

ERASMUS MUNDUS SCHOLARSHIP PROGRAMME

**Meeting rehabilitation needs of persons with disabilities
(PWDs) in an emergency medical response: a role for
physiotherapy?**

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Care
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2013**

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Master's thesis submitted to the Centre for International Health, University of Bergen in partial fulfilment of the requirement for the degree of Master of Science in International Health.

Faculty of Medicine and Dentistry
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2013

Table of Contents

LIST OF TABLES	4
DECLARATION	5
ACKNOWLEDGEMENTS	6
ABSTRACT	7
ACRONYMS AND ABBREVIATIONS	8
INTRODUCTION	9
BACKGROUND	13
RATIONALE	14
OBJECTIVES	15
METHODOLOGY	16
NARRATIVE REVIEW.....	16
<i>General inclusion and exclusion criteria</i>	20
<i>Specific inclusion criteria</i>	21
FINDINGS AND DISCUSSION	22
1.VIOLENT CONFLICT AND POST-DISASTER SETTINGS: THE EPIDEMIOLOGY OF INJURIES AND PRE-EXISTING DISABILITIES	22
1.1 THE EPIDEMIOLOGY OF DISASTER AND VIOLENT CONFLICT-RELATED INJURIES	23
1.1.1 <i>Injury patterns in a disaster context</i>	23
1.1.2 <i>Injury patterns in a violent conflict context</i>	26
1.2 THE BURDEN OF PRE-EXISTING DISABILITIES IN VIOLENT CONFLICT AND DISASTER SETTINGS	28
2. THE CONCEPT OF EMERGENCY MEDICAL ASSISTANCE	30
2.1 THE PARADIGMS OF “TRADITIONAL” EMERGENCY MEDICAL ASSISTANCE AND PRIMARY HEALTH CARE.	30
2.2 “CONTEMPORARY” EMERGENCY MEDICAL ASSISTANCE: FROM ACUTE EMERGENCY TO LONG-TERM RECOVERY AND PRIMARY HEALTH CARE?	33
3. THE ROLE OF PHYSIOTHERAPY IN EMERGENCY MEDICAL RESPONSES	36
3.1 PHYSIOTHERAPY AND REHABILITATION IN GLOBAL HEALTH	36
3.2 PHYSIOTHERAPY IN POST-DISASTER AND VIOLENT CONFLICT SETTINGS	38
3.2.1 <i>Physiotherapy in post-disaster responses</i>	38
3.2.2 <i>Physiotherapy in post-earthquake Haiti</i>	39
3.2.3 <i>Physiotherapy in violent conflict settings</i>	44
3.3 PHYSIOTHERAPY AND ITS IMPACT ON THE QUALITY OF LIFE	46
4. INCLUSIVE EMERGENCY RESPONSES	49
LIMITATIONS	54
CONCLUSION	56
RECOMMENDATIONS.....	58
BIBLIOGRAPHY	59

List of Tables

Table 1. Tracking of literature search for chapter 1: Violent conflict and post-disaster settings: the epidemiology of injuries and pre-existing disabilities.....	17
Table 2. Tracking of literature search for chapter 2: The concept of emergency medical assistance.....	18
Table 3. Tracking of literature search for chapter 3: The role of physiotherapy in emergency medical responses.....	18
Table 4. Tracking of literature search for chapter 4: Inclusive emergency responses.....	19

Declaration

Where other people's work has been used (either from a printed source, internet or any other source) this has been carefully acknowledged and referenced in accordance with departmental requirements.

The thesis entitled "Meeting rehabilitation needs of persons with disabilities (PWDs) in an emergency medical response: a role for physiotherapy?" is my work.

Name: Stefanie Schnabel

Signature:

A handwritten signature in black ink, appearing to read 'Stefanie Schnabel', written in a cursive style.

Date: 30 August 2013

Word Count: 14140

Acknowledgements

First and foremost, I would like to thank the Erasmus Mundus Scholarship Program for this unique opportunity to study for my Master's degree at two different Universities, University College London (UCL) and University of Bergen (UiB). It was a fantastic experience, which moved my academic life as well as expanded my social circle onto a global level. I met so many interesting people from different backgrounds and countries and I had the pleasure to study with them.

A big thanks goes to my parents and my sister who supported me throughout the year and helped me to move between countries. I also want to thank my friends Juliane, Saf and Cila as well as Dr. Landry for proofreading my work.

A very special thanks goes to my supervisor Ingvild Fossgard-Sandøy and my co-supervisor Graziella van den Bergh for the great guidance through my thesis. I very much appreciate that you gave me so much of your time to discuss my work. I also want to say thanks to the administrative staff at UCL, Paloma and Alison and at UiB, Borgny and Linda. When academic work was particularly challenging, Alison and Paloma encouraged me not to give up.

I also want to thank all my patients whom I have met over the past 10 years of my career as a neurological physiotherapist. Without that experience I would have not been able to do what I do. I want to mention two friends of whom I have learned the most, that is, Kristina, my friend with cerebral palsy from Bulgaria and Linda who has multiple sclerosis (MS) from London.

Finally, I want to say thanks to all my friends in Glasgow, London, Stuttgart, Berlin, Los Angeles, Hiroshima, Köln, Ibiza and Bergen who supported me through the degree.

Abstract

Objective: The study explores the potential role of physiotherapists (PTs) in violent conflict and post-disaster responses and discusses physical rehabilitation within the context of “contemporary” emergency medical assistance (EMA) and in the light of the *Convention on the Rights for Persons with Disabilities* (CRPD). **Background:** Rehabilitation needs of persons with pre-existing disabilities and disaster-related acquired disabilities have rarely been addressed in emergency medical responses. With the CRPD that came into force in 2008 and after the earthquake in Haiti in 2010, the humanitarian organization started to involve PTs who dealt with the rehabilitation needs of persons with disabilities (PWDs) and this seemingly indicated a shift from only focusing on the acute emergency medical response to including long-term recovery. **Methods:** This study is a narrative review that synthesizes literature searched in the field of the allied health professions, medicine and social science in the databases PubMed, Web of Knowledge and CINAHL. **Discussion:** An examination of injury pattern in post-disaster and violent conflict settings and medical needs associated with the recent increase in non-communicable diseases (NCDs) indicate a need to include physical rehabilitation in emergency medical responses. The emphasis is on discussing whether rehabilitation needs have been met for PWDs post-disaster and in situ violent conflicts. The discussion of physiotherapy (PT) in emergency medical responses in the light of the CRPD provides ethical arguments for and against an inclusive emergency response. **Conclusion:** Physical rehabilitation should be part of mainstream emergency medical responses in future post-disaster and violent conflict settings. An inclusive humanitarian approach can be achieved by including PWDs and PT into disaster response planning and preparedness.

Keywords: physiotherapy, rehabilitation, disabled persons, relief work, disaster, conflict, emergency medicine, human rights

Acronyms and Abbreviations

ADLs	– Activities of daily living
BI	– Barthel Index
CBR	– Community-based rehabilitation
CBM	– Christian Blind Mission
CRED	– Center for Research on the Epidemiology of Disaster
CRPD	– Convention on the Rights for Persons with Disabilities
DALYs	– Disability-Adjusted Live Years
DPT	– Doctor of Physiotherapy Program
DVT	– Deep Vein Thrombosis
EMA	– Emergency medical assistance
ERW	– Explosive remnants of war
GHI	– Global health initiative
HCRI	– Humanitarian Conflict and Response Institute
HHHI	– Healing Hands for Haiti International
HI	– Handicap International
HRQOL	– Health-related quality of life
HIC	– High-income country
IBR	– Institutional-based rehabilitation
ICRC	– International Committee of the Red Cross
IED	– Improvised explosive devices
IYDP	– International Year of Disabled Persons
LIC	– Low-income country
LMICs	– Low- and middle-income countries
MDG	– Millennium Development Goals
MeSH	– Medical Subject Headings
MIC	– Middle-income country
MSF	– Medecins Sans Frontieres
NCD	– Non-communicable disease
NGO	– Non-governmental organization
OEF	– Operation Enduring Freedom
OIF	– Operation Iraqi Freedom
OT	– Occupational Therapy
PHC	– Primary health care
P&O	– Prosthetics and Orthotics
PT	– Physiotherapy
PTs	– Physiotherapists
PWDs	– Persons with disabilities
QOL	– Quality of life
SLT	– Speech and Language Therapy
SCI	– Spinal cord injury
TBI	– Traumatic brain injury
UN	– United Nations
UNDRC	– United Nations Disaster Relief Coordinator
UNICEF	– United Nations Children’s Fund
WCPT	– World Confederation for Physical Therapy
WRD	– World Report on Disability
WHO	– World Health Organization
WWII	– World War Two

Introduction

The preamble of the *Convention on the Rights for Persons with Disabilities* (CRPD) describes disability as a concept that evolved as a consequence of environmental and attitudinal barriers, which restricts the full participation of persons with impairments on an equal basis with others in our society (Women's Refugee Commission, 2008). The *World Report on Disability* WRD (2011) describes disability as an umbrella term, which includes concepts of impairment and limitations in activity and participation of the individual in its specific environment. Disability is diverse and includes the child born with a physical or intellectual disability, the soldier with a war injury, persons with invisible sensory problems, middle-aged persons with arthritis and the older person with diabetes mellitus. Of the estimated one billion persons living with disabilities worldwide, 80 percent live in low-and middle-income countries (LMICs) (WRD, 2011). The number also includes those who have impairments due to age (Chan and Zoellick in WRD, 2011).

