Developing a Health System Approach to Disaster Management: A Qualitative Analysis of the Core Literature to Complement the WHO Toolkit for Assessing Health-System Capacity for Crisis Management

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Abstract

BACKGROUND The World Health Organisation’s (WHO) sixty-fourth World Health Assembly in May 2011 adopted a resolution on ‘strengthening national health emergency and disaster management capacities and resilience of health systems’. Disaster management is a topical issue globally and countries are being encouraged to improve their disaster preparedness, along with growing international commitment to strengthening health systems. Lessons identified from disasters have not been effectively collated; essential experience is forgotten.

METHODS This paper describes the analysis of the worldwide experience of disasters through a health systems approach. A systematic search of the core literature from January 2000 to November 2011 was conducted. Components drawn from the WHO’s Global assessment of national health sector emergency preparedness and response baseline survey were combined with WHO’s six health system building blocks (or levers) to act as the initial analysis anchors, with a further grounded theory qualitative analysis of the literature allowing the identification of emerging themes and insights. The priority areas identified by this literature review were then compared with the topics covered by the new expert-consensus-derived Toolkit for assessing health-system capacity for crisis management developed by the WHO Regional Office for Europe.

FINDINGS 143 publications identified from a literature search were analysed and appraised. Themes and examples from the literature demonstrate how health system strengthening should contribute to disaster management. Priority areas under-represented in the WHO Toolkit and identified by the qualitative analysis are discussed.

INTERPRETATION Collation and analysis of the disaster management literature identifies how health system strengthening can promote resilience and efficient recovery in the face of disasters. These findings support and complement the WHO Toolkit. Countries can use the literature evidence with the WHO Toolkit to assess their disaster management capacities and identify priorities for strengthening their health system.

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Introduction

Are we prepared for disasters?

Each disaster and its context are different, yet many share similar health sector vulnerabilities and thus common disaster management practices and policies can be built in to the health system to create resilience – the ‘all-hazards’ approach. Four recent major disasters exemplify the need for strengthened health systems.

The earthquake in Haiti, 12th Jan 2010, left 1.5 million homeless and killed 149,095 people of which 6300 died in a potentially preventable cholera outbreak which infected a further 450,000 residents. Haiti lacked an effective health system prior to the earthquake and national authorities were not equipped to manage relief or recovery priorities when the disaster occurred.

Governance structures were destroyed and the required services, health workers, surveillance, resources, funding and (attempts at) coordination were provided almost completely by international organisations, creating its own set of complications and delaying investments into the health system.

Flooding in Pakistan, July to August 2010, affected 20 million people and destroyed health facilities. In spite of the public health challenges, previous disaster management investment in southern Punjab region allowed for effective evacuations and saved
The famine in the Horn of Africa in 2011 affected 10 million people across several countries. Large population displacement created additional public health challenges to areas that have poorly developed health systems and lack disaster preparedness. Immediate priorities included — provision of water, sanitation, and shelter; trained staff to address widespread acute malnutrition; surveillance for outbreaks; vaccine programmes for preventable diseases; funding; and inter-agency coordination\(^6\) These reflect the different components of a health system.

The earthquake and tsunami in Japan, 11\(^{th}\) March 2011, caused destruction of healthcare facilities; initial shortages of food, water, fuel, aid materials and rescue teams to the affected rural population; 400,000 people were evacuated to shelters with no heating in freezing temperatures. However, Japan had invested in disaster management and had created a more resilient health system which continued to function in spite of the challenges\(^5\)

WHO describes public health threats as: ‘new or newly emerging diseases, the accidental release or deliberate use of biological, chemical or radio-nuclear agents, natural disasters, human-made disasters, complex emergencies, conflicts and other events with a potentially catastrophic impact on human health’\(^7\) Public health emergency preparedness has been described as “the capability of the public health and health-care systems, communities, and individuals to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities”\(^8\) The inclusion of disaster ‘prevention’ reflects the public health perspective which is proposed here, whereas preparedness in ‘emergency management’ is limited to the actions to anticipate and build response capacity.

Health system can be defined as ‘comprising all the resources, organizations and institutions that are devoted to producing interdependent actions aimed principally at improving, maintaining or restoring health’\(^7\) WHO describes it as being composed of six building blocks, each involving public health — 1) service delivery, 2) health workers, 3) health information, 4) medical products, technology and vaccines, 5) health finance, and 6) governance and leadership. This paper describes these components as ‘levers’ to encapsulate the complex and dynamic nature of health system’s functioning reflecting the inter-dependent movements of its levers.

Historically, different aspects of disaster management have been considered and discussed in isolation. However, the ‘multi-disciplinary health systems’ approach to disaster management suggests that each component of a health system needs resilience to threats built in to its structure. In this way, the whole health system can be strengthened to meet the demands of any type of disaster, enabling a coordinated, rapid and effective response and recovery.

