WHO/HSE/GAR/DCE/2010.1

Public health risk assessment and interventions

Earthquake: Haiti

January 2010

WHO Communicable Diseases Working Group on Emergencies,
Communicable Diseases Surveillance and Response, WHO Regional Office for the Americas,
WHO Country Office, Haiti

Communicable Disease Working Group on Emergencies (WHO/HQ)
Communicable Disease Surveillance and Response (AMRO/PAHO); WHO Office, Haiti.
Public Health risk assessment and interventions: Earthquake, Haiti

© World Health Organization 2010

All rights reserved.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either express or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

For further information, please contact:

Disease Control in Humanitarian Emergencies
Department of Global Alert and Response
World Health Organization
1211 Geneva 27
Switzerland

Fax: (+41) 22 791 4285
cdemergencies@who.int

Contents

Acknowledgements

1. **Background and risk factors** 6

2. **Immediate public health risks** 8

3. **Specific priority interventions for immediate implementation** 13

4. **Information sources** 20

5. **WHO-recommended case definitions** 27

6. **Staff Health** 29

Annex 1: Prevention and management of wound infection 31

Acknowledgements

This public health risk assessment was compiled jointly by the unit on Disease Control in Humanitarian Emergencies (DCE), part of the Global Alert and Response Department (GAR) in the Health Security and Environment cluster (HSE), in collaboration with the Health Action in Crises (HAC) cluster at World Health Organization (WHO) Headquarters, and supported by the Department of Communicable Disease Surveillance and Response and the Emergency and Humanitarian Action unit in the WHO Regional Office for the Americas and the WHO Country Office of Haiti.

The risk assessment was developed by the Communicable Diseases Working Group on Emergencies (CD-WGE) at WHO headquarters. The CD-WGE provides technical and operational support on communicable disease issues to WHO regional and country offices, ministries of health, other United Nations agencies, and nongovernmental and international organizations. The Working Group includes the departments of Global Alert and Response (GAR), Food Safety, Zoonoses and Foodborne Diseases (FOS), Public Health and Environment (PHE) in the Health Security and Environment (HSE) cluster; the Special Programme for Research and Training in Tropical Diseases (TDR); the Global Malaria Programme (GMP), Stop TB (STB), HIV/AIDS and Control of Neglected Tropical Diseases in the HTM cluster; Health Statistics and Informatics (HIS) in the Information, Evidence and Research (IER) Cluster; the departments of Child and Adolescent Health and Development (CAH), Making Pregnancy Safer (MPS), the department of Country Focus (CCO) in the Partnerships and UN Reform (PUN) cluster; Reproductive Health and Research (RHR), Immunizations, Vaccines and Biologicals (IVB) in the Family and Community Health (FCH) cluster; Violence and Injuries Prevention (VIP) and Nutrition for Health and Development (NHD) and Chronic Diseases Prevention and Management (CHP) in the Noncommunicable Diseases and Mental Health (NMH) cluster; Clinical Procedures unit of Essential Health Technologies, (CPR/EHT) in HSS cluster, Health and Medical Services (HMS) and Security Services (SEC) in the General Management (GMG) cluster, and the cluster of Health Action in Crises (HAC) and the Polio Eradication Initiative (POL) and as a Special Programme in the Office of the Director General.

DCE gratefully acknowledges the current and previous collaboration and input of the disease-specific focal points of the CD-WGE, the WHO Regional Office for the Americas and the Country Office of the WHO Representative for Haiti, which have made the production of this risk assessment possible.

WHO would also like to thank the Government of Ireland (Irish Aid) and the United States Agency for International Development (USAID), and the Office of Foreign Disaster Assistance (OFDA) of USAID for their continued support in the development of these documents.

Preface

The purpose of this public health risk assessment is to provide health professionals in United Nations agencies, nongovernmental organizations, donor agencies and local authorities currently working with populations affected by the emergency in Haiti, with up-to-date technical guidance on the major public health threats faced by the earthquake-affected population.

The topic areas addressed have been selected on the basis of the burden of morbidity, mortality and potential for increase in the area.

Public health threats represent a significant challenge to those providing health-care services in this evolving situation. It is hoped that this risk assessment will facilitate the coordination of activities between all agencies working among the populations currently affected by the crisis.

1. BACKGROUND AND RISK FACTORS

1.1 Event description

On 12 January 2010, at 16:53 local time (GMT 21:53hrs) an earthquake measuring 7.0 on the Richter scale occurred in Haiti. The epicenter of the earthquake was 17 km from the capital Port-au-Prince (population approximately 2 million). Aftershocks measuring up to 6.0 on the Richter scale have been reported. Approximately 3.5 million people live in the earthquake-affected areas.

This is the strongest earthquake recorded in Haiti, a country that has already suffered years of humanitarian crisis and natural disasters including a series of hurricanes/tropical storms in 2008.

The earthquake has inflicted significant damage, particularly to critical infrastructure including basic utilities (power, water, sanitation), transport, communication and health. Preliminary reports indicate many collapsed structures including hospitals and health centers in the Port-au-Prince area, with heavy loss of staff. As a result, the capacity to respond to this crisis has been severely compromised.

The transport infrastructure has been severely affected, including damage to the airport and harbour. Drinking water and sewer systems that were functional before the earthquake are no longer usable.

Information about casualty figures is still provisional but reports indicate a significant loss of life. The UN mission and peacekeeping operations have also been severely affected.

Immediate health priorities include search and rescue for survivors trapped underneath the rubble, providing surgical/medical services to treat injured survivors, preventing wound infection and providing shelter, food, clean water and sanitation. International offers of humanitarian aid are presenting coordination challenges. Field hospitals are being deployed and once operational it is anticipated that these will be sufficient to meet the current needs.

1.2 Country context

Haiti is a Creole- and French- speaking Caribbean country with a total land area of approximately 27 750 square kilometres. It is the third largest country in the Caribbean. Haiti occupies the western third of the Island of Hispaniola, which it shares with the Dominican Republic (see Fig 1). The country has a tropical climate with some variation depending on altitude. There are two rainy seasons, April to June and October to November. The hurricane season is in August and September.

In 2007 the population of Haiti was 9.7 million. It is the poorest country in the western hemisphere, and ranks 149/182 on the UNDP Human Development Index 2007. In 2001, 55% of the population lived in households that were below the extreme poverty line of US$ 1 per person per day.

Hospital and clinical facilities in Port-au-Prince have long been compromised by infrastructural deficiencies, electrical blackouts, water problems and general impoverishment.