The WRD (2011) described rehabilitation in the context of persons with disabilities (PWDs) as measurements that assist PWDs in order to achieve and maintain the best function as possible, to attain self-dependence and to be able to interact with their environment. Physiotherapy (PT), Occupational Therapy (OT) and Speech and Language Therapy (SLT) are allied health professions that are primarily part of medical rehabilitation. Physiotherapy (PT) was last defined by the World Health Organization (WHO) in 1969, as the “*art and science*” of providing exercise programs for muscle strengthening, stretching and coordination as well as work with light, hydrotherapy, heat and cold, and providing massage and manual tests to estimate the muscle strength, nerve supply, functional abilities, range of joint motion and measure vital capacities. More recently, the *World Confederation for Physical Therapy* (WCPT) noted that no global definition for PT exists. It gives the

responsibility to national PT associations to define the role and scope of practice of physiotherapists (PTs) according to their national health care needs and practices (WCPT, 2011). The WCPT (WCPT website, no page number, 2013) only notes that “*physiotherapists are the specialists in human activity and movement*” and provide service for people at any stage of life to improve the quality of life (QOL) in the sphere of physical, emotional, psychological and social wellbeing. In LMICs, the ratio of PTs to population can be as low as one physiotherapist for 530,375 persons in need (WCPT, 2013). In most cases, family members are the only ones who provide care for PWDs. A study on physical rehabilitation for people with spinal cord injuries (SCIs) post-disaster found that physiotherapists, together with physiatrists and social workers, are the most needed in the rehabilitation of people with disaster-related disabilities (Rauch, et al., 2011). On that account, the focus of this study will be on the provision of PT in emergency medical responses.

Although physical rehabilitation has its roots in the military, and both disasters and violent conflicts cause acute and long-term disability, physical rehabilitation has historically rarely been included in humanitarian medical responses. This may be partly related to the fact that a disaster is, as the Center for Research on the Epidemiology of Disasters (CRED) defines (2012, p. 7) “*an unforeseen and often sudden event that causes great damage, destruction and human suffering*” and “*which overwhelms local capacity, necessitating a request to a national or international level for external assistance*”. Disasters can have different causes, which include: geophysical, meteorological, hydrological, climatological and biological (CRED, 2012), or be man-made. The latter was introduced as “complex humanitarian emergencies” in humanitarian aid. The term describes situations of armed conflict, food shortage, a collapsing infrastructure and public health system and a large refugee population (Brennan and Nandy, 2001; Zibulewsky, 2001). According to Brennan and Nandy (2001),

“complex humanitarian emergencies” cause more mortality and morbidity through disease, malnutrition and violent trauma than other types of disasters. In a disaster response resources are often distributed according to the needs of the majority of the population. Priority is often not given to the needs of PWDs who are a minority group. In disaster responses, PWDs are more likely to be left behind, refugee shelters are inaccessible and humanitarian organizations view the health needs of PWDs as “complex medical” needs (UN enable, 2013; Mirza, 2011; Kett and Van Ommeren, 2009; Reilly, 2010).

The *SPHERE* handbook (2011) describes the core standards of disaster relief, which include: water supply; sanitation and hygiene promotion; food security and nutrition; shelter; settlement and non-food items; and health action. According to the *SPHERE* (2011) guidelines, essential health action consists of: the control of communicable diseases, child health, sexual and reproductive health, injury care, mental health and care for non-communicable diseases (NCDs). It includes health-related rehabilitation for post-operative injury and NCDs in its guidelines and is thus in line with the CRPD (SPHERE, 2011). The priorities in disaster responses cannot be defined universally but need to be assessed according to the specific needs of the population (WHO, 2002).

The CRPD was adopted in 2006 and put into force in 2008. It created the legal framework for PWDs to be integrated into all spheres of life, including disasters, emergencies and conflict. Article 25 of the CRPD describes that PWDs should have equal access to health services, in particular to physical rehabilitation, in all contexts. Article 11 (2006, p. 10) states that nation states have the obligation in accordance with international humanitarian law and international human rights law, to intervene in order to “... *ensure the protection and safety of persons with disabilities in situations of risk, including situations of armed conflict, humanitarian*

emergencies and the occurrence of natural disasters”. The commitment to include PWDs in disaster response is further stated in Article 4, which says that nations are obliged to protect PWDs from discrimination by promoting their human rights. Article 32 supports the view that international cooperation, including international development programs, should have an inclusive approach and be accessible for PWDs (CRPD, 2006). To date, 132 nations ratified the CRPD and 155 countries signed the convention (UN Enable, 2013).

Since 2008, many non-governmental organizations (NGOs) that do not work exclusively with PWDs, have endorsed the CRPD. The *Women’s Refugee Commission* published *Disabilities among refugees and conflict-affected populations* in 2008, the University of Oxford Center for Refugee Studies published the *Forced Migration review on Disability and Displacement* in 2010 and the *United Nations Children’s Fund Report (UNICEF) on Children with Disabilities 2013* devoted two chapters to children with disabilities in a humanitarian crisis. With the CRPD and the WRD, the foundations have been laid to follow an inclusive approach in humanitarian settings, which is supposed to encompass the needs of PWDs in all stages of an emergency response. Within that inclusive humanitarian approach falls the need to provide physical rehabilitation service to PWDs. As it is stated in the WRD (2011, p. 108): “*Conflict and natural disaster cause injuries and disabilities and make people with existing disabilities more vulnerable... Foreign aid should also include trauma care and rehabilitation services*”.

Background

The Millennium Development Goals (MDGs), which were set in 2000, address urgent development issues for populations who live in poverty and are marginalized. However, PWDs were not explicitly mentioned in the MDGs (Groce and Trani, 2009). Not addressing the needs of PWDs within development makes it even harder to implement measures of inclusion for PWDs in post-disaster and violent conflict settings. Additionally, it has been shown that even in peacetimes in low-income countries (LICs), health care inequalities for PWDs exist on several levels, including access, financing and delivery (WRD, 2011). The WRD (2011) notes that although, PWDs have a right to receive assistance and care during conflict and after disasters, the needs of PWDs are often not considered because humanitarian organizations have little awareness of the existence of PWDs in emergency settings or they do not know how to respond to their needs. This is the case for both persons with disaster-unrelated and persons with disaster-related disabilities.

It has been observed that studies of injuries in violent conflict or post-disaster settings focus mainly on mortality, although disaster and conflict-related injuries are recognized as main contributors to disability, the outcome of morbidity has been neglected (WRD, 2011). It is important to note that physical rehabilitation is essential for some PWDs, if they are to take an active part in education, the work force and social life. Unmet rehabilitation needs may affect the person's independency in ways such as, cause deterioration in health, increase the need for assistance from others and reduce the QOL. This can have a negative impact on the social and financial situation of the individual, their families and the community as a whole (WRD, 2011). The positive effects of physical rehabilitation on permanent disabilities are already established in high-income settings and the military services of high-income countries (HICs) including PTs in their medical teams. Before examining the need for physical rehabilitation

after traumatic injuries the epidemiology of such injuries need to be explored. This will allow a discussion on whether PT should be included in early medical intervention to reduce the risk of complications and permanent disabilities.

Rationale

LMICs are more affected by disaster, violent conflict and inadequate medical care than HICs (UN Enable, 2013). In many LMICs, health-related rehabilitation such as PT is not established as a profession. Physical rehabilitation is often only provided by NGOs and most PWDs do not receive rehabilitation. As to my knowledge, rehabilitation responses after disasters and violent conflicts, before and after the CRPD came into force, have not been compared in detail. It is important to discuss physical rehabilitation in humanitarian crisis settings in the light of the CRPD and to see whether the rights of PWDs are protected in this context. The study will examine the potential role of PT in a humanitarian medical response from four different angles: the injury pattern of conflict and disasters will determine whether there is a need for physical rehabilitation; the ability of emergency medical assistance (EMA) to meet the need for persons who survived an injury with permanent disability and those who have pre-existing disabilities; empirical data of PT involvement in emergency responses and its impact on the QOL for PWDs; and finally, the legal frame of the CRPD, promoting inclusive humanitarian responses, which encompass meeting health care and rehabilitation needs of PWDs. Within the limits of this study, the focus will be on the role of PT as a health-related intervention in disaster responses and it will only examine the needs of persons with permanent physical disabilities.

Objectives

The study has the primary objectives to:

- Examine the epidemiology of injuries and disabilities in violent conflict and post-disaster to determine rehabilitation needs
- Discuss the conceptual frame of EMA in the light of rehabilitation needs of PWDs
- Examine experiences with PT to address rehabilitation needs and how PT impacts on the QOL of PWDs in violent conflict and post-disaster settings

The secondary objective is to:

- Address whether the rights of PWDs in the field of health, as formulated in the CRPD, are met in “contemporary” emergency medical responses

Methodology

Narrative review

This study is a literature review in a narrative style, which examines the role of PT in humanitarian medical responses. A narrative review was thought to be the most appropriate methodology because it allows scope to discuss evolving concepts and controversies and to synthesize the literature to draw a conclusion from the gathered evidence (Collins and Fauser, 2005; Green, et al., 2006). The databases PubMed, Web of Knowledge, and CINAHL were searched for relevant literature. Google, Google Scholar and websites of NGOs, working in disaster relief, were searched for grey literature. The University of Bergen (UiB) Library catalogue was searched for books and e-books. The literature search focused on four different topics and an electronic literature search was conducted for each database between 6th May 2013 and 5th June 2013. Peer-reviewed literature and grey literature that was published from 1969 through 5th June 2013 and which was available online was eligible. The year 1969 was chosen because the WHO published its second, which is also the latest report on medical rehabilitation in that year and provided a definition of physiotherapy. The following medical subject headings (MeSH) were used for the search: physical therapy (speciality), physiotherapy (speciality), rehabilitation, disabled persons, disasters, conflict, emergency medicine, relief work and human rights. Other search terms that are not part of the MeSH terminology but are more focused were used too. Those search terms include: persons with disabilities, rehabilitation needs, healthcare needs, earthquake, physical rehabilitation, quality of life, global health, emergency response, disaster response, humanitarian rehabilitation, rapid rehabilitation disaster response, war-injury, combat-injury, Iraq, Afghanistan, epidemiology of disability, emergency medical assistance, humanitarian medical response and emergency medical response. Afghanistan and Iraq were used as search terms in order to find information about modern war injuries and physiotherapy involvement in the military.

A more semi-systematic approach to the literature search was used for the chapters one to three, where pragmatic decisions had to be made on the combinations of the search terms due to the large amount of literature found on the databases. For the fourth chapter, grey literature provided the main source for the discussion. Tables one to four show the search in detail and the different combinations of MeSH terms and search terms used in the search query text. Additionally, the reference lists of core articles were searched for relevant papers and five studies were included that way.