The WHO Regional Office for Europe has adopted health system strengthening as the approach to support emergency preparedness and enhancement of crisis management capacities of member states. In response to international requests, a practical, action oriented Toolkit was developed and refined in a series of expert consultations.

The Toolkit for assessing health-system capacity for crisis management was piloted in 2007 and 2008 in an earlier version in multidisciplinary country missions to Armenia, Azerbaijan and the Republic of Moldova\(^9\) with the respective assessment reports published on the WHO/Europe website. Based on the feedback and experience, the Toolkit was adapted and fine-tuned.

The Toolkit consists of a “User manual” and the “Assessment form” and is structured using the WHO health systems framework – subcategorized into 16 key components and 51 essential attributes — to facilitate a structured and reproducible assessment of the preparedness of health systems, based on defined indicators.

The final revised version, published in January 2012, was used to prepare a country report for Turkey\(^10\) and Croatia. The methodology has been applied for targeted assessments to evaluate public health preparedness for an increased influx of migrants following the North Africa Crisis in assessment missions to Malta\(^11\), Italy (Lampedusa)\(^12\) and Greece (Evros Region).\(^13\) The scope of the application of the assessment tool has been broadened towards a self-assessment methodology for countries to identify gaps in health system capacities and to measure progress towards indicators.

A report using the WHO Toolkit to evaluate England’s health system arrangements to deal with crises, risk prevention and mitigation initiatives was submitted in January 2012. The findings demonstrate the advantages of the largely integrated nature of the National Health Service (NHS) in England in regard to disaster management, working in conjunction with the structured response system that involves multi-sector collaboration and coordination.
In spite of this progress there remains a lack of evidence or collated evidence about the use of a health system-wide approach to disaster management; it has not yet received attention in the disaster-related core literature. Lessons identified from disasters are not readily accessible resulting in disaster management experience being forgotten. Important frameworks exist to guide disaster management, such as the United Nations International Strategy for Disaster Reduction’s Hyogo Framework for Action, and the WHO Regional Office for Europe Toolkit, which are developed through expert consultation to create a consensus set of guidelines and checklist. This paper contributes an alternative approach, drawing from the collated actual worldwide experience of disasters in the published literature. The qualitative analysis of the evidence and experience found in the literature supports the Toolkit’s objective to build resilience across the health system levers for an all-hazards approach to disaster management.

Methods

Analysis - The worldwide experience of disasters drawn from the core literature. A systematic review was conducted of the core literature in Medline and EMBASE databases published between 1st January 2000 and 18th November 2011. Search terms comprised of disaster terms combined with the components of the health system – full details of the systematic review and the documents identified are reported elsewhere. Content analyses and evidence assessment (using Harden’s quality appraisal tool) was completed on each of the 143 documents identified by the search. An additional qualitative analysis identified the strategies for developing a health systems approach to disaster management. Priorities identified by the analysis are compared with those used in the expert-consensus-derived WHO Toolkit, and the relevant experience found in the literature discussed.

An initial content analysis was conducted on each document identified by the systematic review using a matrix combining the WHO’s six levers of health systems with components drawn from the WHO’s Global assessment of national health sector emergency preparedness and response, WHO’s baseline preparedness survey of Member States.

Further to completing the content analysis matrix, a grounded theory qualitative analysis approach was employed. Extracts were collated according to each health system lever area as they combined with components drawn from WHO’s baseline survey – each box of the matrix acting as an ‘anchor’ from which concepts and categories were developed. Thus the analysis is structured while allowing the reviewed papers to deliver the emerging themes and examples – the collated worldwide experience thus indicating how health system strengthening can contribute to disaster management.

The range and number of information-rich studies included limited the risk of any disaster management theme being under-represented by the process. Additionally, while all documents analysed were published in the peer-reviewed core literature, the review encompasses a range of materials, including case reports. Thus the type and quality of ‘evidence’ is broad, and comments detailing the type of evidence formed part of the quality appraisal for each paper. By including a range of documents the analysis identifies lessons from actual disaster experience. Each disaster is different, and these experiences may be most useful for planning in the future, rather than merely focusing on more standard disaster management practices.

Finally, the selected priorities identified by the literature analysis are compared with the components of the expert-consensus-derived WHO Toolkit. Topics that are under-represented are discussed using the literature evidence.

