}) = 81
**use this search strategy; includes some unique articles – developing countries, disasters, critical care and healthcare facilities*

Recovery/reconstitution/rebuilding

**({low income country} OR {middle income country} OR {developing country} OR {developing countries} OR {resource poor} OR {resource limited} OR Africa OR {south America} OR Asia OR {developing world} OR {least developed countries} OR {less developed countries} OR {third world} OR austere) AND (disaster OR disasters OR {disaster planning} OR {rescue work} OR {relief work} OR tornado OR hurricane OR flood OR earthquake OR {mass casualty incident} OR {mass casualties} OR bombing OR {disease outbreak}) AND ({severe illness} OR {critical care} OR {intensive care} OR {intensive care unit} OR trauma* OR {major surgery} OR {mass critical care}) AND (recovery OR reconstitution OR rebuilding OR rebuild OR post-disaster) = 39

**includes disaster and low income and critical care and recovery; use this search strategy although many PTSD and post recovery articles are not really relevant; omitted pandemic*

**low income country} OR {middle income country} OR {developing country} OR {developing countries} OR {resource poor} OR {resource limited} OR Africa OR {south America} OR Asia OR {developing world} OR {least developed countries} OR {less developed countries} OR {third world} OR austere) AND (disaster OR disasters OR {disaster planning} OR {rescue work} OR {relief work} OR tornado OR hurricane OR flood OR earthquake OR {mass casualty incident} OR {mass casualties} OR bombing OR {disease outbreak}) AND (recovery OR reconstitution OR rebuilding OR rebuild OR post-disaster) AND ({Health Care Facilities} OR {health care facility} OR {healthcare facilities} OR hospital* OR {health personnel}) = 20

**adding clinic only added 3 additional references which were not relevant; adding "OR {health care system} OR {healthcare infrastructure}" included 2 additional references, which were not relevant*

Surge Capacity

**({low income country} OR {middle income country} OR {developing country} OR {developing countries} OR {resource poor} OR {resource limited} OR Africa OR {south America} OR Asia OR {developing world} OR {least developed countries} OR {less developed countries} OR {third world} OR austere) AND ({capacity building} OR mitigation OR mitigate OR {system strengthen} OR preparedness) AND {surge capacity} = 6

**use this strategy even though it didn't retrieve any new results*

Capacity Building/Mitigation/Preparedness

**({low income country} OR {middle income country} OR {developing country} OR {developing countries} OR {resource poor} OR {resource limited} OR Africa OR {south America} OR Asia OR {developing world} OR {least developed countries} OR {less developed countries} OR {third world} OR austere) AND ({capacity building} OR mitigation OR mitigate OR {system strengthen} OR preparedness)

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AND ({severe illness} OR {critical care} OR {intensive care} OR trauma* OR {major surgery} OR {mass critical care}) = 41

**this one is pretty good. Retrieves results not already retrieved from PubMed; however, there are still plenty of irrelevant results. Include because of the useful ones. Only focuses on capacity building, developing countries and critical care – not specific to disasters.*

Note: Results were exported to EndNote from MEDLINE/PubMed and Scopus, and duplicate references removed. This resulted in a final set of **487** unfiltered search results.

ARTICLE REVIEW STRATEGY

Paper sections were divided among authors into teams, each team having a primary and secondary author. The above papers and abstracts were reviewed by each primary and then confirmed by secondary; the papers were initially divided into GREEN (likely applicable to their section) and YELLOW (possibly applicable to their section). Depending on the outcome, section authors then further modified the search, reviewed papers' references for additional sources, and conducted other similar search strategies in order to maximize the information available for their sections. The following papers highlight those from each section using the initial search described above.

DEFINITION

See papers chosen for *Infrastructure and Capacity Building and Resources Necessary to Enhance Capacity*.