Table 1: Tracking of literature search for chapter 1: Violent conflict and post-disaster settings: the epidemiology of injuries and pre-existing disabilities

Search term	PubMed	Web Knowledge of	CINAHL	Total
“war injury” OR “combat injury” AND “Iraq” OR “Afghanistan”	68	57	13	138
“epidemiology of disability” AND “conflict”	80	194	20	294
“rehabilitation needs” OR “healthcare needs” AND “emergency response” OR “emergency medicine” OR “disaster response”	69	5	2	76
Total	217	256	35	508

Table 2: Tracking of literature search for chapter 2: The concept of emergency medical assistance

Search terms	PubMed	Web Knowledge of	CINAHL	Total
“emergency medical assistance” OR “humanitarian medical response” OR “emergency medical response” AND “physical therapy” OR “physiotherapy” OR “physical rehabilitation”	91	0	3	94
“humanitarian rehabilitation” OR “rapid rehabilitation disaster response”	121	1	1	123
“physical therapy” OR “physiotherapy” AND “disaster response” OR “emergency response”	4	0	4	8
Total	216	1	8	225

Table 3: Tracking of literature search for chapter 3: The role of physiotherapy in emergency medical responses

Search terms	PubMed	Web Knowledge of	CINAHL	Total
“physical therapy” OR “physiotherapy” OR “physical rehabilitation” AND “disabled persons” OR “persons with disabilities” AND “disasters”	4	10	0	14
“physical therapy” OR	196	45	23	264

“physiotherapy” AND “disasters” AND “quality of life”				
“physical therapy” OR “physiotherapy” AND “global health”	324	0	7	331
“disaster” AND “relief work” AND “physical rehabilitation” OR “physical therapy” OR “physiotherapy”	7	4	0	11
“physical therapy” OR “physiotherapy” OR “physical rehabilitation” AND “earthquake”	73	24	7	104
	604	83	37	724

Table 4: Tracking of literature search for chapter 4: Inclusive emergency responses

Search terms	PubMed	Web Knowledge	of CINAHL	Total
“human rights” AND “disabled persons” AND “disaster” OR “conflict”	35	10	2	47
Total	35	10	2	47

A total of 1504 peer-reviewed studies were found in the databases, of which 1307 were not relevant to the topic according to the title, not freely accessible or duplicates. Of 197 studies, the abstracts were read and considered for the review. Of the remaining 197 studies, 118 were excluded and 84 (including the five studies from the reference lists) included in the findings and discussion section based on the inclusion and exclusion criteria.

General inclusion and exclusion criteria

Peer-reviewed articles and grey literature were included when they met all of the following criteria:

1. All types of studies (qualitative, quantitative, case studies, experience reports, systematic reviews, narrative reviews, editorials) were included in the narrative when they had a component about physical rehabilitation in a violent conflict or post-disaster setting; evaluated the rehabilitation outcome for war- and disaster-related injuries or evaluated the rehabilitation response after disaster and violent conflict settings
2. The population (all ages) with permanent disaster-related and disaster-unrelated physical disabilities were considered
3. Studies in LMICs and HICs
4. Literature in English, German and French

Studies were excluded according to the following criteria:

1. Studies which were not accessible in full length through UiB and University College London (UCL) libraries
2. Community-based rehabilitation (CBR) exclusively discussed in the context of development

Specific inclusion criteria

Peer-reviewed articles and grey literature were included when they met the following criteria:

Chapter 1. “Violent conflict and post-disaster settings: the epidemiology of injuries and pre-existing disabilities”

- Studies of injury pattern of different types of natural disasters
- Modern conflict setting, which are characterized by the use of explosive devices as they changed the pattern of injuries

Chapter 3. “The role of physiotherapy in emergency medical responses”

- Studies in non-disaster settings which discuss physiotherapy for PWDs in the context of quality of life

Chapter 4. “Inclusive emergency responses”

- Literature on the rights of PWDs which was published after the adoption of the CRPD in 2006

Findings and Discussion

1. Violent conflicts and post-disaster settings: the epidemiology of injuries and pre-existing disabilities

Natural disasters and political conflict have an impact on the morbidity and mortality of a population. Long-term disability following a natural disaster and political conflict can have a burdening impact on the individual, community and society (Zhang, et al., 2013; Kerridge, et al., 2012). Long-term effects of conflict on mortality and life expectancy have been acknowledged but no study has looked at the long-term impact of conflict on disability and non-fatal outcomes (Kerridge, et al., 2012). Additionally, the burden of morbidity and disability after a natural disaster is poorly described in the literature (Kerridge, et al., 2012). Overall there is a lack of documentation of war-related injuries among civilians and therefore it is difficult to estimate how many people are affected by conflict and what their long-term outcomes are. I will also focus on the burden of non-communicable diseases (NCDs) in the context of conflict and post-disaster settings as recent literature suggests, conflict and disaster trigger an increase of NCDs. The aging population and the increase of wealth in middle-income countries (MICs) leads to higher rates of persons with NCDs and those countries are as well more often affected by disaster and conflict than HICs (Kerridge, et al., 2012; Mirza, 2011; Durham and Hoy, 2013; Lopez, et al., 2006). This chapter aims to describe the epidemiology of injuries in violent conflict and post-disaster that leads to permanent disability and the epidemiology of pre-existing disabilities in that setting. I will look at the injury pattern in order to examine the necessity to include physical rehabilitation in humanitarian responses.

1.1 The epidemiology of disaster and violent conflict-related injuries

1.1.1 Injury patterns in a disaster context

Scientific documentation of injury pattern after natural disasters was carried out after the earthquakes in Pakistan in 2005, the Sichuan earthquake in China in 2008, Indonesia in 2009 and Haiti in 2010. Indonesia, Pakistan and China are MICs whereas Haiti is a LIC (World Bank, 2011). A study by Zhang, et al. (2012) found that fractures were the most common injuries among earthquake-related injuries in the Sichuan earthquake in 2008. However, the study failed to distinguish between fractures of different body parts. Thus it is difficult to conclude what the needs for surgical care and rehabilitation were since these differ enormously for fractures of, for example, the vertebrae and the upper extremity. In the Indonesian earthquake in West Sumatra in 2009, fractures to both upper and/or lower limbs were reported as the most frequent (72%), followed by fractures of the lower limb (58%), face, head and neck (26%), upper limb (23%) and the vertebrae column (18.6%) (Sudaryo, et al., 2012). The most common earthquake injuries reported in Haiti were laceration and bleeding wounds, fractures, SCIs, internal head injuries, internal organ injury and neck or back injuries (Doocy, et al., 2013; Iezzoni and Ronan, 2010; Etienne, et al., 2010; Sullivan, et al., 2010). Winter, et al. (2011) note that most patients with injuries to air-filled organs, severe bleeding and severe traumatic brain injury (TBI) did not survive the first hours because of the lack of medical relief.

After the earthquake in Pakistan in 2005, with a death toll of 73,338 and an injury rate of 128,309, 741 cases with SCI were registered, followed by 713 cases with amputations as a cause of permanent disability (Mallick, et al., 2010). Amputations are common after earthquakes as it is often a consequence of crushed limbs and mismanagement of fractures and open wounds (Sudaryo, et al., 2012). SCI requires surgical emergency and special care to

avoid additional neurological injuries. The rate of SCI patients is often increased when patients with spinal fractures are transported in ordinary vehicles and lifted without supporting the injured spine (Rathore, et al., 2008). In Pakistan paraplegia (paralysis of both lower limbs) was found in 89% of SCI patients and no tetraplegia (paralysis of upper and lower limbs) was detected (Rathore, et al., 2008). Those numbers are consistent with another study of the epidemiology of SCI after the earthquake in Pakistan, which shows that 71% of 741 SCI patients developed paraplegia (Mallick, et al., 2010). The study of patients with SCIs after the Sichuan earthquake in China notes that 43% of the SCI patients had thoracolumbar lesions, 29% had thoracic injuries and 9% cervical lesions (Li, et al., 2012). All three studies found that females and the age group 18 – 40 were the most affected by SCI (Rathore, et al., 2008; Mallick, et al., 2010; Li, et al., 2012). In Haiti, the number of people with SCIs was more difficult to estimate because of the lack of local surveillance systems and research. It has been estimated that 200 people were affected (Landry, 2010) and other international research teams note that of the overall population, 18.4% had fractures and 8.8% had head and neck injuries (Doocy, et al., 2013), without specifying the location or degree of injury. A pilot project on rehabilitation needs for people with SCIs post-earthquake looked at 18 people with SCIs and found predominantly thoracic lesion followed by lumbar and cervical injuries (Rauch, et al., 2011), which is consistent with studies from other earthquakes.

The epidemiology of amputations has been investigated after the earthquakes in China, Indonesia and Haiti. A study in China found that the majority of amputations were below the knee, followed by amputations of digits and of the lower limb above the knee, both one-sided and on both sides (Li, et al., 2009). In Indonesia it was observed that the majority of injuries were fractures to upper and lower extremities (81%), which resulted in 9% having amputations (Sudaryo, et al., 2012). The number of people who underwent amputations after

the Haitian earthquake is unclear. It was estimated that over 1500 people had an amputation of one or more limbs (Knowlton, et al., 2011; Landry, et al., 2010; O'Connell and Ingersoll, 2012). Of those amputations observed by research teams, lower extremities amputations above the knee were the most common, followed by amputations below the knee and upper limb amputations (O'Connell and Ingersoll, 2012). Redmond, et al. (2011) looked at the data of seven surgery providers and found that 1,476 amputations had been carried out, with the majority being lower extremities amputations.