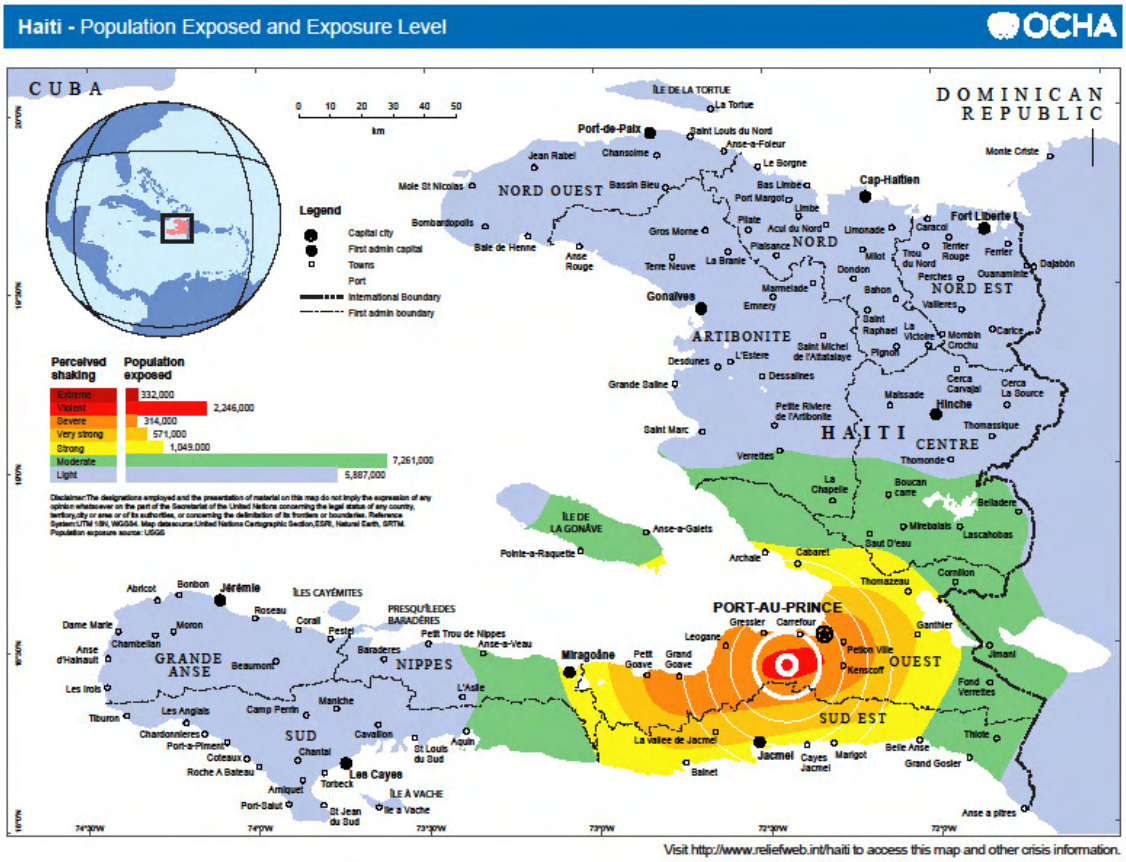
Haiti experiences significant water and sanitation problems. In 2009, 45% of the population lacked access to safe water and 83% of Haiti's total population did not have access to sufficient sanitation (WHO/CCS).

In 2007, 47% of the population lacked access to basic health care, with the majority of the population seeking care from traditional healers. An estimated 40% of households experience food insecurity, manifested by low birth weight and nutrient deficiencies.

The health system in Haiti is serviced by the public sector (Ministry of Public Health and Population and Ministry of Social Affairs); the private for-profit sector; the mixed non-profit sector (Ministry of Health personnel working in private institutions (NGOs) or religious organizations; the private non-profit sector (NGOs, foundations, associations); and the traditional health system. The Ministry of Public Health and Population encompasses 10 national bureaux and 4 coordinating units, addressing infectious and

communicable diseases, EPI, nutrition, and hospital safety. There are 371 health posts, 217 health centres and 49 hospitals in Haiti. In 2009, there were >250 additional implementing partners in the health sector, further challenging health coordination (WHO/CCS).

Fig 1. Map of Haiti showing the epicentre of the 13 January earthquake and population affected



2. IMMEDIATE PUBLIC HEALTH RISKS

2.1 Wounds and injuries

Earthquakes cause high mortality due to trauma. **Wounds and Injuries** will be numerous due to the initial impact of the earthquake and subsequent rescue and clean-up activities. Surgical needs are critically important during the first days and weeks. The majority of the injured are likely to have minor cuts and bruises, a smaller percentage will suffer from simple fractures, and a minority (but a significant number) will present with serious multiple fractures or internal injuries and crush syndrome requiring surgery, blood transfusion and other intensive treatment. These serious injuries are likely to overwhelm existing treatment capabilities, resulting in further delays. A significant number of **burns** have also been reported, requiring specific burns care.

Risk of **wound infection** and **tetanus** are high due to the difficulties with immediate access to health facilities and delayed presentation of acute injuries. **Gangrene** is a complication of wound contamination, and prompt wound treatment is critical for its prevention. Gangrenous wounds should be managed aggressively, with surgical removal of gangrenous tissue. There is no risk of transmission of gangrene to unaffected persons.

Low vaccination coverage among one-year-old children (DTP3 53% at one year in 2007, see Table 1), and waning tetanus immunity in adults increases the likelihood of morbidity and mortality from **tetanus**. (For additional information, see section 4, Wounds and injuries, and Child health in emergencies: *Pocket book of hospital care for children*).

2.2 Water/sanitation/hygiene-related and foodborne diseases

The displaced populations in Haiti are at high risk from outbreaks of water, sanitation, and hygiene and foodborne-related diseases, as well as foodborne diseases, due to reduced access to safe water and sanitation systems. Disruption of usual water sources and contamination of water by damaged sewage infrastructure may result in unsafe drinking water being consumed, increasing the risk of exposure. *Salmonella typhi* (causing **typhoid fever**), **hepatitis A** and **hepatitis E** are present and have epidemic potential. Cholera is not endemic in Haiti. Diarrhoea is already a major contributor to the high rates of under-five mortality; WHO estimates that diarrhoea accounts for 16% of under-five deaths in Haiti. **Leptospirosis** is endemic in Haiti (see section 2.5 *Vector-borne and zoonotic diseases*).

2.3 Diseases associated with crowding

Population displacement can result in overcrowding in resettlement areas, raising the risk of transmission of certain communicable diseases that are spread from person to person through respiratory droplets such as **measles**, **diphtheria** and **pertussis** (see section below on vaccine-preventable diseases), and **acute respiratory infections** or **ARI.** This risk is increased with inadequate ventilation. Overcrowding can also increase the likelihood of transmission of meningitis, waterborne and vector-borne diseases in the weeks and months following the earthquake.

