

REVIEW ARTICLE

## Medical Rehabilitation in Natural Disasters: A Review



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### Abstract

**Objective:** To present an evidence-based overview of the effectiveness of medical rehabilitation intervention in natural disaster survivors and outcomes that are affected.

**Data Sources:** A literature search was conducted using medical and health science electronic databases (PubMed, MEDLINE, Embase, Cumulative Index to Nursing and Allied Health Literature, Cochrane Library, PsycINFO) up to September 2014.

**Study Selection:** Two independent reviewers selected studies reporting outcomes for natural disaster survivors after medical rehabilitation that addressed functional restoration and participation.

**Data Extraction:** Two reviewers independently extracted data and assessed the methodologic quality of the studies using the Critical Appraisal Skills Program's appraisal tools.

**Data Synthesis:** A meta-analysis was not possible because of heterogeneity among included trials; therefore, a narrative analysis was performed for best evidence synthesis. Ten studies (2 randomized controlled trials, 8 observational studies) investigated a variety of medical rehabilitation interventions for natural disaster survivors to evaluate best evidence to date. The interventions ranged from comprehensive multidisciplinary rehabilitation to community educational programs. Studies scored low on quality assessment because of methodologic limitations. The findings suggest some evidence for the effectiveness of inpatient rehabilitation in reducing disability and improving participation and quality of life and for community-based rehabilitation for participation. There were no data available for associated costs.

**Conclusions:** The findings highlight the need to incorporate medical rehabilitation into response planning and disaster management for future natural catastrophes. Access to rehabilitation and investment in sustainable infrastructure and education are crucial. More methodologically robust studies are needed to build evidence for rehabilitation programs, cost-effectiveness, and outcome measurement in such settings.

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Disaster is defined by the World Health Organization (WHO) as “a serious disruption of functioning of a community or a society causing widespread human, material, economic or environmental losses which exceeds the ability of the affected community or

society to cope using its own resources.”<sup>1(p6)</sup> In general, disaster can be classified into the following: natural, technologic (eg, nuclear accidents), and complex humanitarian emergencies (eg, wars). A natural disaster is defined as “a situation or event caused by nature, which overwhelms local capacity, necessitating a request to a national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction and human suffering.”<sup>2(p5)</sup> Natural disasters can be classified by etiology (table 1).

Natural disasters may result in significant loss of life and long-term disability from severe injuries, including spinal cord injury

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**Table 1** Classification of natural disasters

Subgroup	Definition	Main Type
Geophysical	Events originating from solid earth	Earthquake, volcano, mass movement (dry)
Meteorologic	Events caused by short-lived/small- to mesoscale atmospheric processes (spectrum from minutes to days)	Storm
Hydrologic	Events caused by deviations in the normative water cycle and/or overflow of bodies of water caused by wind setup	Flood, mass movement (wet)
Climatologic	Events caused by long-lived/meso- to macroscale processes (in the spectrum from intraseasonal to multidecadal climate variability)	Extreme temperature, drought, wildfire
Biologic	Disaster caused by the exposure of living organisms to germs and toxic substances	Epidemic, insect infestation, animal stampede

NOTE. Adapted from the Centre for Research on the Epidemiology of Disasters.<sup>2</sup>

(SCI), traumatic brain injury, limb amputation, fracture, peripheral nerve injury, crush injury, and psychological impairment.<sup>3,4</sup> It is estimated that >100,000 lives are lost annually as a result of natural disasters.<sup>5</sup> The incidence of morbidity and mortality because of natural disasters varies based on nature and the amplitude of disasters and various human and environmental factors.<sup>6</sup> Natural disasters create a large socioeconomic burden with significant impact on health care costs, social infrastructure, and the environment.<sup>3,4</sup> The number of severe natural disasters has escalated in recent years, threatening WHO sustainable development and poverty reduction initiatives.<sup>7</sup> Natural disaster-related economic losses have increased 10-fold in the last 4 decades, with estimated costs of >\$100 billion annually.<sup>8</sup> Moreover, most natural disasters and disaster-related deaths occur in low-resourced regions (estimated 97%) with significant proportionate economic loss and long-term negative consequences on human development.<sup>4,5</sup>