Many studies of the mentioned earthquakes have concentrated on the care and rehabilitation of SCIs and a few have highlighted the need for rehabilitation for people with upper limb and lower limb amputation as well as fractures (O'Donnell and Ingersoll, 2012; Zhang, et al., 2012). SCI and amputation have the greatest impact on mobility and ambulation, which affects the activities of daily life (ADLs) and QOL heavily. Persons with neurological or trauma injuries thus require early rehabilitative input to re-learn how to adapt their environment to their disability. Persons with a fracture of the vertebrae column or fractures of both lower and/or upper limbs need more intensive physical rehabilitation input (including OT) than a person with a single limb fractures. The latter two could be seen as short-term disabilities as their rehabilitation input is determined by the healing process, whereas for a person with a fractures vertebrae column, which could become a permanent disability, physical rehabilitation may be indicated long-term.

1.1.2 Injury patterns in a violent conflict context

In armed conflicts, war-related injuries are determined by the use of the type of weapons or explosive devices (Cukier, 2008). I will only look at injury patterns in modern violent conflicts because the nature of weapons used in armed conflicts has changed since both the World Wars, resulting in a changing epidemiology of injuries. Willy, et al. (2011) note that during World War Two (WWII) injuries of the upper and lower extremities were equally common, whereas in modern conflicts injuries to the lower extremity is predominant due to wider use of antipersonnel mines, fragmenting munitions, e.g. mortars, bombs and shells, artillery, improvised explosive devices (IED) and rocket-propelled grenades (Sayer, et al., 2009; Cukier, 2008).

Two papers have described the injury pattern leading to permanent disability in Afghanistan and Lebanon. In South Lebanon, after the attack “Grapes of Wrath” in 1996, among the study population the most disabling injuries were those to the lower extremities and the abdomen, caused by explosives (Sibai, et al., 2000). The literature review on war-related injuries among Afghan refugees in Pakistan found that the majority of injuries were caused by explosives, with injuries to the extremities as the most common and injuries to the head as the second most common (Nasir, et al., 2004). Mortality, war-related injuries and disabilities are well documented for combatants from the United States (U.S.), the United Kingdom (UK) and Germany who served in the wars in Afghanistan (Operation Enduring Freedom) and in Iraq (Operation Iraqi Freedom) (U.S. and UK only). Most injuries resulted from explosives according to studies on combat injuries of Operation Iraqi Freedom (OIF) between 2003 and 2010, and Operation Enduring Freedom (OEF) in Afghanistan since 2001 (Melcer, et al., 2013). One paper notes that 88% of injuries to combatants are caused by blasts from explosive devices (Warden, 2006). The U.S. Casualties Statistics on OIF and OEF show that

the majority of war-related injuries of combatants were TBIs, counting for 253,330 cases between January 2000 and August 2012. 77% were mild TBIs, 17% were categorized as moderate TBIs, and 2% were severe TBIs. Amputations of lower and upper extremities counted for a total of 1,715, with a majority being lower extremities amputations (Fischer, 2013). TBIs are claimed to be the “signature injury” for the military operations in Iraq and Afghanistan due to blasts waves according to several studies (Willy, et al., 2008; Sayer, et al., 2009; Warden, 2006). However, these numbers are not consistent with findings from other studies, which have shown that injuries to the extremities, in particular the lower extremities are the most frequent due to explosions (Pasquier, et al., 2011; Masini, et al., 2009). One study examined SCIs among combatants of the OIF and OEF and found that 29 out 390 injured soldiers (7.4%) sustained a combat-related SCI, which resulted from explosive devices (Schoenfeld, et al., 2012).

Lower limb amputations are documented as the main disabling injury among civilians after conflicts in areas that are contaminated with land mines. The post Indo-China War in 1975 in Cambodia and Lao People Democratic Republic left a large amount of land mines and other explosive remnants of war (ERW). A systematic literature review examined the injury pattern of land mines in Lao People Democratic Republic and Cambodia and found the following: amputation of lower extremities was the most common, multiple laceration the second most common and upper extremity amputation, blindness and head injury were the third most common injuries. The study, however, was limited by the scarcity of data available (Durham and Hoy, 2013). Levy and Sidel (2008) state that in post-war Cambodia it is estimated that 1 in 236 people is an amputee, which is related to land mine explosions. It is estimated that one-third of Ethiopian soldiers were disabled after the civil war in 1991 and more than 40,000 civilians lost one or more limbs due to landmines (Levy and Sidel, 2008). Willy, et al. (2008)

note that 6% of U.S. combatants in the OIF were amputees, caused by IEDs. Compared to previous conflicts, the incidence rate of amputation doubled (Willy, et al., 2008). The nature of injury is determined by the setting and the type of weapons used (Polly Jr. 2003 in Willy, et al., 2011) but the review of modern wars where injury patterns are well documented shows that TBIs, amputations and SCIs are among the most prevalent of war-related injuries, potentially leading to a permanent disability. These injuries indicate a need for early intervention of physical rehabilitation (including OT and SLT) in order to minimize complications, which could lead to more severe permanent disabilities.

1.2 The burden of pre-existing disabilities in violent conflict and disaster settings

It is difficult to determine how many PWDs live in areas that are prone to armed conflicts and natural disasters because often PWDs are invisible due to social constructs and a lack of disabled friendly infrastructure. On that account, PWDs are also at greater risk to be neglected during an emergency situation (Shivij, 2010). The WRD acknowledges the difficulty to estimate the prevalence of PWDs on a national level in LMICs. Additionally, different definitions of disability are used in different cultures and a low prevalence of disability in LICs may be due to the fact that the term disability is used in a narrow sense, whereas in HICs it is higher because people with NCDs are included in the definition (WRD, 2011).

The *Global Burden of Disease* study in 2004 found that the risks of NCDs are higher in LMICs than in HICs. Although NCDs were associated with HICs because of ageing populations, the increase in NCDs in LMICs suggests that the risk of the burden of cardiovascular disease, ischemic heart disease and stroke is higher in those countries, when the age distribution is controlled for through the age standardization of disability-adjusted life

years (DALYs) (WHO, 2008). Mirza (2011) and Spiegel, et al. (2010) suggest that among conflict-affected countries, in particular MICs, an ageing population means that there is a need to include services for chronic diseases in disaster and conflict settings. Several studies note that the burden of morbidity and mortality of people with NCDs may increase during conflict or disaster, as they are more vulnerable to stress during an emergency situation due to for example, the lack of supply of medication (WHO, 2011; Chan and Kim, 2011; Reinhardt, et al., 2011; Spiegel, et al., 2010). Kerridge, et al. (2012) claim that people who experienced armed conflict have a greater risk of mortality and disability due to an exacerbation of NCDs, such as cardiovascular disease. After the Sichuan earthquake in 2008, 30% admissions to the hospital were related to an exacerbation of NCDs as a direct effect by the earthquake (Chan and Kim, 2011). One study in Japan found that people with existing non-communicable diseases were at greater risk of physical symptoms such as insomnia, chest pain and cold as well as mental stress compared to people with NCDs who did not live through the earthquake (Mori, et al., 2007). There is limited data on the prevalence of persons with pre-existing disabilities in violent conflict- or post-disaster settings, as they are not a priority in health and population research (Rockhold and McDonald, 2009).

2. The concept of emergency medical assistance

Natural disasters and man-made disasters affect mostly LMICs but natural disasters occur in HICs too. EMA however differs enormously between HICs and LMICs. Medical responses to disasters are determined by the existence of a well-functioning primary health care (PHC) system, a system for emergency preparedness and disaster reduction, and the emergency response and humanitarian action that countries are able to receive by the international community. It is important to distinguish between PHC, EMA and emergency preparedness, as each has a different paradigm. In this chapter, the concept of EMA is discussed in close relation to PHC and it will show that despite the different paradigms of PHC, EMA, emergency preparedness, they cannot be fully separated in many real-life situations. This is seen in programs from Medecins Sans Frontieres (MSF) for example, whose strategy and philosophy is based on EMA but who also provide PHC and who establish rehabilitation centers.

2.1 The paradigms of “traditional” emergency medical assistance and primary health care

In the literature EMA is also called emergency medical response, emergency medicine, disaster medicine, humanitarian medical response and humanitarian medical assistance (MSF, 2013; Van Damme, et al., 2002; Waeckerle, et al., 1994). With a weak public health system in place in complex humanitarian emergencies EMA is often provided by foreign relief organizations to the population in need. Traditionally, disaster medicine has the intention to provide medical assistance in a disaster setting on the utilitarian principle “the greatest good for the greatest number” (Waeckerle, et al., 1994). This principle means that the distribution of resources is guided by the benefit of the majority of the people in need and therefore, does

not meet the needs of those who have needs outside the mainstream. Disaster medicine has its roots in war traumatology and surgery and has developed into a more comprehensive management of disasters, which evolved with medical knowledge and research (Dara, et al., 2005). The paradigm of EMA places physical survival as its main goal as it is the foundation for further human development and mobilizing all resources available to achieve the goal of saving as many lives as possible (Van Damme, et al., 2002). Effectiveness of the interventions is prioritized in emergency situations with a tendency to jeopardize autonomy and independence. It has been noted that the relationship between medical professionals and those people in need develop into a paternalistic arrangement within EMA. A further characteristic of EMA is that cure is prioritized over care and autonomy (Van Damme, et al., 2002).

The Alma Ata conference in 1978 defined PHC as a holistic health intervention, including prevention, cure, rehabilitation and community-based interventions into its program (Alma-Ata, 1978). The *Alma-Ata Declaration* was the first step to mobilize for social justice and the right to health care for all. The *World Health Report 2008 on The Changing Health Problems*, addressed new patterns of disease such as the rise of NCDs on a global scale (WHO, 2008). In HICs, chronic diseases, as a public health problem have been incorporated into emergency preparedness even before the *World Health Report*. One example is hurricane Katrina in 2005 in the U.S., where studies have shown that of those people visiting a clinic immediately after the disaster, 33% had chronic health problems, which were exacerbated with the disaster (Miller and Aquilla, 2008; Chiou-Tan, et al., 2007). The example of hurricane Katrina bridges a gap between providing emergency response in order to save lives and to maintain PHC services to those with chronic health problems (Redwood-Campbell, et al., 2011).