Findings

Panel 1 presents a selection of health system priority areas drawn from the analysis of the core literature. These topics were then compared with the WHO Toolkit and the relevant ‘Essential Attribute’ reference in the Toolkit is identified; areas that are under-represented by the Toolkit are underlined and discussed in the next section.
### Panel 1: Health system priorities in all-hazards disaster management – with references

<table>
<thead>
<tr>
<th>1) Leadership and governance</th>
<th>2) Health workforce</th>
<th>3) Medical products, vaccines and technology</th>
<th>4) Health information</th>
<th>5) Health financing</th>
<th>6) Service delivery</th>
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<tbody>
<tr>
<td>• International, national and cross-boundary systems of governance, coordination and response for all-hazards disasters (Toolkit essential attribute 1a &amp; 2a)</td>
<td>• Public health training in disaster management and evaluation</td>
<td>• Stockpiling disaster-related medications and equipment, and their distribution (EA 17b, d &amp; e, &amp; EA 18 b, d &amp; e)</td>
<td>• Requirement to optimize the performance of health information at all stages of disaster planning (EA 21a &amp; c, &amp; EA 23a &amp; b), management (EA 22b &amp; 24) and recovery (EA 24)</td>
<td>• Health finance system consequences on disaster management effectiveness and coordination</td>
<td>• Disaster preparedness (EA 32), acute response (EA 34) and continuing service requirements (EA 39 &amp; EA 51)</td>
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<td>(EA 28b,c &amp; d)</td>
<td>• Establishing the commitment, welfare and volunteer-credentialing of health workers (EA 15c)</td>
<td>• Required characteristics for mass vaccination and understanding previous controversies (EA 18a)</td>
<td>• Awareness of research and developments in health information tools</td>
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<td>• Community preparedness strategies to increase community resilience</td>
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<td>• Public health consequences of technology failures and impact on healthcare facilities (EA 39b &amp; c, &amp; EA 51)</td>
<td>• Communications – inter-agency; two-way with the public; and the role of the media as part of disaster management strategy (EA 28b,c &amp; d)</td>
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<td>• Surge capacity development within (EA 33) and beyond healthcare facilities</td>
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<td>• Issues in adjusting to crisis standards of care and maintaining priorities (EA 32 &amp; EA 36a &amp; EA 38i)</td>
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<td>• Safeguarding patient’s medical records and medication needs (EA 44a) during disaster</td>
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**Reference Link**

- Disaster preparedness: What do we do now? Keeney GB. Journal of Midwifery and Women's Health 2004;49(4 Suppl.) (pp 2-6).
- Inter-agency communications; two-way with the public; and the role of the media as part of disaster management strategy. In support of home-care provision, Levin considers – “Placing large numbers of infected people in one congested facility, without adequate facilities for personal hygiene and sanitation, could serve to promote its spread and provide marginal care at best”. Hick argues that political authorities must be well-versed on issues, such as the allocation of scarce resources, and should be willing to trust the advice of public health and health care agencies.

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**Noji** considers that mass vaccination is rarely advisable, ineffectually diverting limited resources.

**Barnett et al** have explored this issue in relation to Public Health workers, and identify that rural cohorts are more... urban based workers. They suggest that further investigation may identify factors that influence willingness to respond.

**Bayntun C. How can health system strengthening contribute to disaster management?** A systematic review and qualitative analysis of the literature. WHO Collaborating Centre for Public Health Training & Education, Imperial College, London. 2011.


**Matsumoto M, Inoue K. Earthquake, tsunami, radiation leak, and crisis in rural health in Japan**. Rural and Remote Health 2011;1759(11).

**Use of health information systems in disaster recovery**.


**Arrieta** highlights that patients generally lack knowledge about their medical history and thus advises that patients should be provided with summaries that can be distributed, with prescriptions linked to pharmacies with central databases.


**Harris** analysis ‘social networks’ of public health disaster planners to reveal a paucity of networking with high-level and private-sector contacts, which the authors feel are necessary for managing an effective response to a disaster.


**This initial exploration provides scope for development.** Future research should consider the usability and effectiveness of disasters means that each incident can identify important lessons, and thus have been included in this collation.

**• Stockpiling disaster-related medications and equipment, and their distribution (EA 17b, d & e, & EA 18 b, d & e)**

**• Required characteristics for mass vaccination and understanding previous controversies (EA 18a)**

**• Public health consequences of technology failures and impact on healthcare facilities (EA 39b & c, & EA 51)**

**• Requirement to optimize the performance of health information at all stages of disaster planning (EA 21a & c, & EA 23a & b), management (EA 22b & 24) and recovery (EA 24)**

**• Awareness of research and developments in health information tools**

**• Communications – inter-agency; two-way with the public; and the role of the media as part of disaster management strategy (EA 28b,c & d)**

**• Health finance system consequences on disaster management effectiveness and coordination**

**• Health management funding issues; implications for national public – and global – health**

**• Disaster preparedness (EA 32), acute response (EA 34) and continuing service requirements (EA 39 & EA 51)**

**• Community preparedness strategies to increase community resilience**

**• Surge capacity development within (EA 33) and beyond healthcare facilities**

**• Issues in adjusting to crisis standards of care and maintaining priorities (EA 32 & EA 36a & EA 38i)**

**• Safeguarding patient’s medical records and medication needs (EA 44a) during disaster**