Acute respiratory infections. ARIs include any infection of the upper or lower respiratory tracts. A major concern is acute lower respiratory tract infection (ALRI) (pneumonia, bronchiolitis and bronchitis) in children under five. WHO estimated in 2000 that 20% of under-five deaths in Haiti were caused by pneumonia. Low birth weight, malnourished and non-breastfed children and those living in overcrowded conditions are at higher risk of acquiring pneumonia. Infants of less than six months of age, who are not breastfed, have an increased risk of dying from pneumonia that is five times higher than in infants who are exclusively breastfed for the first six months.

Early detection and case management of pneumonia and other common illnesses, guided by the Integrated Management of Childhood Illness (IMCI), will prevent unnecessary morbidity and mortality in children

under five years of age. It is recommended that trained health care workers refer to the national IMCI guidelines during and after the emergency.

Pandemic influenza A (H1N1) 2009 is currently circulating in Haiti. It is transmitted from person to person as easily as normal seasonal influenza by exposure to infected droplets expelled by coughing or sneezing or via contaminated hands or surfaces. (For additional information, see section 4, Pandemic influenza A (H1N1) 2009).

Meningococcal disease is spread from person to person through respiratory droplets from infected people. Transmission is facilitated by close contact and crowded living conditions.

Tuberculosis (TB) is still among the leading causes of morbidity and mortality. Haiti has the highest TB incidence in the western hemisphere. In 2007, the estimated number of TB cases was 35 000 with an incidence of 147 cases per 100 000 population.

Mortality rate from all forms of TB was 71/100 000 population in 2007. Among new cases, 23% were **HIV** positive. The estimated prevalence of multi-drug resistant TB (MDR) among all new cases is 1.8% *(WHO, TB country profile)*.

Haiti has adopted the DOTS strategy, with services provided through the National TB Programme (NTP). TB control in Haiti involves a significant number of NGOs. Treatment is available in 198 health facilities, including four sanitaria. The objectives of the NTP, in line with the WHO global targets, (at least 70% TB case detection rate and at least 85% treatment success rate) have not yet been met. Indeed, the detection rate of smear-positive TB cases was 47% in 2007 and the treatment success rate was 81% in 2006.

In the acute phase of this emergency, the potential interruption of all treatments for chronic diseases (including TB, HIV, diabetes, etc.) and loss of patient follow-up is likely to be a significant problem. It is therefore essential that strong collaboration is established between health workers responding to the emergency and the established NTP services. Other aspects of TB control can be addressed once emergency and basic health care have been re-established. Pages 95 to 97 of the guideline *TB care and control in refugee and displaced populations* highlight the TB control issues that should be considered in situations of natural disasters (see section 4, *Tuberculosis*).

2.4 Vaccine-preventable diseases and routine immunization coverage

Tetanus has a high case-fatality rate of 70–100% without medical treatment and is globally under-reported. The incubation period is usually three to 21 days. A shorter incubation period is associated with severe disease and a worse prognosis. Reports from the national authorities, WHO and UNICEF indicate a 53% Diphtheria-tetanus-pertussis, 3rd dose (DTP3) coverage (2007) among one-year-old children in Haiti.

Appropriate management of injured survivors should be implemented as soon as possible to minimize future disability and to avert avoidable death following the earthquake. All wounds and injuries should be scrutinized as *Clostridium tetani* spores that are present in the soil can infect trivial, unnoticed wounds, lacerations and burns. Health-care workers operating in disaster settings should be alerted by the occurrence of cases of dysphagia (difficulty in swallowing) and trismus ("lockjaw" or tonic contraction of jaw muscles), often the first symptoms of the disease.

Patients should systematically receive prophylactic antibiotics and tetanus toxoid vaccine if non-immune, together with tetanus immune globulin if the wound is tetanus-prone. (See sections 3.1 *Case management* and 3.3 *Immunization*; for additional information, see section 4, *Tetanus; Wounds and injuries*.)

Measles, diphtheria, **pertussis** and **polio.** In populations with low vaccination coverage, the crowding associated with displacement may increase the risk of outbreaks from measles, pertussis, and diphtheria. Measles infection has not been confirmed in Haiti since 2001. Reports from the national authorities, WHO

and UNICEF indicate 58% measles vaccine coverage* among one-year-old children (2007), resulting in an increased risk of measles outbreaks. Diphtheria outbreaks occurred in Haiti in 2004, 2005 and 2009; 3rd dose (DTP3) coverage (2007) among one-year-old children in Haiti is reported as 53%. Polio has been eliminated in Haiti. Coverage (OPV3) among one-year-old children (2007) is 52%.

Hepatitis A is a liver infection caused by the hepatitis A virus (HAV), and transmitted by the faecal-oral route. (See sections 2.1 *Water/sanitation/hygiene-related and foodborne diseases* and 3.4 *Immunization*)

Table 1. Routine vaccination coverage at one year of age, 2007, Haiti

Antigen	% coverage*
(BCG) bacille Calmette–Guérin	75
Diphtheria-tetanus-pertussis, 3rd dose	53
MCV (measles-containing vaccine)	58
Polio, 3rd dose	52

* Official country estimates reported to WHO/UNICEF, 2007

2.5 Vector-borne diseases and zoonotic diseases

Dengue / dengue haemorrhagic fever (DHF) is a viral disease transmitted by the *Ae. aegypti* mosquito which is endemic in Haiti. High transmission rates of all four dengue viruses have been reported from Haiti, with transmission occurring mainly from April to November. Dengue causes a severe influenza-like illness. A potentially lethal complication called dengue haemorrhagic fever can sometimes occur. Epidemics of dengue can occur cyclically in 3–5 year intervals. *Ae. aegypti* is not typically a night-time biter and preferentially breeds in peridomestic standing water (storage tanks, plastic ware, etc). (For additional information, see section 4, *Dengue*).

Malaria risk in Haiti exists throughout the year in the entire country, including coastal and border zones. Risk in the main urban areas of Port-au-Prince is considered to be low but may increase in the current emergency situation. In 2008, Haiti reported 36 774 cases of malaria, of which 740 were from Port-au-Prince. Almost all malaria cases in Haiti are due to *P. falciparum*, which is sensitive to treatment with chloroquine, the current first line treatment. Early diagnosis and treatment for malaria patients will save lives and is the first priority for malaria control in this emergency.

Anopheles albimanus, the principal malaria vector mosquito, bites after dark early in the night (peak biting before 21:00 hrs). Its favourite breeding sites are groundwater habitats including hoof/footprints, ditches, rice fields, and ground pools; it is not commonly found in highly polluted water or containers. Seasonal peaks of malaria transmission due to increased vector densities occur in June–August and November–January, following the rainy seasons. Communities in Haiti have experience with long lasting insecticidal nets (LLIN). Over 210 000 LLIN bednets were distributed in 2007 and 2008 (biennial total).