An acute emergency response is bound to a time limit and three phases have been described in complex emergencies and natural disasters. Governments, humanitarian organizations and other stakeholders operate during these phases to provide the most efficient support. According to Redwood-Campbell and Riddez (2006), and Burkholder and Toole (1995), the first phase is the acute emergency phase from zero to one month post-disaster, the second phase is the late emergency phase, from one month to six months after the disaster and the third phase is the post-emergency phase, which lasts for more than six months after the event. More recent literature suggests that an acute emergency phase lasts only a few days after the disaster, as lives can be saved only in those first few days and after that, health professionals should concentrate on community needs and PHC capabilities (Redwood-Campbell, et al, 2011). The timeframe in emergency settings is an important factor, as experience reports from multiple medical professionals, including surgeons, neurologists, anesthesiologists and orthopedics suggest, most surgeries on crushed limbs, fractures, SCIs and TBIs were performed within the first two weeks after the earthquake in Haiti, which were then followed by wound care and closure prioritization (Etienne, et al., 2010; Winter, et al., 2011; Sullivan, et al., 2010; Iezzoni and Ronan, 2010). The latter two priorities would fall under the responsibility of PTs and nurses and incorporate physical rehabilitation in the early stages of healing. If we take the suggestion of Redwood-Campbell, et al. (2011) as guidance that the acute emergency phase lasts only a few days, PHC and rehabilitation services would need to be included after the first few days, in the late emergency phase. In other words, according to the old timeframe, PHC and rehabilitation would fall under the acute emergency phase. Winter, et al. (2011) note that in the first few days after the earthquake in Haiti medical personnel worked to save as many lives with as little risk for permanent disability as possible. Saving lives still applies as the sole principle of the EMA intervention within the first few days after a disaster. The time factor however plays a role and further interventions are necessary after those first few days

that provide follow-up care and rehabilitation to prevent secondary complications and disabilities. For that reason, rehabilitation services have a place in EMA as firstly, the acute phase is quickly succeeded by the late emergency phase and secondly, EMA needs and PHC needs may overlap within those first few days.

2.2 “Contemporary” emergency medical assistance: from acute emergency to long-term recovery and primary health care?

A theoretical foundation was established that described EMA not as solely providing “the greatest good for the greatest number” but expanded the concept of EMA toward a more holistic approach. According to Waeckerle, et al. (1994), emergency relief in disasters need to take into account the basic needs of people during all stages of a disastrous event. Gunn (1990, cited in Waeckerle, et al., 1994) describes the concept of EMA as a holistic concept which includes several health disciplines e.g. pediatrics, epidemiology, communicable disease, public health, emergency medicine and community care, in order to deal with the health problems from the aspects of prevention, immediate response and rehabilitation. This definition of EMA might be difficult to achieve by an international collaboration but requires local emergency preparedness and disaster reduction strategies. The WHO introduced the concept of emergency preparedness and disaster reduction, stating that a disaster reduction plan is part of a country’s development and includes disaster reduction in the public health sector (WHO, 2007). In 2005 the WHO urged nation states to implement emergency preparedness in public health and to build capacities of disaster preparedness on a national level and in communities (WHO, 2007). Where previous literature suggested a multidisciplinary disaster medical response independently from PHC, more recent studies discuss EMA from a perspective of PHC, claiming that strengthening PHC in LICs would, at

the same time, strengthen disaster preparedness and therefore emergency medical responses (Redwood-Campbell and Abrahams, 2011). Redwood-Campbell and Abrahams (2011) conducted a literature review with the search terms “PHC” and “disaster” and found a need for improvement of PHC for the treatment of chronic diseases, mental health and the provision of PHC soon after a disaster. It was concluded that PHC is important for an effective emergency medical response and building of an emergency preparedness and disaster response system. The WHO and Redwood-Campbell and Abrahams (2011) discuss strengthening of PHC in LICs being not only good for communities in peacetimes but also, as it is already seen in high-and middle-income countries, to manage disasters more effectively. The disaster response community supports the concept of strengthening PHC in LICs to make communities healthier and to see EMA from a PHC perspective (Redwood-Campbell and Abrahams, 2011).

That PHC and EMA cannot be fully separated is seen in the work of MSF, the French non-governmental organization. MSF describes itself as an organization providing EMA for people in conflict, natural disaster, epidemics, and to those excluded from healthcare. MSF is an independent organization, which receives the majority of its funds from private sources, and only a very limited amount from governments (MSF, 2013). Over the years MSF has developed from an organization that provided only emergency aid to an organization with long-term programs in countries with a weak PHC system. Providing health care for people who are excluded from health care is very broad area and according to Van Damme’s definition does not fall into the category of EMA. MSF’s care for amputees in Sierra Leone is only one example of many, where their involvement was part of a rehabilitation program. After the civil war in Sierra Leone, upper extremities amputations were common. People with upper limb amputations experienced chronic neuropathic pain, which led MSF to open a pain

clinic in 2001 to treat those with neuropathic pain and other patients with chronic pain syndromes (Lacoux and Ford, 2002). Another example of rehabilitation involvement is the provision of psychological care for victims of the tsunami and earthquake in Japan in 2011. Two months after the disaster, the medical infrastructure in the affected region was already stabilized, MSF moved its focus to psychological care for vulnerable people including the elderly population, single parents and those with physical disabilities and chronic diseases (MSF, 2011). MSF's efforts to care for those left out of the healthcare system is a great asset. However, if we stick to the paradigms, it does not fall under EMA but may be defined as PHC or rehabilitation service.

The emergency response after the earthquake in Haiti in 2010 is another example of a perceived shift away from traditional EMA to one that incorporates long-term recovery and is discussed within the concept of PHC (Knowlton, et al., 2011). The literature suggests that firstly, EMA can no longer be defined as only "saving lives" and neglecting care and autonomy for the sake of effectiveness but that an approach is needed that is holistic and involves prevention and recovery pre-and post-disaster (Knowlton, et al., 2011; Landry, et al., 2010). Secondly, the response in Haiti, as a LIC has shown that it is possible for humanitarian relief to be multidisciplinary and to involve several stages of recovery, including the need for rehabilitation and that, because of its weak PHC system pre-earthquake, foreign aid needs to focus on primary care to improve the infrastructure of the system and therefore strengthen emergency preparedness.

3. The role of physiotherapy in emergency medical responses

This chapter discusses the role of PT within a multidisciplinary medical rehabilitation operation in a humanitarian response. Firstly, I will provide an overview of PT and rehabilitation in global health. Secondly, I will discuss empirical examples of PT involvement in humanitarian responses. Finally, I will draw from quasi-experimental studies conducted after the Sichuan earthquake in China to examine whether the involvement of physical rehabilitation in the early and late stages of a medical emergency response has a positive impact on the QOL for persons with permanent disaster-related disabilities.

3.1 Physiotherapy and rehabilitation in global health

The concept of rehabilitation is a product of the twentieth century and the middle classes in the Western world. Post-WWII, rehabilitation developed with the injury pattern of wounded combatants and advancements in medical skills and technologies (Greenwood, 1985). As Greenwood (1985) notes, in the Western world the military service was prioritized to receive prime treatment and medical rehabilitation, followed by children with physical disabilities, the educated class with physical and sensory impairments, those with intellectual disabilities, the elderly and lastly, those who are excluded from the health care services. She also writes about the high prevalence of permanent physical disability in LMICs and argues for greater involvement of medical rehabilitation services in those settings (Greenwood, 1985).

Compared to the medical profession, PTs are only beginning to become actively involved in global health. Global health problems are already on the curriculum for medical students with global health initiatives (GHIs) and placements in resource-poor settings becoming popular. Alappat, et al. (2007) notes that GHIs have focused more on acute medical provision and

health care and so, physical rehabilitation in LMICs has been less prioritized by the global health community, which may be related to a lack of PTs involved in global health. Additionally, it is to note that the PT profession is in many countries not available. Therefore, PT in global health should not only be limited to GHIs where physical rehabilitation specialists work and exchange knowledge in LMICs but there is also a need to raise awareness of the PT profession in countries where it is non-existent. PT in global health has several tasks, including that of direct service, teaching and cooperation between educational institutions to introduce PT programs. Twinning PT schools has happened between Nigeria and the University of Michigan-Flint U.S. to establish a Doctor of Physiotherapy Program (DPT) (John, et al., 2012).

A need for rehabilitation services and in particular PT in LMICs is shown by the relationship between disability and poverty, where both disability can both be a cause of poverty and poverty can lead to an increased risk of disability (Landry, 2007). The same accounts for disability as a possible consequence of HIV/AIDS (UN Enable, 2013) as well as a number of other communicable diseases and NCDs in all age ranges. Little research has been conducted on the involvement of PTs from HICs in GHIs and educational exchange. Humphreys and Carpenter (2010) looked at PTs volunteering in LICs and found that it is most successful and effective when PTs have an interest in the culture and there is an equal share of knowledge between local and foreign PTs. Peinying, et al. (2012) examined clinical placements in LMICs for PT students and found an increase in cultural sensitivity and competency among those PT students. In the study by Alappat, et al. (2007), cultural sensitivity and competency as well as unrealistic expectations were barriers to capacity building and cooperation between foreign and local PTs. They concluded that global health themes and clinical placements should be incorporated in PT education.

3.2 Physiotherapy in post-disaster and violent conflict settings

3.2.1 Physiotherapy in post-disaster responses

The lack of follow-up care and physical rehabilitation had already been highlighted by research after the Gujarat earthquake in India in 2001. The earthquake in India left 166,000 injured and many people post-surgery developed secondary complications because follow-up care was missing (Chatterjee, 2002). India's Oxfam emergency coordinator (Chatterjee, 2002, p.327) states that *"Past experience shows that disability never gets adequately addressed in post-disaster response in this country"*. Raissi (2007) who studied the rehabilitation needs of persons with SCIs after the earthquake in Bam, Iran in 2003, recommends that well organized international rehabilitation teams would be a great asset in disaster areas, referring to the lack of rehabilitation services to victims of the Bam earthquake. In Pakistan, after the earthquake in 2005, physical disabilities were managed by the first CBR program in this country, which led to a nationwide adoption of CBR in the management of PWDs. Institutional-based rehabilitation (IBR) was scarce and resulted in patients with SCIs and amputations developing secondary complications. The Federal Ministry of Health established a spinal cord unit with the help of Handicap International (HI), the WHO and UNICEF (Mallick, et al., 2010). This unique and successful rehabilitation system for PWDs post-disaster, combining IBR and CBR as a post-earthquake response, shows that it is possible for a country with no pre-existing rehabilitation service to establish CBR on a nationwide level for PWDs and promote knowledge and expertise for conditions such as SCIs and amputations within rehabilitation institutions as a result of the earthquake (Mallick, et al., 2010).