INFRASTRUCTURE AND CAPACITY BUILDING

This review comes primarily from articles gleaned from the initial 'resource poor' search, a second one that added 'developing countries' as a search term and a third individual search on 'new and innovative technologies applied to resource poor countries'. It is important for us to recognize that the Resource allocation in poor settings is much different than those found in the Resource Allocation paper where there are empirical studies to review. Many of the publications reviewed are similar to what was published in the developed world back in the 60s and 70s. Also, and most critical, is that critical care defined in these countries is more like care in emergency departments in the developing world. In fact, in Africa only 3 countries have urban hospital based critical care units (South Africa, Egypt and Morocco) and are rare in South East Asia. Thus even the simplest of triage papers, for example, represent an advancement that can be shared among these developing countries. In these primarily descriptive papers one idea or two from each paper can build a consensus base for building a simple triage system in a developing country...a major advancement. – Skip Burkle

Green PAPERS

1. Sippel S, Muruganandan K, Levine A, Shah S. "Review article: Use of ultrasound in the developing world." *Int J Emerg Med*. 2011 Dec 7;4:72. doi: 10.1186/1865-1380-4-72.
2. Levine AC, Shah SP, Umulisa I, Munyaneza RB, Dushimiyimana JM, Stegmann K, Musavuli J, Ngabitsinze P, Stulac S, Epino HM, Noble VE. "Ultrasound assessment of severe dehydration in children with diarrhea and vomiting." *Acad Emerg Med*. 2010 Oct;17(10):1035-41. doi: 10.1111/j.1553-2712.2010.00830.x.
3. Molyneux, E. (2009). "Emergency care for children in resource-constrained countries." *Trans R Soc Trop Med Hyg* 103(1): 11-5. <http://www.ncbi.nlm.nih.gov/pubmed/18768191>

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4. Molyneux, E. (2010). "Emergency care in poorly resourced settings: trying to make a difference." Emj-Engineering Management Journal: 3-4.
5. Fonjungo PN, Kebede Y, Messele T, Ayana G, Tibesso G, Abebe A, Nkengasong JN, Kenyon T. "Laboratory equipment maintenance: a critical bottleneck for strengthening health systems in sub-Saharan Africa?" J Public Health Policy. 2012 Feb;33(1):34-45. doi: 10.1057/jphp.2011.57. Epub 2011 Nov 10.
6. Molyneux, E., S. Ahmad, et al. (2006). "Improved triage and emergency care for children reduces inpatient mortality in a resource-constrained setting." Bull World Health Organ 84(4): 314-9. <http://www.ncbi.nlm.nih.gov/pubmed/16628305>
7. Leow, J. J., S. I. Brundage, et al. (2012). "Mass casualty incident training in a resource-limited environment." Br J Surg 99(3): 356-61. <http://www.ncbi.nlm.nih.gov/pubmed/22190046>.
8. Dünser MW, Festic E, Dondorp A, Kisson N, Ganbat T, Kwizera A, Haniffa R, Baker T, Schultz MJ; Global Intensive Care Working Group of European Society of Intensive Care Medicine. Recommendations for sepsis management in resource-limited settings. Intensive Care Med. 2012 Apr;38(4):557-74. doi: 10.1007/s00134-012-2468-5. Epub 2012 Feb 14.
9. Goosen, J., C. Mock, et al. (2005). "Preparing and responding to mass casualties in the developing world." Int J Inj Contr Saf Promot 12(2): 115-7. <http://www.ncbi.nlm.nih.gov/pubmed/16156536>
10. Gottschalk, S. B., D. Wood, et al. (2006). "The Cape Triage Score: a new triage system South Africa. Proposal from the Cape Triage Group." Emerg Med J 23(2): 149-53. <http://www.ncbi.nlm.nih.gov/pubmed/16439753>
11. Gove, S., G. Tamburlini, et al. (1999). "Development and technical basis of simplified guidelines for emergency triage assessment and treatment in developing countries. WHO Integrated Management of Childhood Illness (IMCI) Referral Care Project." Arch Dis Child 81(6): 473-7. <http://www.ncbi.nlm.nih.gov/pubmed/10569960>
12. Khilnani, P. and R. Chhabra. (2008). "Transport of critically ill children: how to utilize resources in the developing world." Indian J Pediatr 75(6): 591-8. <http://www.ncbi.nlm.nih.gov/pubmed/18759088>
13. Malik, Z. U., M. Pervez, et al. (2004). "Triage and management of mass casualties in a train accident." J Coll Physicians Surg Pak 14(2): 108-11. <http://www.ncbi.nlm.nih.gov/pubmed/15228876>
14. Bond, G. R., S. Pieche, et al. (2008). "A clinical decision aid for triage of children younger than 5 years and with organophosphate or carbamate insecticide exposure in developing countries." Ann Emerg Med 52(6): 617-22. <http://www.ncbi.nlm.nih.gov/pubmed/18555561>
15. Bond, G. R., S. Pieche, et al. (2008). "A clinical decision rule for triage of children under 5 years of age with hydrocarbon (kerosene) aspiration in developing countries." Clin Toxicol (Phila) 46(3): 222-9. <http://www.ncbi.nlm.nih.gov/pubmed/18344104>
16. Bruijns, S. R., L. A. Wallis, et al. (2008). "Effect of introduction of nurse triage on waiting times in a South African emergency department." Emerg Med J 25(7): 395-7. <http://www.ncbi.nlm.nih.gov/pubmed/18573946>