Displaced populations may be at an increased risk of malaria and dengue due to lack of adequate shelter resulting in increased exposure to vectors. Localized outbreaks may occur. (For additional information, see section 3.4, *Case management* and section 4 *Malaria*)

Human rabies transmitted by dogs is a priority disease in Haiti. Rabies control is a priority, and a mass vaccination campaign of dogs was underway at the time of the earthquake. There may be an increased risk of rabies transmission from animal bites following the earthquake.

---

* The country carried out a catch-up campaign targeting children and adolescents aged 1–19 years of age from November 2007 to November 2008 with measles and rubella containing vaccine (MR). Reported administrative coverage was 103% with rapid coverage monitoring results reporting 94% coverage.

Leptospirosis is endemic in Haiti. Infection in humans may occur indirectly when the bacteria come into contact with the skin (especially if damaged) or the mucous membranes. It can also result from contact with moist soil or vegetation contaminated with the urine of infected animals.

Lymphatic filariasis is endemic throughout the island and transmitted by the night-biting *Culex quinquefasciatis* mosquito. Displaced populations without adequate shelter may be at increased risk of bites from these mosquitoes. LLINs offer some protection against mosquito vectors.

2.6 Other public health risks and considerations

Corpses. It is important to convey to all parties that **corpses do not represent a public health threat**. When death is due to the initial impact of the event and not because of disease, dead bodies have not been associated with outbreaks. Standard infection control precautions are recommended for those managing corpses. (For additional information, see section 4, *Management of dead bodies*).

Malnutrition is a problem in all provinces in Haiti, particularly for children under five years of age. Under-nutrition is an important underlying factor contributing to childhood mortality rates, and has also been linked to impaired cognitive development. Prevalence of acute malnutrition among children under five is an area of serious concern, having doubled in 5 years: national prevalence of acute malnutrition was 4.5% in 2000 (DHS 2000) and 9.1% in 2005 (DHS 2005). Over the period 2000–2007, 41% of infants under 6 months of age were exclusively breastfed.

The earthquake-affected populations are at an increased risk of moderate and severe acute malnutrition, especially in vulnerable groups such as young children, pregnant and lactating women and older persons. This risk is linked to lack of access to appropriate and adequate food, increased cases of diarrhoeal diseases and reduced access to health and nutrition services.

Additionally, the risk may be increased by lack of support for mothers or caretakers for breastfeeding, relactation or appropriate complementary feeding. Uncontrolled donations of infant formula and other breast-milk substitutes can increase morbidity and mortality in infants and young children. (For additional information, see section 4, *Malnutrition*).

Key reproductive health interventions can ensure safe delivery (access to basic and comprehensive emergency obstetric care), and provide clinical management of sexual violence, prevention of HIV transmission and contraceptives to meet demand. These interventions are critical components of the Minimal Initial Service Package (MISP) for reproductive health, which is implemented in the acute phase of an emergency. (For additional information, see section 4, *Reproductive Health in Emergencies*)

Sexually transmitted infections (STIs) including human immunodeficiency virus (HIV). Haiti is affected by a generalized HIV epidemic. An estimated 120 000 people in Haiti are living with the virus (UNAIDS, WHO 2005). In the 2008 Universal Access report 2008, the Ministry of Health and Population estimated there were 47 health centres (7%) providing antiretroviral treatment in Haiti, with over 19 000 patients receiving antiretroviral treatment (ART).

The emergency response should include a minimum package of HIV prevention, treatment and care services, including the strengthening of standard precautions, with the provision of gloves, sterile needles and syringes, and safe waste disposal management in health services. Additional services should include provision of condoms, education and prevention messages, and post-exposure prophylaxis for occupational exposure and survivors of rape. Needle and syringe exchange programmes should be maintained. Efforts should be made to ensure that HIV/AIDS patients receiving ART do not have their treatment interrupted and that ART is provided for the prevention of mother-to-child transmission of HIV.

During emergencies, vulnerable people may be subjected to situations that substantially increase their exposure to STIs, including HIV. Risk factors include massive displacement of people from their homes, women and children left to fend for themselves, prevalence of domestic violence, social services overwhelmed or destroyed, and a lack of means to prevent HIV infection, such as clean needles, safe

blood transfusions and availability of condoms. (For additional information, see section 4, *Gender and Gender-based violence and HIV/AIDS*).

Skin infections occur not only due to overcrowding but also as a result of a lack of water and reduced hygiene. Infestations (e.g. scabies, lice – associated with typhus) are also common and require treatment once they occur.

Noncommunicable diseases (NCDs) are recognized as an important health concern in Haiti. Chronic conditions, including cardiovascular disease (hypertension, ischemic heart disease, cerebrovascular disease and heart failure), cancer, diabetes, chronic respiratory disease and neuropsychiatric disorders, account for an increasing proportion of the disease burden. This group of diseases places a substantial burden on health services and an impoverishing drain on families and communities. The priorities during the acute phase of this emergency are to treat exacerbations and minimize treatment interruptions.

Mental health and psychosocial support. Much of the affected population is likely to be burdened by a wide range of symptoms of normal distress caused by severe loss, trauma, continuing danger, and constrained social and living conditions. It is important for health services to differentiate between normal psychological distress and moderate or severe mental disorders. Normal psychological distress may be reduced through psychological first aid and other psychosocial interventions. However, moderate or severe mental disorders require clinical treatment.

Environmental risks may exist from damaged hazardous installations such as industrial facilities, damaged oil and gasoline depots, warehouses in which agricultural, industrial or other chemicals are stockpiled, as well as damaged technical equipment (e.g. transformers, medical equipment with radiological sources). Most of Haiti's industry is located around Port-au-Prince. Health workers should look out for patients' symptoms that may be consistent with chemical intoxication, especially skin irritation and chemical burns.

Poor management of waste, including health-care waste, can potentially expose health-care workers, waste handlers, patients and the community at large to infection, toxic effects and injuries as well as increasing the risk of polluting the environment. (For additional information, see section 4, *Environmental health in emergencies, UNEP/OCHA Environmental Risk Identification*).

Carbon monoxide poisoning is a risk if petrol-driven generators are used in enclosed spaces. Care should be taken to ensure adequate ventilation where generators are used.

Interrupted power supply. As a result of extended power supply interruption, food is likely to have been spoiled and could become a possible source of disease if consumed. Routine vaccine stocks and the cold chain are also likely to have been compromised.