Harrison in 2007 conducted a qualitative study on PTs who had been involved in the early emergency phase after a disaster. She identified two roles for PTs in immediate disaster response; first, patient care which included helping with the triage, wound care, first aid as

well as musculoskeletal treatment and second, the organization of a physiotherapy service in the immediate disaster response. Harrison (2007) was the first to research the involvement of PT in an imminent emergency response and concluded that there is a role for PT, as PTs have a more holistic approach and therefore could assist physicians, as Harrison (2007, p. 464) states to “...*balance this very medical focus*”.

3.2.2 Physiotherapy in post-earthquake Haiti

International rehabilitation responses within an emergency response only started to gain more recognition after the earthquake in Haiti in 2010, which included trauma care and rehabilitation services in EMA. The earthquake that struck Haiti with a magnitude of 7.0, affected 3,500,000 people. Approximately 220,000 died and an estimated 300,000 were injured (Disaster Emergency Committee, 2013; Winter, et al., 2011). Within 48 hours post-earthquake the first international medical teams arrived. The response by the international community in Haiti had not seen such a multidisciplinary health care provision before in a humanitarian crisis such as after the Indian Ocean Tsunami in 2004 or after other disasters such as the earthquakes in Iran in 2003 and Pakistan in 2005 (Tataryn and Blanchet, 2012). Thousands of international organizations responded to the earthquake ranging from established NGOs, UN agencies, military forces and small organizations (Tataryn and Blanchet, 2012). Academic health centers, physical therapists, prosthetic and orthotic services and physiatrists joined physicians and surgeons to deal with the vast burden of injury and disability post-earthquake (Babcock, et al., 2012; O’Connell, et al., 2012; Landry, 2010). It is estimated that 125 rehabilitation organizations were involved in the medical response in Haiti (Arie, 2012) with HI and the Christian Blind Mission (CBM) as the largest NGOs providing rehabilitation services in conflict and disaster settings. It was difficult to estimate how many

PTs and rehabilitation specialists were involved in Haiti because of the fragmentation of the humanitarian response system and the poor coordination and communication between organizations (Tataryn and Blanchet, 2012).

The pronounced rehabilitation response may be related to several reasons: first, the geographical position of Haiti, being only a couple of flight hours away from the U.S.; secondly, the large number of expatriates from Haiti working as health professionals in the U.S.; and thirdly, the greater rehabilitation needs due to the survival of injured persons attributed to the immediate medical emergency response (Tataryn and Blanchet, 2012). Prior to the disaster, people with traumatic injuries such as SCI and TBI did not survive. However, due to the immediate and vast response by the international community, more people with SCIs survived (Landry, 2010; Landry, et al., 2010).

Prior to the earthquake, 800,000 persons were living with disabilities, which rose to 1.1 Million post-earthquake, making it impossible to provide follow-up care for the newly injured population as physical rehabilitation and orthopedic services were provided mainly for disabled children in two NGO-based institutions in the capital Port-au-Prince (UN Enable, 2013; Bigelow, 2010). These were funded by NGOs from the U.S. and staffed by local and foreign rehabilitation professionals. Outside Port-au-Prince, rehabilitation services were non-existent (Bigelow, 2010). These rehabilitation centers were destroyed during the earthquake and were unable to provide services in the recovery period (O'Connell, et al., 2010). The rehabilitation role of humanitarian intervention actors was therefore vital. HI's preliminary report on injury and disability from 15–26th January 2010 reports that HI worked with more than 600 people with earthquake-related injuries, in particular with persons with amputations and to reduce the risk of secondary disabilities. HI responded immediately with post-operative

rehabilitation at more than fourteen hospitals in the most affected areas as well as providing rehabilitation services in the community such as wound care, psychosocial support, physical rehabilitation and the distribution of devices (O'Connell, et al., 2010). Further, it is noted that during their needs assessment, HI found five other hospitals where rehabilitation was offered by foreign allied health professionals, who arrived after the earthquake. One of them was the Toronto Rehabilitation Institute, an academic medical center that sent a team of rehabilitation specialists. They responded one month after the earthquake struck Haiti and worked in an area not directly affected by the earthquake, which was part of an evacuation zone where many people went to seek healthcare. Within the first two weeks, the Toronto rehabilitation team provided up to 300 sessions of direct clinical care and 25 teaching sessions as well as collaborating with Healing Hand for Haiti (HHHI) working in a SCI unit for a total of eight weeks (Landry, et al., 2010).

Another study, jointly conducted by HI and the Humanitarian and Conflict Response Institute (HCRI) showed that a peak in amputations were on the fifth day post-earthquake, suggesting that most of the amputations were performed by foreign surgeons, instead of local staff as the first medical professionals started to arrive 48 hours after the earthquake (Redmond, et al., 2012). It also shows that rehabilitation for earthquake-related amputations was high in the first few months but later increased for people with amputations unrelated to the earthquake. Redmond, et al. (2012) note that a majority of people who accessed the rehabilitation services had non-earthquake related amputations. This cohort of previous subserviced PWDs need to be considered into disaster planning and services should therefore have a PHC approach (Redmond, et al., 2012). Further, Redmond, et al. (2012) point out that statistics were collected across organizations who provided surgery but unfortunately not for rehabilitation providers relying only on the data that have been collected by HI and CBM and not from the

other organizations such as academic medical centers, which also provided rehabilitation. For that reason, it is difficult to estimate how many people with injuries and disabilities, related and unrelated to the earthquake received rehabilitation input.

A qualitative study investigated the sustainability of the rehabilitation efforts in post-earthquake Haiti and concluded that the service lacked the foundation for development because of the high turnover of volunteers, volunteer workers having no local language skills and neither the medical expertise. Although, prosthetic needs received the most attention, NGOs' lack of knowledge of physical rehabilitation and devices resulted in equipment being distributed without carrying out a needs assessment (Arie, 2012). Finally, the study questions the focus of emergency service by the international agencies, when there is such an enormous need for long-term rehabilitation in a population with more than 300,000 new PWDs that does not have an established rehabilitation infrastructure (Arie, 2012). On that account, when many more lives are saved that would otherwise not be saved with international help, providing an infrastructure for ongoing care and rehabilitation becomes necessary. This would imply a contribution from EMA towards PHC and development, and would help to make the response more sustainable.

Pakistan was able to establish a national rehabilitation system based on CBR after the earthquake in 2005, whereas the rehabilitation services set up in Haiti seems not sustainable in the long term. A difference between Pakistan and Haiti may be the political and economic stability of the country. CBR in Pakistan received support by the government, as well as it had PT education in place and a greater ability to work with international organizations. Haiti lacked a national structure for rehabilitation services including PT education. Therefore, it could be argued that this places greater responsibility on the international community to

provide further assistance to the 1.1 Million PWDs post-earthquake. This indicates that an emergency response alone is not enough in LICs because of a lack of infrastructure to meet the needs of a whole population affected by a disaster. It should also include building capacity from the early stages of an emergency such as training local staff (Tataryn and Blanchet, 2012).

The recent developments in “disaster medicine” and “disaster rehabilitation” (Rathore, et al., 2012) show that rehabilitation should be part of disaster planning but it should also provide the roots for a sustainable capacity. This crosses the line between emergency response and development as well as EMA and PHC. Indeed, a short-term international response to provide assistance during the emergency phase does not bring development and future emergency responses will be better tackled if structures are in place that can deal with the response of a disaster. As Europe and the U.S. developed their rehabilitation expertise from the experiences of WWII, post-earthquake Haiti will hopefully follow and develop its rehabilitation provisions for patients with SCIs, as well as raising awareness towards social inclusion for PWDs. HI notes that they will hand over their work and infrastructure for rehabilitation to the local partner organization to continue the work (Arie, 2012). It remains to be seen how successful this will be.

The response after the Great East Japan Earthquake, which hit Japan in March 2011, had less traumatic injuries such as SCI, TBI and amputations, but the needs of the elderly population and PWDs needed to be address. The low incidence of traumatic injuries came as a surprise, as traumatic injuries have had high incidence rates during previous earthquakes, including the Awaji Great Earthquake in 1995 (Liu, et al., 2012). Multidisciplinary rehabilitation teams, including physiatrists, PTs, OTs and nurses were sent to shelters for the earthquake victims to

provide services to the elderly population and PWDs and their families. Among elderly persons, immobilization syndrome affected 30% and therefore a management strategy to avoid new cases of immobilization syndrome was an imminent need (Liu, et al., 2012). For PWDs, rehabilitation needs that were required to be addressed included: prevention of the deterioration of ADLs realized through group and individual rehabilitation sessions, help with transfer to temporary housing, assistance with transfer to new rehabilitation services and adaptations in new shelters (Liu, et al., 2012). The study shows that immobilization syndrome resulted in the highest need for rehabilitation, which reflects the high number of elderly living in Japan. Despite the involvement of rehabilitation specialists such as PTs and OTs and SLTs in the Great East Japan earthquake, they are not included in the provision of health care during disaster by the Japanese Ministry of Health. Instead, NGOs dispatched the rehabilitation specialists and also had to cover the costs for the rehabilitation services. However professions such as dental hygienists and laboratory technicians are listed among the health professionals providing care during a disaster in Japan. The paper, however, argues for the mainstream inclusion of PTs and OTs in disaster responses in Japan (Liu, et al., 2012).