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17. Bruijns, S. R., L. A. Wallis, et al. (2008). "A prospective evaluation of the Cape triage score in the emergency department of an urban public hospital in South Africa." Emerg Med J 25(7): 398-402. <http://www.ncbi.nlm.nih.gov/pubmed/18573947>

18. Nwadiaro, H. C., S. J. Yiltok, et al. (2000). "Immediate mass casualty management in Jos University Teaching Hospital: a successful trial of Jos protocol." West African journal of medicine 19(3): 230-4. <http://www.ncbi.nlm.nih.gov/pubmed/11126091>

Yellow PAPERS

1. Robertson, M. A. and E. M. Molyneux. (2001). "Description of cause of serious illness and outcome in patients identified using ETAT guidelines in urban Malawi." Arch Dis Child 85(3): 214-7. <http://www.ncbi.nlm.nih.gov/pubmed/11517103>

2. Robertson, M. A. and E. M. Molyneux. (2001). "Triage in the developing world--can it be done?" Arch Dis Child 85(3): 208-13. <http://www.ncbi.nlm.nih.gov/pubmed/11517102>

3. Rosedale, K., Z. A. Smith, et al. (2011). "The effectiveness of the South African Triage Score (SATS) in a rural emergency department." S Afr Med J 101(8): 537-40. <http://www.ncbi.nlm.nih.gov/pubmed/21920127>

4. Schuftan, C. (1996). "Triage management in Third World health ministries." Trop Doct 26(2): 90-1. <http://www.ncbi.nlm.nih.gov/pubmed/8685984>

5. Shattock, F. M. (1970). "Application of triage to the provision of medical care in developing countries." Lancet 1(7644): 461-3. <http://www.ncbi.nlm.nih.gov/pubmed/4189763>

6. Talwar, S., S. Jain, et al. (1999). "Trauma scoring in a developing country." Singapore Med J 40(6): 386-8. <http://www.ncbi.nlm.nih.gov/pubmed/10489505>

7. Tamburlini, G., S. Di Mario, et al. (1999). "Evaluation of guidelines for emergency triage assessment and treatment in developing countries." Arch Dis Child 81(6): 478-82. <http://www.ncbi.nlm.nih.gov/pubmed/10569961>

8. Twomey, M., L. A. Wallis, et al. (2007). "Limitations in validating emergency department triage scales." Emerg Med J 24(7): 477-9. <http://www.ncbi.nlm.nih.gov/pubmed/17582037>