Drug and equipment donations. Inappropriate donations of medicines, medical equipment and medical supplies can be minimized by donors adhering to the interagency guidelines (for additional information, see section 4, *Drug donations*). In general, the key principles are:

- drug and medical equipment donations should not be a priority;
- donated drugs and medical equipment should explicitly address the expressed official needs of the recipient country;
- donated drugs must be on the national list of registered drugs;
- donated drugs must be labelled in English or the national language;
- the date of expiration of the drugs must be no less than one year from arrival in the country.

(See section 4, *Drug donations*)

Disposing of pharmaceuticals should be by high temperature incineration (i.e. above 1200 ºC). Such incineration facilities, equipped with adequate emission control, are mainly found in the industrialized world. The cost of disposing of hazardous waste in this way ranges from US$ 2000 to US$ 4000 per ton.

Staff health. (See Section 6)

3. Specific priority interventions for immediate implementation

Table 2. Immediate priorities

Health sector priorities

- **Access to surgical, medical and emergency obstetric care and proper case management, particularly for trauma, wounds and burns**
- **Priority immunizations, including mass vaccination campaign for measles/rubella, and tetanus immunization as part of wound care**
- **Communicable disease surveillance and response, including preparedness for epidemic-prone diseases**
- **Support for appropriate infant and young child feeding and malnutrition management**
- **Continuity of care for chronic diseases (e.g. HIV, TB, hypertension, etc)**
- **Public health communication**

Non-health sector priorities impacting health

- **Shelter and site planning**
- **Provision of sufficient and safe water, and sanitation.**

3.1 Case management

Good case management is predicated on ensuring access to care. Access to health care for the affected population is critical, including case management protocols and medications/material to treat likely high-burden conditions (trauma/wounds, communicable and non-communicable diseases, emergency reproductive health services).

Essential medical and surgical care

- Priority must be given to providing emergency medical and surgical care to people with **injury-related conditions.** These account for many of the health-care needs among those requiring medical attention in the immediate aftermath of the event. Falling structures have inflicted crush injuries, fractures, and a variety of open and closed wounds, as well as burns. Appropriate medical and surgical treatment of these injuries is vital to improve survival chances, minimize future functional impairment and disability and ensure as full a return as possible to community life. In order to prevent avoidable death and disability, field health personnel dealing with injured survivors should observe the following basic principles of trauma care. (For additional information, see Annex 1 *Prevention and management of wound infections;* also section 4, *Tetanus; Wounds and injuries, Integrated Management of Essential and Emergency Surgical Care*).

- Patients should be **categorized by severity** of their injuries and treatment prioritized in terms of available resources and chances for survival. The underlying principle of triage is allocation of resources in a manner ensuring the greatest health benefit for the greatest number.
- **Open wounds that are infected, contaminated, or over 6 hours old** should not be closed. Debridement of dead tissue is essential which, depending on the size of the wound, may necessitate a surgical procedure undertaken in appropriate (e.g. sterile) conditions. Any associated involvement of organs, neurovascular structures, or open bone fractures will also necessitate appropriate surgical care.
- After debridement and removal of dead tissue and debris, wounds should be dressed with sterile dressings and the patient scheduled for **delayed primary closure**.
- Patients with open wounds should receive tetanus prophylaxis (vaccine and/or immune globulin depending on vaccination history). Antibiotic prophylaxis or treatment will likely be indicated. (For additional information, see section 4, *Wounds and injuries, Prevention and management of wound infections*).
- **Burns** often follow earthquakes and should be addressed using the core principles of wound management provided in Annex 1. It should also be borne in mind that tetanus prophylaxis is indicated. Care must also be given to airway management, as there is a risk of obstruction especially in cases of burns from fires in enclosed spaces, which leads to high risk of inhalation injury. Patients with burns who are delayed in presenting for care (as may well be the case following an earthquake), may have severe volume depletion.
- Wherever possible, search and rescue workers should be equipped with **basic protective gear** such as footwear and leather gloves to avoid puncture wounds.
- **HIV post-exposure prophylaxis** (PEP) kits should be available to health-care workers, search and rescue workers in case of accidental exposure to contaminated blood and body fluids.
- **Protection of safe blood supply** is essential. Blood should be screened under national standards for HIV antibodies, syphilis, malaria and hepatitis B. The emergency relief package should include rapid or conventional test kits to screen donated blood for these diseases which are common in Haiti. A rapid assessment of availability of these tests is necessary.

Case management of communicable diseases

- Heightened community awareness of the need for **early treatment** and reinforcement of **proper case management** are important in reducing the impact of communicable diseases. The use of **standard treatment protocols** in health-care facilities with agreed-upon first-line drugs is crucial to ensure effective diagnosis and treatment for ARI, the main epidemic-prone diseases (including cholera, dysentery, shigellosis, typhoid, dengue and DHF, hepatitis, leptospirosis, measles, malaria, meningitis and pandemic influenza H1N1 (2009) and STIs.
- **Standard Precautions** aim to ensure hand hygiene and the avoidance of direct contact with blood and body fluids. Therefore essential supplies should include waterless hand antiseptics and personal protection (e.g. gloves). Additional specific (transmission-based) precautions should be determined by risk assessment. It is important that Standard Precautions should be used not only at health-care facilities, but also by health-care workers providing care in the field (see section 4, *Infection prevention and control in health care*).
- **Malaria treatment:** Chloroquine (25 mg base / kg over 3 days) can be used for treatment of uncomplicated malaria, as no *P. falciparum* resistance to chloroquine has yet been reported. In the emergency phase, severe falciparum malaria can be treated with artemether by the intramuscular route as an acceptable and practical alternative. However, as soon as intensive case monitoring becomes possible, artesunate by the intravenous or intramuscular route should be used as the treatment of choice, followed by intravenous quinine.
- **Tetanus**: appropriate management of injured survivors should be implemented as soon as possible to minimize future disability and to prevent avoidable death following disasters. Tetanus vaccine (TT or Td) AND tetanus immune globulin (TIG) are indicated for those with open wounds/lacerations who have never been vaccinated. TIG is indicated for previously vaccinated people who sustain wounds/lacerations (e.g. clean-up workers) depending on their tetanus immunization history.
- Provision of **anti-TB** treatment must be ensured for TB patients who were previously receiving treatment in the affected areas. Approximately 4 000 TB patients were undergoing treatment in

Port au Prince in April 2009 (Global Drug Facility mission report, 2009). Their treatment must not be interrupted and should be provided in line with the directives of the national TB control programme (NTP) services. All aspects of TB case management should also follow the NTP directives. The drugs used to treat the disease, such as rifampicin or streptomycin, must not be used for the treatment of other illnesses.