Saving lives immediately after a natural disaster is an urgent priority. Current data show a significant increase in the numbers of injuries sustained relative to mortality,<sup>6</sup> indicating that medical and nonmedical rehabilitation (ie, restoration of rehabilitation services, infrastructure) are integral to comprehensive disaster management.<sup>9,10</sup> Medical rehabilitation is “a set of measures that assists individuals who experience or are likely to experience disability to achieve and maintain optimal physical, sensory, intellectual, psychological and social functioning in interaction with their environment.”<sup>11(p96)</sup> Primary goals of medical rehabilitation are to improve activity and participation within contextual factors (personal, environmental).<sup>12</sup> This includes management of acute injury, optimization of functional capabilities (including cognitive and neuropsychological function), and social reintegration.<sup>3,4</sup> Further, those with preexisting disabilities are at higher risk of

mortality and additional comorbidities during natural disasters.<sup>6</sup> With an increasing frequency of natural disasters, there is greater focus on the role of rehabilitation in disaster management. The disaster rehabilitation continuum model (fig 1) includes a response phase based on individual clinical needs for acute and core rehabilitation stages (including community-based rehabilitation [CBR]) and comprises response, recovery, mitigation, and preparation phases.<sup>3</sup> The aim is to enhance community health through an organized system of injury, acute care, and longer-term rehabilitation, fully integrated into the public health system of a local community.<sup>3,6,9</sup>

The role of a rehabilitation medicine physician in any disaster event should be integrated into the multidisciplinary field medical team,<sup>6</sup> which should include nursing and allied health disciplines (box 1).<sup>6,12</sup> The critical role of this team after a disaster is directed toward conservation of body function, activity, and participation domains defined by the WHO's *International Classification of Functioning, Disability and Health* (ICF) framework.<sup>6,13</sup> Rehabilitation technical standards (including foreign medical teams), core standards, and guiding principles should be followed for appropriate care.<sup>14</sup> This process is multidimensional and reflects evolving clinical requirements, transitioning from emergency surgical support in established facilities to less acute rehabilitative input for injuries and complications in the community.<sup>4</sup> There is evidence that patients treated in services with rehabilitation facilities after natural disasters have reduced length of hospital stay, fewer complications, and better clinical outcomes compared with patients in centers with no rehabilitation physician supervision.<sup>6</sup>

Disaster health research encompasses the traditional disaster cycle comprising preparedness, response, recovery, and mitigation phases.<sup>15</sup> Most disaster literature addresses recovery, including rehabilitation service infrastructure.<sup>9</sup> Empirical evidence on medical rehabilitation after natural disasters is increasing, and various studies evaluate effectiveness of rehabilitation in survivors; however, most reports are narratives.<sup>3,6,16</sup> Nevertheless, there is a lack of studies systematically analyzing various rehabilitation interventions in a natural disaster settings. The benefit and harms associated with these interventions need to be established comprehensively to guide disaster management teams and policymakers. This review, therefore, systematically assessed the effectiveness, safety, and cost-efficiency of medical rehabilitation intervention in survivors of natural disasters, focusing on approaches that are effective (type of rehabilitation intervention) and outcomes that are affected (functional activity, participation). This study also explored gaps in evidence for medical rehabilitation in this area.

#### List of abbreviations:

<b>ADL</b>	activities of daily living
<b>CASP</b>	Critical Appraisal Skills Program
<b>CBR</b>	community-based rehabilitation
<b>CI</b>	confidence interval
<b>ICF</b>	<i>International Classification of Functioning, Disability and Health</i>
<b>MBI</b>	Modified Barthel Index
<b>NGO</b>	nongovernmental organization
<b>PTSD</b>	posttraumatic stress disorder
<b>QOL</b>	quality of life
<b>SCI</b>	spinal cord injury
<b>WHO</b>	World Health Organization

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