3.2.3 Physiotherapy in violent conflict settings

Little is written on the experiences of PT efforts for civilians in conflict and post-conflict settings. In Bosnia in 1999, for example the literature shows that the U.S. military employed PTs since the peacekeeping mission. The service provided PT for combatants with non-traumatic musculoskeletal injuries and inpatients as part of post-operative care (Teyhen, 1999). Teyhen (1999) recommended more involvement of PTs in complex humanitarian emergencies to provide PT for civilians as there was a shortage of PTs considering the number of patients, including civilians with war-related injuries such as amputations and burn

wounds. Another study from Bosnia and Herzegovina reports that a CBR strategy was used to deal with the needs of PWDs during the war and was continued after the conflict and integrated into the PHC system. During the war it was estimated that between 40,000 and 70,000 people needed physical rehabilitation due to war-related injuries. It is reported that multidisciplinary therapy centers were established in shelters, empty shops and other vacant buildings in the community due to the lack of basic treatment (Peat and Jalovcic, 2009). Post-conflict, CBR was chosen by the government for the rehabilitation of war victims, as IBR was unavailable for injured persons. When IBR service is unavailable for PWDs, CBR for physical rehabilitation is an effective way to address the needs and help to protect the right to health for PWDs (Peat and Jalovcic, 2009).

In Afghanistan, which has been in chronic conflict for more than three decades, PT for PWDs outside the private health care provision is non-existent. A qualitative study among Canadian PTs working in a military base in Afghanistan shows a high demand for PT in post-operative care for combatants and civilians. Civilians, included children, with war-related wounds and other chronic health problems received PT if capacity was available (Rowe and Carpenter, 2011). Another qualitative study in 2012 examined the physical rehabilitation provision for people with SCIs in Afghanistan (Michael and Roth, 2012). (In Afghanistan, SCI is mainly a consequence of violence although, whether caused by foreign military or tribal dispute is unknown, and spinal tuberculosis). The study suggests that for rehabilitation to be effective for SCI patients, rehabilitation must start during acute hospital care and be followed up in CBR programs. The study also shows that stigmatization of PWDs in Afghanistan is one of the main obstacles that need to be overcome in order for community integration to be successful (Michael and Roth, 2012). Ideally, post-conflict, government-run health organizations should continue the work of international NGOs but to date, physical

rehabilitation is predominantly provided by foreign NGOs such as the International Committee of the Red Cross (ICRC), HI and by foreign military personnel (Michael and Roth, 2012; Rowe and Carpenter, 2011).

3.3 Physiotherapy and its impact on the quality of life

QOL is a multidimensional concept, which is a subjective perception of different aspects in life and includes domains such as health, job, relationships, housing and cultural values (CDC, 2011). Subjective wellbeing has been used when assessing outcomes of medical rehabilitation for PWDs (Fuhrer, 2000; Anneken, et al., 2010). Health related quality of life (HRQOL), which focuses on physical and mental health may affect other aspects of the QOL such as social and vice versa (CDC, 2011). A study on the impact of physical exercises on the QOL for people with SCIs in a non-disaster setting showed that physical exercises are the main contributor to HRQOL in both physical and psychological aspects. Those who were active in sports had a higher employment rate than those who were not physically active (Anneken, et al., 2010). A higher employment rate has a positive impact on the individual and the community.

The QOL for persons with permanently disabling injuries was assessed after the Sichuan earthquake in quasi-experimental studies (Zhang, et al., 2013; Zhang, et al., 2012). In the effectiveness study (Zhang, et al., 2013), people with disabling injuries including SCIs, TBIs, amputations, fractures and other injuries, were randomly selected into three groups: the first, an intervention group with IBR followed by CBR, the second group received IBR followed by CBR one year after the event and the third group acted as the control group, receiving no treatment. The outcome was measured with the Barthel Index (BI) to measure functionality

in ADLs and mobility. The study shows that those who received IBR followed by CBR, which included physiatrists, PTs, OTs, a rehabilitation nurse and psychological support, improved long-term physical functioning compared to those who only received rehabilitation one year after the event and the effects were even stronger when compared with the control group (Zhang, et al., 2013). However, selection bias could have influenced the results since there were more persons with TBI injuries in the control group and more SCI patients in the first intervention group and the recovery of these two types of injury have different paths. With TBI, it is highly dependent on the severity of the injury. However, the authors did not discuss these aspects of bias. Further, it is unclear at which time after the occurrence of the Sichuan earthquake the first group started with the rehabilitation. Additionally, it is questionable if it is ethical to have a control group. The study was conducted in three different counties and the authors justified the decision by using a county that had no rehabilitation facilities in place due to poor resources and political instability as the control group and so, the study suffers from selection bias again.

Another study by the same research group looked at the impact of physical rehabilitation on the QOL for people with fractures after the Sichuan earthquake. Three groups were analyzed: early rehabilitation intervention, late rehabilitation intervention and a control group. ADLs were measured with the BI, HRQOL was evaluated with the Medical Outcomes Study Short Form-36 (SF-36) and overall life satisfaction was measured with the Life Satisfaction Questionnaire (LiSat-9) (Zhang, et al., 2012). The study shows that those who received early rehabilitation input scored higher on the SF-36 than the control group and both intervention groups had higher ADL outcomes and life satisfaction than the control group (Zhang, et al., 2012). The study recommends that physical rehabilitation should start immediately after the stabilization of the trauma and be continued with CBR as it reduces fracture complications

and improves functional outcomes, which improves physical independence and therefore, potentially has a positive impact on QOL. A third study conducted post-Sichuan earthquake, examined the rehabilitation outcomes for people with SCI found that ambulation, ADLs and wheelchair mobility had improved after rehabilitation. Early onset of rehabilitation (less than three months post-earthquake) had a more positive effect on outcomes such as managing pressure sores and deep vein thrombosis (DVT) than starting rehabilitation later than three months post-event (Li, et al., 2012). A prospective cohort study on the QOL for people with SCI post-earthquake in Sichuan found that IBR had a positive impact on ADLs and physical independence and that the QOL improved after persons returned to the community (Hu, et al., 2012).

The positive impact of medical rehabilitation on the QOL in earthquake victims with permanent disabling injuries shows that rehabilitation professionals should be part of the emergency response team to achieve better outcomes in wound healing and physical independence. A problem, however is, the lack of an international rehabilitation standard. The only rehabilitation specific guidelines by the WHO to date are on wheelchair service and Prosthetic and Orthotics (P&O) training (Tataryn and Blanchet, 2012). International rehabilitation guidelines for PTs and OTs do not exist, which could be guidance for rehabilitation specialists working in humanitarian response operations. Therefore, the creation of rehabilitation guidelines by the WHO might be a next step in more involvement of physical rehabilitation in emergency medical responses.

4. Inclusive emergency responses

The legal framework of the CRPD has created the basis for implementing measures to include PWDs in all areas of life and social construct, as the WRD shows. This chapter discusses the implementation of CRPD in disaster response and disaster planning. I will briefly discuss the rights-based approach and common theories, that is, utilitarianism, which is used to guide the allocation of scarce resources, as is mostly the case in times of conflict and disaster. I will show that a rights-based approach clashes with utilitarian theories of distribution, as those theories of distribution do not take into account individual rights.

Including PWDs into disaster planning already received attention in 1981, the International Year of Disabled Persons (IYDP) when the UN Disaster Relief Coordinator (UNDRC) started their investigation into PWDs in disaster settings (Health Library for Disasters, 2013). Parr (1987) started to ask what happens to PWDs in a disaster and investigated that little research and discussion had been conducted in that field. The study highlights that PWDs are dependent on others, in particular in disaster situations and therefore, an investigation was required into how PWDs could be best assisted in a disaster response (Parr, 1987). The *Bonn Declaration* in 2007 discussed an inclusive approach for PWDs in emergency responses, which was a milestone in the way forward to protect the human rights of PWDs. The declaration recommended that PWDs should be included in all spheres of disaster response, that is, disaster preparedness and planning, acute emergency response and immediate rehabilitation, and post-disaster development, rehabilitation and reconstruction (Bonn Declaration, 2007).

A testimony of a relative of a quadriplegic woman who drowned in her own flat during Hurricane Katrina in 2005 shows that even in HICs, where infrastructure is adapted to the

needs of PWDs, they are not always sufficiently included. She reported that her sister in law, despite being in contact for two days with the local organization that organizes transportation for PWDs, which would have been possible, the organization never send a transport to evacuate her. Without the help of others she could not move herself outside her flat and despite disaster measures that included PWDs in the U.S., she was left on her own where she could not flee the water that came into the house (Burns, et al., 2012). This happened in a HIC where very little disaster-related injury was reported.

In LMICs, there are many more such stories, where PWDs, including older people are left behind (Reinhardt, et al., 2011; Atlas Alliance no date). Kett (2013) also states that disabled children are in increased danger to be left at home in the country of origin in the case where the family needs to flee quickly to another country. The host country's discriminating policies, for example, not granting asylum for PWDs can be another reason for the vulnerability of PWDs. Past situations of disaster management show that PWDs are the most affected by disaster and as studies from Japan and Taiwan concluded, the death rate among people with physical and mental health problems nearly doubled after a disaster (Kett, 2005; Reinhardt, et al., 2011; Mori, et al., 2007). It is highlighted that PWDs are the most vulnerable during conflict and at the same time the most neglected (WDR, 2011; Reilly, 2010). Several reports addressed the issue of including PWDs and older people in disaster preparedness. Practical guidance is given by the *WHO department of violence and injury prevention* (2005), which states that in acute emergency response PWDs need to be identified and their healthcare needs, for example, medication, have to be addressed in order to decrease the risk of further exacerbation of their condition. The WHO (2011) claims that poor disaster management and policies are responsible for the exclusion of PWDs in disaster responses.