9. Vincent, D. S., B. W. Berg, et al. (2009). "Mass-casualty triage training for international healthcare workers in the Asia-Pacific region using manikin-based simulations." Prehosp Disaster Med 24(3): 206-13. <http://www.ncbi.nlm.nih.gov/pubmed/19618356>

10. Burkle, F. M., Jr. (2010). "The triage dilemma: opening Pandora's box... ever so slowly." Crit Care 14(1): 401. <http://www.ncbi.nlm.nih.gov/pubmed/20092613>

11. Camacho-McAdoo, G. (2010). "Triage following a natural disaster: a Haitian experience." J Emerg Nurs 36(4): 385-7. <http://www.ncbi.nlm.nih.gov/pubmed/20624582>

12. Domres, B., M. Koch, et al. (2001). "Ethics and triage." Prehosp Disaster Med 16(1): 53-8. <http://www.ncbi.nlm.nih.gov/pubmed/11367943>

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13. Etienne, M., C. Powell, et al. (2010). "Healthcare ethics: the experience after the Haitian earthquake." Am J Disaster Med 5(3): 141-7. <http://www.ncbi.nlm.nih.gov/pubmed/20701171>
14. Al-Harbi, M. (1998). "Management of emergency department during Haj period." Saudi Medical Journal 19(2): 113-116.
15. Mwaniki, M. K., D. J. Nokes, et al. (2009). "Emergency triage assessment for hypoxaemia in neonates and young children in a Kenyan hospital: an observational study." Bulletin of the World Health Organization 87(4): 263-270.
16. Carpentier, J. P., R. Petrognani, et al. (2002). "[Natural selection and medical triage: everyday realities]." Med Trop (Mars) 62(3): 263-7. <http://www.ncbi.nlm.nih.gov/pubmed/12244925>
17. Fadeyibi, I. O., D. T. Omosibi, et al. (2009). "Mass Burns Disaster in Abule-egba, Lagos, Nigeria from a Petroleum Pipeline Explosion Fire." Ann Burns Fire Disasters 22(2): 97-103. <http://www.ncbi.nlm.nih.gov/pubmed/21991163>
18. Malik, Z. U., M. S. Hanif, et al. (2006). "Mass casualty management after a suicidal terrorist attack on a religious procession in Quetta, Pakistan." J Coll Physicians Surg Pak 16(4): 253-6. <http://www.ncbi.nlm.nih.gov/pubmed/16624186>

RESOURCES NECESSARY TO ENHANCE CAPACITY

GREEN PAPERS

1. Riviello ED, Letchford S, Achieng L, Newton MW. "Critical care in resource-poor settings: lessons learned and future directions." Crit Care Med. 2011 Apr;39(4):860-7.
2. Baker, T. (2009). "Critical care in low-income countries." Trop Med Int Health 14(2): 143-8. <http://www.ncbi.nlm.nih.gov/pubmed/19207174>
3. Kotagal M, Lee P, Habiyakare C, Dusabe R, Kanama P, Epino HM, Rich ML, Farmer PE. "Improving quality in resource poor settings: observational study from rural Rwanda." BMJ. 2009 Oct 30;339:b3488. doi: 10.1136/bmj.b3488.
4. Leatherman S, Ferris TG, Berwick D, Omaswa F, Crisp N. "The role of quality improvement in strengthening health systems in developing countries." Int J Qual Health Care. 2010 Aug;22(4):237-43. doi: 10.1093/intqhc/mzq028. Epub 2010 Jun 12.
5. Onen CL. "Medicine in resource-poor settings: time for a paradigm shift?" Clin Med. 2004 Jul-Aug;4(4):355-60.
6. Bremer, R. (2003). "Policy development in disaster preparedness and management: lessons learned from the January 2001 earthquake in Gujarat, India." Prehosp Disaster Med 18(4): 372-84. <http://www.ncbi.nlm.nih.gov/pubmed/15310051>
7. Burkle, F. M., Jr., A. C. Argent, Kissoon N. (2011). "The reality of pediatric emergency mass critical care in the developing world." Pediatr Crit Care Med 12(6 Suppl): S169-79. <http://www.ncbi.nlm.nih.gov/pubmed/22067927>