- **HIV/AIDS:** Efforts should be made to ensure that HIV/AIDS patients receiving ART do not have their treatment interrupted and that ART is provided for the prevention of mother-to-child transmission of HIV.
- **Rabies prophylaxis:** Post-exposure prophylaxis with serum and human vaccine is recommended for all persons bitten by animals.

Noncommunicable diseases

- **Noncommunicable diseases**: Continuation of treatment for those on medications for cardiovascular disease (including hypertension, ischaemic heart disease, cerebrovascular disease and heart failure) diabetes, cancer and renal failure. Where feasible, decentralization of care will increase treatment coverage given the restrictions on movement.

Reproductive health services

- **Access to emergency reproductive health (RH) services and implementation of the** Minimum Initial Service Package (MISP) for Reproductive Health
  - A lead agency for reproductive health should be identified to work within the health cluster/health coordination structure to ensure priority RH needs are addressed and that there is coordination, communication and collaboration in MISP implementation.
  - Sexual violence should be prevented and clinical care provided to survivors of sexual violence (including PEP and emergency contraception).
  - HIV transmission should be prevented.
  - Excess maternal and newborn morbidity and mortality should be prevented, including through unhindered access to basic and emergency obstetric care.
  - Plans should be put in place for the transition to comprehensive reproductive health services.

(For additional information, see section 4, *Reproductive Health*)

3.2 Water and sanitation

Ensuring uninterrupted provision of safe drinking-water is the most important preventive measure in reducing the risk of outbreaks of waterborne diseases.

- UNHCR, WHO and SPHERE recommend that each person be supplied with **at least 15–20 litres** of clean water per day.
- **Chlorine is the most widely available and easily used**, and the most affordable of the drinking-water disinfectants. It is also highly effective against nearly all waterborne pathogens.
  - For point-of-use or household water treatment, the most practical forms of free chlorine are liquid sodium hypochlorite, sodium calcium hypochlorite and bleaching powder.
  - The amount of chlorine needed depends mainly on the concentration of organic matter in the water and has to be determined for each situation. After 30 minutes, the residual concentration of active free chlorine in the water should be 0.5 mg/litre, which can be determined by using a simple field test kit.
- The provision of appropriate and sufficient water containers, cooking pots and fuel can reduce the risk of cholera and other diarrhoeal diseases by ensuring that water storage is protected and that food is properly cooked.
- Key messages on hygiene should be promoted to raise awareness among communities of the relevant health risks.

In addition, adequate sanitation facilities should be provided in the form of latrines or designated defecation areas. These should be separate sex-specific facilities designed and located with attention to security issues.

3.3 Shelter and site planning

- Wherever possible, shelters for the displaced or homeless must be positioned with sufficient space between them and, in accordance with international guidelines (UNHCR), aimed at preventing diseases related to overcrowding or lack of ventilation, such as measles, ARI, diarrhoeal diseases, TB and vector-borne diseases.
- In shelter sites and during food distribution, particular attention and protection should be given to women, the elderly and unaccompanied minors. Women should be included in planning and implementation of shelter and food distribution activities.
- Waste should be disposed in a pit, away from shelters and protected from rodents to reduce the exposure of the population to rodents and other vectors of disease.
- Shelters should be equipped with long-lasting insecticidal nets (LLIN) for each sleeping space to prevent malaria transmission.

3.4 Immunization

- **Measles / Rubella** vaccination is recommended for all persons 6 months–35 years of age who are displaced and living in crowded conditions. The vaccine of choice is either measles-rubella containing vaccine (MR) or measles-rubella-mumps containing vaccine (MMR). Vaccine should be administered as soon as they enter an organized camp or settlement, regardless of previous vaccination or history of measles disease, neither of which are contraindications to receiving the vaccine. Emergency public health personnel, both national and international, should be routinely vaccinated against measles and rubella, regardless of age.
- When the situation stabilizes, **routine vaccinations** offered by the national immunization programme should be made available to all infants, pregnant women and other people as part of the provision of basic emergency health-care services.
- Recommendations for **hepatitis A** vaccination in outbreak situations vary according to the epidemiology of hepatitis A in the community, and the feasibility of rapidly implementing a widespread vaccination programme. The use of hepatitis A vaccine to control community-wide outbreaks has been most successful in small, self-contained communities, when vaccination is started early in the course of the outbreak, and when high coverage of multiple-age cohorts is achieved. Vaccination efforts should be supplemented by health education and improved sanitation.
- Mass **tetanus** vaccination programmes to prevent disease are not indicated. Tetanus vaccine (TT or Td) AND tetanus immune globulin (TIG) is indicated for those with open wounds/lacerations who have never been vaccinated. TIG is indicated for previously vaccinated people who sustain wounds/lacerations (e.g. clean-up workers) depending on their tetanus immunization history.

3.5 Surveillance/early warning and response system

The purpose of the surveillance/early warning and response system is to detect disease outbreaks. Rapid detection of cases of epidemic-prone diseases is essential to ensure rapid control. The surveillance/early warning and response system should:

- focus on the **priority epidemic-prone communicable diseases** most likely to occur in the disaster-affected population;
- be simple to use, uniform in style and include **standard case definitions** and reporting forms (for WHO case definitions, see section 5 for detection of *acute watery diarrhoea, acute bloody diarrhoea, measles, acute respiratory infection, dengue, malaria, jaundice syndrome, meningitis, tetanus, unexplained fevers, any unusual/unexpected public health events, including disease clusters and unexplained disease*);
- include an **alert system** for immediate reporting and prompt investigation of priority epidemic-prone diseases such as *bloody diarrhoea, measles and DHF*;
- include **outbreak preparedness**, with development of specific outbreak response plans and adequate stockpile of supplies such as ORS and Ringer's Lactate for diarrhoeal diseases, amoxicillin and vitamin A for measles, chloroquine for malaria, intravenous solutions and specific medicines for DHF management, erythromycin for pertussis cases and contacts, diphtheria anti-

toxin, erythromycin (cases) and benzathine penicillin G (contacts) for diphtheria, as well as outbreak investigation kits and transport material for laboratory specimens;

- complement **existing surveillance structures**;
- be sensitive to unusual emerging and re-emerging communicable diseases of major public concern, including dengue and diphtheria;
- identify **key laboratories** for prompt diagnosis and confirmation of the main communicable disease threats, as well as protocols for transport and tracking of specimens;
- ensure data is forwarded to the local health authorities and the WHO office.