Including PWDs in disaster responses is grounded in a rights-based approach and has the potential to clash with utilitarianism, the dominating theory of distribution of resources in disaster responses. Utilitarian theories, which are derived from Jeremy Bentham and John Stuart Mill, are often discussed as the happiness principle, which promotes the distribution of resources, guided by the benefit for the majority of the people in need as has been already discussed in chapter two. The outcome of the intervention should bring a maximizing benefit to society and minimize harm (Sztajnkrzyca, et al., 2006). Triage in disaster settings use the utilitarian principle to decide who receives treatment as a priority (Waeckerle, et al., 1994). However, as Sztajnkrzyca, et al. (2006) note, the origins of prioritization in triage of patients were based on the egalitarian principle, which provided health care first to those who were in most need for it. Further, the authors also question whether resources are scarce in a disaster or whether it is the critical time window that prevents helpers to save more lives. If a rights-based approach should be achieved in all spheres of disaster response, then PWDs must be viewed as equally valuable for society and should not be singled out when it comes to disaster response. The egalitarian approach also requires the distribution of scarce resources equally to all members of society. The rights-based approach protects individual rights and places all individuals, regardless of mental and physical ability on the same scale. With the adoption of the CRPD, the egalitarian concept should be applied rather than the utilitarian theory. On the basis of the CRPD, selecting people for triage in a disaster response on the basis of a ranking of physical and mental ability would be unethical (Sztajnkrzyca, et al., 2006).

Using an inclusive humanitarian response requires society to provide the necessary assistance for PWDs so that they have an equal chance as able-bodied persons to receive help in all spheres of a humanitarian response. The inclusive humanitarian approach incorporates the concept of equal dignity for all persons. According to Gewirth (1996), the concept of dignity

is the basis for universal human rights and so should be encompassed in all spheres of human interaction. The Aristotelian doctrine sees human beings as social animals, where people can develop their humanity only in interactions with others within a social order. On that account, people are aware of other people's needs and interests, which are the objects of rights (Gewirth, 1996). Therefore, the community is responsible for protecting those individual interests, including the needs of PWDs. In a community that is struck by conflict, the rights and interests of individuals are often violated. However, according to Article 32 of the CRPD and UN resolution 688, the international community has the right to humanitarian intervention and therefore, has the responsibility to intervene and to protect those fundamental rights according to human rights laws that are based on dignity (Fonrouge and Gunn, 2008). For that reason PWDs need to be included in a humanitarian response and rehabilitative measures should be included into the PHC package provided in the refugee shelter (Mirza, 2011).

However, this is not necessarily understood everywhere. Sahlool, et al. (2012, p. 6) state in a evaluation study of health care services at a refugee camp for Syrians in Turkey that *"The abuse of the health system by the refugees with chronic problems, disabilities or congenital abnormalities that were present and unsolved for long time in their original locations put extra burden on the health care sector"*. In their view the needs of PWDs have a negative effect on the effectiveness of the health care provision for refugees. However, unmet needs should not be interpreted as abuse of services, as these needs ideally need to be addressed. As mentioned earlier, Syria, as a MIC has a considerable burden of NCDs and since this burden is predicted to rise in the future, care for NCDs should be incorporated in disaster and conflict situations. MSF reports from Syria that in addition to war-related injuries they also treat people with diabetes, high blood pressure and complications during pregnancy since patients

with these conditions are among those who need health care. These conditions can become life threatening due to the lack of medication and the exacerbation of the condition by the conflict (MSF, 2013). Pregnant women's need for specialized health care has been recognized universally and so should be for PWDs and the elderly.

The legal framework is a first important step to make people aware that we all have the same rights, which are fundamentally based on dignity. In Pakistan, positive developments on a governmental level included the introduction of CBR for PWDs nation wide (Mallick, et al., 2010). The experiences in Haiti mainstreamed the need to include PWDs in disaster preparedness and brought the issues of PWDs closer to the agenda of the government, which is the first step to changes in policies. (UN Enable, 2013; Wolbring, 2011). In Japan, NGOs collaborated to consider the rehabilitation needs of elderly and PWDs (Liu, et al., 2012). However, misperceptions among healthcare staff working in humanitarian responses were noted such as the perception that PWDs require specialized care, that PWDs cannot contribute to work, education and societal activities and that PWDs are unable to help others (Kett and Van Ommeren, 2009; Mirza, 2011). In the case of the conflict in Syria, it seems that attitudes towards persons with chronic conditions and disabilities among the local research groups and healthcare providers have not changed yet. Sahlool, et al. (2012), write about abuse of the health care service by this vulnerable group, which indicates that they see health provision in a long-term conflict, as it seems to happen in Syria, as a purely emergency response despite the efforts by the CRPD and the WRD to secure health care and rehabilitation for PWDs, even in violent conflict situations. In long-term violent conflicts such as in Syria, emergency medicine needs to incorporate PHC services, as it is already seen with MSF but the research community needs to become aware of that too. Inclusive disaster preparedness and planning is one step to put the CRPD into practice.

Limitations

The study is limited by the small amount of peer-reviewed and grey literature available online which describe PT in conflict and post-disaster settings. The number of peer-reviewed articles is particularly small. It might be the case that more rehabilitation programs exist in such settings but that no article or report has been written. In the case of post-disaster response in Haiti, the main sources of information about physical rehabilitation services are editorials and reports on the experiences of health professionals. Only two peer-reviewed articles were found that investigated the surgical input and the rehabilitation response after the earthquake in Haiti. However, those studies did not investigate the outcomes of rehabilitation for earthquake victims. Few studies on rehabilitation outcomes for earthquake victims were only available from China, after the Sichuan earthquake. The findings from Sichuan are, however, likely to be generalizable to other emergency settings because of the similarity of injury pattern after disasters and violent conflicts.

A limitation of the study might be the methodology. The study is not a systematic review and therefore, it is possible that relevant papers and reports were missed. The paper is restricted by the use of peer-reviewed articles written in English, German and French, as there may be more relevant literature available on the Great Eastern Japan earthquake and the Sichuan earthquake in Japanese and Mandarin. Accessing databases through the UCL and UiB libraries only, is another limitation of this study. The lack of research in the field of emergency responses has to do with the unpredictability of the events. However, it is suggested that some natural disasters can be predicted because of their connection to climate change (Holmes, 2009). The same may be the case for violent conflicts such as the recent developments with the Arab Spring. Similar patterns in political governance led to a number of internal conflicts in the Arab world and civil strife, such as in Syria that has become long-

term, has the potential to spread to other Arabic nations too. Therefore, research might not be so limited by unpredictability of events if a pattern of conflict or disaster is already observed. For that reason, in the future more research in disaster settings might be available and suggest ways to better respond to emergencies.

Conclusion

In this study I have examined the epidemiology of injury and disability after disaster and violent conflict and the findings indicate that there are rehabilitation needs, which can be met by involving PT in emergency responses. The study found that injury patterns in conflict and disaster are similar, with fractures, amputations, TBI and SCI as the most common and an increase in NCDs in LMICs. The findings of this narrative review show, as in the case of military research, that physical rehabilitation including physiotherapy needs to be included into EMA in post-disaster and violent conflict settings and brought to the attention of foreign donors. Moreover, EMA and PHC do interact in real-life situations such as during conflict and post-disaster and therefore, EMA has the potential to include immediate physical rehabilitation to meet the needs of persons with disaster-related injuries but also of persons with chronic conditions unrelated to the disaster. Therefore, EMA cannot be totally distinguished from PHC, as EMA will have to deal with persons with chronic conditions, unrelated to whether it is inflicted by disaster or violent conflict. Just as there will always be women who need assistance giving birth in disaster settings, there are people with chronic health needs who require medical assistance or rehabilitative input.

The perceived paradigm shift from EMA to long-term recovery, which includes PHC and development, was noticed after the emergency response in Haiti (Knowlton, et al., 2011). The high morbidity rate after the earthquake in Haiti indicated a greater need for physical rehabilitation, which was understood by the international community (Tataryn and Blanchet, 2012; Landry, 2010). Providing PT to combatants after traumatic injuries has been already done in the military of HICs, to decrease the level of permanent disability and thereby improving their QOL (Teyhen, 1999; Rowe and Carpenter, 2010; Sayer, et al., 2009). The positive impact of PT on the QOL of persons with traumatic injuries has also been

investigated after the Sichuan earthquake. The literature on PT in military operations suggests further that physical rehabilitation should start immediately post-operatively or after conservative treatment of injury for better health outcomes (Sayer, et al., 2009).

The CRPD proposed adequate health care for PWDs in a disaster and conflict response, making it a legal claim for PWDs to be included in the health care response and subsequently in disaster planning (UN enable, 2013; WRD, 2011; CRPD, 2006). For that reason, priority-setting theories need to be more egalitarian in order to meet the human rights of PWDs. The CRPD and the response in Haiti might have been turning points in disaster response in LMICs, which promoted the inclusion of PWDs and therefore physical rehabilitation and may be part of disaster planning and preparedness in the future. As it has been assessed in this study, rehabilitation has a place in the immediate response (Harrison, 2007; Knowlton, et al., 2011; Zhang, et al., 2013), which may be also the start for development. For instance, promoting competence building among local health professionals should always be part of international response (Tataryn and Blanchet, 2012). Including rehabilitation and other kinds of health care provision within a framework of development would make future disaster responses in the same region less dependent on the international community and health care provision can be included in disaster planning and management.

Recommendations

1. The creation of international physical rehabilitation guidelines for PWDs by the WHO would help to further identify rehabilitation needs and provide a scope of practice for PTs working in LMICs and other global settings.
2. PT services need to improve in general globally but in particular, to deal with the increased burden of NCDs in LMICs. PTs can contribute to the care of that population group, as it is already happening in HICs. This would not leave persons with NCDs as a burden to the EMA system but include them through the involvement of PT in disaster.
3. More research needs to be conducted in the area of PT for populations affected by disaster and conflict in order to raise awareness about the importance of physical rehabilitation for PWDs and bring it to the attention of national and international policy makers and leaders of humanitarian aid organizations so that PWD are included, as the CRPD requires.
4. PT education has to implement global health topics in the curriculum of PT students in HICs (Alappat, et al., 2007) and make PTs aware of their role in development and humanitarian response environments. Not the least, PT (and other rehabilitation) education programs should be strengthened or build in LMICs in order to make physical rehabilitation services sustainable. For instance, competence building programs between PT departments and academic institutions from different parts of the world could be created to promote sustainable development (John, et al., 2012).
5. CBR needs to be expanded into all humanitarian response, which could bridge the gap between EMA and development. Therefore, the promotion of CBR is an important measure to include PWDs and physical rehabilitation in all three phases of a disaster response.

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