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8. Lanata CF. *Lancet*. Human resources in developing countries. 2007 Apr 14;369(9569):1238-9. Editorial with good background data
9. Campbell H, Duke T, Weber M, English M, Carai S, Tamburlini G; Pediatric Hospital Improvement Group. Global initiatives for improving hospital care for children: state of the art and future prospects. *Pediatrics*. 2008 Apr;121(4):e984-92.
10. Hyder AA, Dawson L. "Defining standard of care in the developing world: the intersection of international research ethics and health systems analysis." *Dev World Bioeth*. 2005 May;5(2):142-52.
11. Nkengasong JN, Mesele T, Orloff S, Kebede Y, Fonjungo PN, Timperi R, Birx D. "Critical role of developing national strategic plans as a guide to laboratory health systems in resource-poor settings." *Am J Clin Pathol*. 2009 Jun;131(6):852-7. doi: 10.1309/AJPC51BLOBBPAKC.
12. Kahabuka C, Kvale G, Moland KM, Hinderaker SG. "Why caretakers bypass Primary Health Care facilities for child care - a case from rural Tanzania." *BMC Health Serv Res*. 2011 Nov 17;11:315. doi: 10.1186/1472-6963-11-315.
13. Zere E, Mbeeli T, Shangula K, Mandlhate C, Mutirua K, Tjivambi B, Kapenambili W. "Technical efficiency of district hospitals: evidence from Namibia using data envelopment analysis." *Cost Eff Resour Alloc*. 2006 Mar 27;4:5.
14. Dunser, M. W., I. Baelani, et al. (2006). "A review and analysis of intensive care medicine in the least developed countries." *Crit Care Med* 34(4): 1234-42. <http://www.ncbi.nlm.nih.gov/pubmed/16484925>
15. Galukande M, von Schreeb J, Wladis A, Mbembati N, de Miranda H, Kruk ME, Luboga S, Matovu A, McCord C, Ndao-Brumblay SK, Ozgediz D, Rockers PC, Quiñones AR, Vaz F, Debas HT, Macfarlane SB. "Essential surgery at the district hospital: a retrospective descriptive analysis in three African countries." *PLoS Med*. 2010 Mar 9;7(3):e1000243. doi: 10.1371/journal.pmed.1000243.
16. Ehiawaguan, I. P. (2007). "Mass casualty incidents and disasters in Nigeria: The need for better management strategies." *Niger Postgrad Med J* 14(4): 341-6. <http://www.ncbi.nlm.nih.gov/pubmed/18163146>
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RESPONSE

NOTE: With limited papers defined using the above strategy, this section's search was refined as follows:

Search conducted: 3/19/13 (had run earlier but updated 3/19/13)

Database searched: MEDLINE/PubMed & Scopus

Search limits used: No limits used.

Search strategy used: *Search terms used were primarily suggested by Topic Team POC, the Dunser articles and from review of key articles. These can be changed and the searches re-run in PubMed with duplicates removed.*

MEDLINE/PubMed

Disasters & Developing Countries & Medical Missions/Foreign Medical teams:

("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab]))

AND ("Geological Processes"[Mesh] OR hurricane OR tornado OR earthquake OR flood OR tsunami OR wildfire OR "Terrorism"[Mesh] OR "Disasters"[Mesh:noexp] OR disaster*[tiab] OR "Weapons of Mass Destruction"[MeSH] OR "Power Plants"[Mesh] OR catastrophe[tiab] OR catastrophic[tiab] OR catastrophes[tiab] OR "public health emergency"[tw] OR "Mass Casualty"[tiab] OR "Mass Casualties"[tiab] OR "Mass Casualty Incidents"[tw]) AND ("foreign medical team" OR "Medical Missions, Official"[Mesh] OR "medical missions") = 30