3.6 Prevention and management of malnutrition

- Infants should normally start breastfeeding within one hour of birth and continue breastfeeding exclusively (with no food or liquid other than breast milk, not even water) until 6 months of age. The aim should be to create and sustain an environment that encourages frequent breastfeeding for children up to 2 years of age. Infants who are not breastfed are vulnerable to infection and diarrhoea. (For additional information, see section 4, *Malnutrition*).
- Only infants who have no access to breast milk require an adequate supply of appropriate breast milk substitutes. Milk powder supplies usually increase in emergency situations, which tend to further exacerbate the low percentage of infants being exclusively breastfed. Reconstituting milk powder in settings where safe water supplies are compromised significantly adds to the risk of death from diarrhoea. In situations where there is no alternative, health-care providers including mothers should be provided with guidance on alternatives to breastfeeding and powdered milks that are nutritionally adequate and safe such as ready-to-use foods. If infant formula is to be given to the infant then health-care providers including mothers should be provided with information about the safe preparation of powdered infant formula products.
- Many adults will have been or will now also be of borderline nutritional status, and given that diarrhoeal disease will further compromise this, attention must be paid not only to the equitable distribution of food, but also to maintaining adequate nutrition of nursing mothers.
- Bacterial infections are very common in severely malnourished children on initial admission to hospital. Clinical management of severely malnourished patients, including fluid management, must be thorough, carefully monitored and supervised. Common problems encountered in severe malnutrition include hypothermia, hypoglycaemia, dehydration and electrolyte disturbances. It is important that the phases and principles of management of severely malnourished children are followed as outlined in WHO guidelines. (For additional information, see section 4, *Malnutrition*).
- In anticipation of increased rates of severe malnutrition (especially in populations experiencing chronic food insecurity), additional supplies of ready-to-use therapeutic feeds (RUTF) should be planned and ordered. RUTF may also be considered for children with moderate malnutrition as a preventive strategy.
- Screening of children for the development of severe acute malnutrition should be implemented at community level and a community-based treatment programme implemented early.
- Populations dependant on food aid need to be given food rations that are safe and adequate in terms of quantity and quality (covering macro- and micro-nutrient needs). Infants from 6 months onwards and older children need hygienically prepared, and easy-to-eat, digestible foods that nutritionally complement breast milk. Regular assessments of households' access to food (including market prices) need to be undertaken and emergency food aid needs to be adapted accordingly. Households' access to facilities for the safe preparation of their food should also be assessed on a regular basis and emergency supplies of necessary utensils and appropriate energy sources for cooking should be adapted accordingly.
- After the acute phase of the emergency, efforts should be made to improve household access to food in a more sustainable way (e.g. seed distribution, land/crop management, income generation activities) and to institute appropriate child-feeding and caring practices, including diversifying diets and improved hygiene. It is important to emphasize that poor hand hygiene exacerbates the spread of diarrhoeal diseases, even in the presence of adequate nutrition.

3.7 Public health communication

Information may be the most important commodity during emergencies. Information may also be the most rapid public health response ahead of the delivery of aid. In addition, the dissemination of information in a timely and transparent manner also helps generate trust and credibility in response activities and agencies providing relief.

- Carry out rapid assessment of current response strategies and health information needs alongside health risk assessments.
- Identify what different groups need to know and do to protect themselves and their communities from identified health risks.
- Develop communications strategies integrated into public health interventions.
- Ensure coordination of health communications activities between response agencies and partners.
- Implement a system to exchange and evaluate communications strategies, ensuring input to decision making.

Sample basic messages for the community:

Safe water

- Even if it looks clear, water can contain germs. Under the present emergency in Haiti, water in the affected areas should be assumed to be contaminated.
- Add drops of chlorine to the water, or boil, before drinking or using for food preparation.
- Keep drinking-water in a clean, covered pot or bucket or other container with a small opening and a cover. It should be used within 24 hours of collection.
- Pour the water from the container – do not dip a cup into the container.
- If dipping into the water container cannot be avoided, use a single cup or other utensil with a handle and which is attached to the container.

Promote good hygienic practice

- Wash hands with soap, ash or lime:
  - before cooking, before eating and before feeding children;
  - after using the latrine or cleaning children after they have used the latrine;
  - wash all parts of hands – front, back, between the fingers and under the nails.
- Minimum of 250 g of soap should be available per person per month.
- Use the latrine to defecate.
- Keep latrines clean.
- Promote recommended respiratory etiquette.

Water sources

- Do not defecate or urinate in or near a source of drinking-water.
- Do not wash yourself, your clothes, or your pots and utensils in the source or the site dedicated for fetching drinking-water (stream, river or water hole).
- In normal circumstances, delta area water sources are likely to be found at surface level, these should be assumed to be contaminated. Further inland, open wells must be covered when not in use to avoid contamination.
- Buckets used to collect water should be hung up when not in use – they must not be left on a dirty surface.
- The area surrounding a well or a hand pump must be kept as clean as possible.
- Do not allow refuse and stagnant water to collect around a water source.

Avoid mosquito bites

- Sleep under an insecticide-treated bednet. Make sure your house or tent/shelter has been properly sprayed with insecticide during the transmission season.
- Wear protective clothing at times when mosquitoes and other biting insects are active.
- Stay indoors when outdoor biting mosquitoes are most active.
- Use insect repellents and mosquito coils if available.
- Remove, destroy or empty small rain-filled containers near the house or tent/shelter.

Safe food

The risk of disease transmission through food preparation can be minimized by adhering (as closely as practicable) to the following recommendations:

- Breastfeeding of infants and young children should be encouraged.
- Water should be considered to be contaminated and made safe through boiling or treatment with chlorine before being consumed or used in food.
- Safe food is particularly important for infants, pregnant women and the elderly who are most susceptible to foodborne diseases.
- Keep clean: wash hands and sanitize equipment used for food preparation, and keep people with symptoms of disease away from food preparation areas.
- Separate raw and cooked food and never use the same equipment for raw foods and foods that are ready-to-eat, unless such equipment has been sanitized.
- Cook food thoroughly until steaming hot, and eat cooked food immediately.
- Use safe water to cook vegetables, and peel fruits that are eaten raw; discard damaged (flooded), spoiled or mouldy food.
- "COOK IT – PEEL IT – OR LEAVE IT".
- Do not allow sick animals or animals found dead to enter the food chain.

Seek treatment early

- Diagnosis and treatment of fever, within 24 hrs of onset of symptoms can be life-saving.
- Early diagnosis and treatment diarrhoea, within 24 hours of onset.
- In the case of diarrhoea, a solution of oral rehydration salts made with safe (boiled or chlorinated) water should be consumed and treatment sought at a health centre.