**specific to medical missions including military missions; very specific and targeted search*

("Geological Processes"[Mesh] OR hurricane OR tornado OR earthquake OR flood[tiab] OR tsunami OR wildfire OR "Terrorism"[Mesh] OR "Disasters"[Mesh:noexp] OR disaster*[tiab] OR "Weapons of Mass Destruction"[MeSH] OR "Power Plants"[Mesh] OR catastrophe[tiab] OR catastrophic[tiab] OR "public health emergency"[tw] OR "Mass Casualty"[tiab] OR "Mass Casualties"[tiab] OR "Mass Casualty Incidents"[tw]) AND ("Relief Work"[Mesh] OR "relief work" OR humanitarian OR "international aid" OR "foreign medical team" OR "Medical Missions, Official"[Mesh] OR "medical missions) AND ("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) = 73

**limited to developing countries;*

("Geological Processes"[Mesh] OR hurricane OR tornado OR earthquake OR flood[tiab] OR tsunami OR wildfire OR "Terrorism"[Mesh] OR "Disasters"[Mesh:noexp] OR disaster*[tiab] OR "Weapons of Mass Destruction"[MeSH] OR "Power Plants"[Mesh] OR catastrophe[tiab] OR catastrophic[tiab] OR "public health emergency"[tw] OR "Mass Casualty"[tiab] OR "Mass Casualties"[tiab] OR "Mass Casualty Incidents"[tw]) AND ("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed

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countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) AND ("Relief Work"[Mesh] OR "relief work" OR humanitarian OR "international aid" OR "foreign medical team" OR "Medical Missions, Official"[Mesh] OR "medical missions" OR "Foreign Professional Personnel"[Mesh]) = 278

Disaster & Developing Countries & Disaster/Emergency Response:

("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab]))

AND ("Geological Processes"[Mesh] OR hurricane OR tornado OR earthquake OR flood OR tsunami OR wildfire OR "Terrorism"[Mesh] OR "Disasters"[Mesh:noexp] OR disaster*[tiab] OR "Weapons of Mass Destruction"[MeSH] OR "Power Plants"[Mesh] OR catastrophe[tiab] OR catastrophic[tiab] OR catastrophes[tiab] OR "public health emergency"[tw] OR "Mass Casualty"[tiab] OR "Mass Casualties"[tiab] OR "Mass Casualty Incidents"[tw]) AND (response[tw] OR "disaster response"[tiab] OR "emergency response"[tiab]) = 230

**same # results with adding "emergency response";*

Disaster & Developing Countries & Critical care & Hospitals/Facilities:

("low income country" OR "middle income country" OR "developing country" OR "Developing Countries"[mesh] OR "resource poor" OR "resource limited" OR Africa[tw] OR "south America"[tw] OR Asia[tw] OR "developing world" OR "least developed countries" OR "less developed countries" OR "third world" OR austere[tiab] OR "resource poor"[tiab] OR (resource[tiab] AND poor[tiab]) OR (resource[tiab] AND limit[tiab])) AND ("severe illness" OR "critical care"[tiab] OR "Critical Care"[majr] OR "intensive care"[tiab] OR "Intensive Care"[majr] OR "intensive care units"[majr] OR "intensive care unit"[tiab] OR ICU[tiab] OR trauma[tiab] OR Trauma[majr] OR "major surgery" OR "mass critical care"[tiab]) AND (Health Care Facilities, Manpower, and Services [mesh] OR "health care facility" OR "healthcare facilities" OR hospital[tiab] OR Hospitals[mesh]) AND ("Geological Processes"[Mesh] OR hurricane OR tornado OR earthquake OR flood[tiab] OR tsunami OR wildfire OR "Terrorism"[Mesh] OR "Disasters"[Mesh:noexp] OR disaster*[tiab] OR "Weapons of Mass Destruction"[MeSH] OR "Power Plants"[Mesh] OR catastrophe[tiab] OR catastrophic[tiab] OR "public health emergency"[tw] OR "Mass Casualty"[tiab] OR "Mass Casualties"[tiab] OR "Mass Casualty Incidents"[tw]) = 102

**good, not bad – disasters AND resource poor AND hospitals AND critical care*

SCOPUS

TITLE-ABS-KEY(({"low income country"} OR {"middle income country"} OR {"developing country"} OR {"developing countries"} OR {"resource poor"} OR {"resource limited"} OR Africa OR {"south America"} OR Asia OR {"developing world"} OR {"least developed countries"} OR {"less developed countries"} OR {"third world"} OR austere) AND (disaster OR disasters OR {"disaster planning"} OR tornado OR hurricane OR flood OR earthquake OR tsunami OR {"mass casualty incident"} OR {"mass casualties"} OR {"mass casualty incidents"} OR bombing OR {"disease outbreak"} OR {"public health emergency"}) AND ({"foreign medical team"} OR {"Medical Missions"} OR {"foreign medical mission"} OR {"foreign professional personnel"} OR {"foreign medical professional"})) = 45

**limit to medical missions – excluded humanitarian; international aid/relief, rescue work, relief work;*

Disaster & Developing Countries & Critical care & Hospitals/Facilities:

TITLE-ABS-KEY(({"low income country"} OR {"middle income country"} OR {"developing country"} OR {"developing countries"} OR {"resource poor"} OR {"resource limited"} OR Africa OR {"south America"} OR Asia OR {"developing world"} OR {"least developed countries"} OR {"less developed countries"} OR {"third world"} OR austere) AND (disaster OR disasters OR {"disaster planning"} OR tornado OR hurricane OR flood OR earthquake OR tsunami OR {"mass casualty incident"} OR {"mass casualties"} OR {"mass casualty incidents"} OR bombing OR {"disease outbreak"} OR {"public health emergency"}) AND ({"foreign medical team"} OR {"Medical Missions"} OR {"foreign medical mission"} OR {"foreign professional personnel"} OR {"foreign medical professional"})) = 45

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OR austere) AND (disaster OR disasters OR {disaster planning} OR tornado OR hurricane OR flood OR earthquake OR tsunami OR {mass casualty incident} OR {mass casualties} OR {mass casualty incidents} OR bombing OR {disease outbreak} OR {public health emergency}) AND ({severe illness} OR {critical care} OR {intensive care} OR {intensive care unit} OR trauma* OR {major surgery} OR {mass critical care}) AND ({Health Care Facilities} OR {health care facility} OR {healthcare facilities} OR hospital* OR {health personnel}) = 84

Disaster & Developing Countries & Disaster/Emergency Response:

{low income country} OR {middle income country} OR {developing country} OR {developing countries} OR {resource poor} OR {resource limited} OR Africa OR {south America} OR Asia OR {developing world} OR {least developed countries} OR {less developed countries} OR {third world} OR austere) AND (disaster OR disasters OR {disaster planning} OR tornado OR hurricane OR flood OR earthquake OR tsunami OR {mass casualty incident} OR {mass casualties} OR {mass casualty incidents} OR bombing OR {disease outbreak} OR {public health emergency}) AND ({disaster response} OR {emergency response}) = 192

**removed "response" and limited retrieval down;*

Note: Results were exported to EndNote from MEDLINE/PubMed and Scopus, and duplicate references removed. This resulted in a final set of 509 unfiltered search results, which are listed below. These are the raw search results from the searches used above; no additional filtering or limits were applied to the searches. The records include the citation and abstract (if available). Records below include the URL to the citation in MEDLINE/PubMed or Scopus. Click on the link to go to the database and download the article via your institution's subscriptions. Titles in square brackets (e.g., [title]) are articles where the title was translated into English. The article is most likely not in English

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RESEARCH

This section was developed as the initial paper was divided into two, with those topics relevant to Research, Quality Improvement, and Innovation placed into this section. No separate literature search occurred for this section.

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