4. INFORMATION SOURCES

WHO headquarters/WHO Regional Office for the Americas (AMRO/PAHO)

WHO

http://www.who.int/fr/index.html
http://www.who.int/en/

Disease control in humanitarian emergencies (DCE), WHO/HQ

http://www.who.int/diseasecontrol_emergencies/en/

Epidemic Alert and Response Team (EAR), WHO/AMRO - PAHO

http://new.paho.org/
http://new.paho.org/hq/index.php?option=com_pronpro&Itemid=298

Health Action in Crises (HAC), WHO/HQ

http://www.who.int/hac/en/

Child health in emergencies

Emergencies documents

http://www.who.int/child_adolescent_health/documents/emergencies/en/index.html

IMCI Documents

http://www.who.int/child_adolescent_health/documents/imci/en/index.html

Acute respiratory tract infections in children

http://www.who.int/fch/depts/cah/resp_infections/en/

Pocket book for hospital care of children (WHO, 2005)

http://www.who.int/child_adolescent_health/documents/9241546700/en/index.html

Dengue

Dengue Guidelines for diagnosis, treatment, prevention and control. (WHO 2009)

http://www.who.int/csr/resources/publications/dengue/Denguepublication/en/print.html

http://www.who.int/topics/dengue/en/

Guidelines for Dengue Surveillance and Mosquito Control, Second Edition, WHO Regional Office for Western Pacific Region, 2003

http://www.wpro.who.int/publications/pub_9290610689.htm

Update on the principles and use of rapid tests in Dengue WHO *Regional Office for Western Pacific Region April 2009*

http://www.wpro.who.int/internet/resources.ashx/MVP/Update+on+dengue+rapid+tests_15.04.09_final.pdf

Guidelines for treatment of dengue fever and dengue haemorrhagic fever in small hospitals, New Delhi, World Health Organization, WHO Regional Office for South-East Asia, 1999. [pdf-255 kb]

http://www.searo.who.int/LinkFiles/Dengue_Guideline-dengue.pdf

Dengue haemorrhagic fever (film): early recognition, diagnosis and hospital management an audiovisual guide for health-care workers responding to outbreaks.(English version)

http://www.who.int/csr/about/what_we_do/films/en/index.html

Diarrhoeal diseases

Key documents and position papers under

http://www.who.int/cholera/publications/en/

Position paper: Prevention and control of cholera outbreaks: WHO policy and recommendations

http://www.who.int/cholera/technical/prevention/control/en/index.html

WHO position paper on Oral Rehydration Salts to reduce mortality

http://www.who.int/cholera/technical/en/index.html

WHO position paper on cholera vaccine use

http://www.who.int/cholera/CholeravaccineuseinIraqpositionpaper051007.pdf

Acute diarrhoeal diseases in complex emergencies: critical steps.
http://www.who.int/cholera/publications/critical_steps/
http://whqlibdoc.who.int/hq/2004/WHO_CDS_CPE_ZFK_2004.6_fre.pdf
Cholera outbreak: assessing the outbreak response and improving preparedness
http://www.who.int/cholera/publications/cholera_outbreak/
http://whqlibdoc.who.int/hq/2004/WHO_CDS_CPE_ZFK_2004.4_fre.pdf
First steps for managing an outbreak of acute diarrhoea.
http://www.who.int/cholera/publications/first_steps/
http://whqlibdoc.who.int/hq/2004/WHO_CDS_CSR_NCS_2003.7_Rev.1_fre.pdf
Guidelines for the control of shigellosis, including epidemics due to Shigella dysenteriae *type 1*
http://www.who.int/cholera/publications/shigellosis/
http://www.paho.org/english/hcp/hct/eer/Shigella.htm
Oral cholera vaccine use in complex emergencies: What next? Report of a WHO meeting. Cairo, Egypt, 14–16 December 2005. [pdf-3200kb]
http://www.who.int/cholera/publications/cholera_vaccines_emergencies_2005.pdf
Background document: the diagnosis, treatment, and prevention of typhoid fever (WHO, 2003) [pdf-230kb]
http://whqlibdoc.who.int/hq/2003/WHO_V&B_03.07.pdf

Drug donations
Guidelines for Drug Donations (WHO, revised 1999) [pdf-270kb]
http://www.who.int/selection_medicines/emergencies/guidelines_medicine_donations/en/
http://whqlibdoc.who.int/hq/1999/WHO_EDM_PAR_99.4.pdf
http://apps.who.int/medicinedocs/pdf/whozip53f/whozip53f.pdf

Environmental health in emergencies
http://www.who.int/water_sanitation_health/hygiene/emergencies/en/

Food safety
Ensuring food safety in the aftermath of natural disasters
http://www.who.int/foodsafety/foodborne_disease/emergency/en/
Foodborne disease outbreaks: guidelines for investigation and control
http://www.who.int/foodsafety/publications/foodborne_disease/fdbmanual/en/
5 Keys to safer food : simple advice to consumers and food handlers
http://www.who.int/foodsafety/consumer/5keys/en/index.html
http://www.who.int/foodsafety/publications/consumer/en/5keys_fr.pdf
Guideline for the safe preparation, storage and handling of powdered infant formula (WHO, 2007)
http://www.who.int/foodsafety/publications/micro/pif2007/en/index.html
http://www.who.int/foodsafety/publications/micro/pif_guidelines_fr.pdf

Gender & Gender-based violence (see also Reproductive and Sexual Health in Emergencies below)
IASC Guidelines for Gender-based Violence Interventions in Humanitarian Settings (2005) [pdf-1900kb]
Arabic, English, French, bahasa, Spanish
http://www.humanitarianinfo.org/iasc/content/products/docs/tfgender_GBVGuidelines2005.pdf
http://www.humanitarianinfo.org/iasc/pageloader.aspx?page=content-subsidi-tf_gender-gbv
http://www.humanitarianinfo.org/iasc/downloadDoc.aspx?docID=4435
IASC Gender Handbook in Humanitarian Action Women, Girls, Boys and Men Different Needs – Equal Opportunities (2006) [pdf-3200kb]
http://www.humanitarianinfo.org/iasc/content/documents/subsidi/tf_gender/IASC%20Gender%20Handbook%20(Feb%202007).pdf
http://www.humanitarianinfo.org/iascweb2/pageloader.aspx?page=content-products-products&productcatid=3
WHO/UNHCR Clinical management of rape survivors: Developing protocols for use with refugees and internally displaced persons. 2004 - Revised edition
http://www.who.int/reproductive-health/publications/clinical_mngt_rapesurvivors/
http://www.who.int/reproductivehealth/publications/emergencies/924159263X/en/
http://whqlibdoc.who.int/publications/2005/9242592633_fre.pdf

http://whqlibdoc.who.int/publications/2004/924159263X.pdf

Women's health in emergencies

http://www.who.int/hac/techguidance/pht/womenshealth/en/index.html

WHO, UNHCR & UNFPA Clinical Management of Rape e-learning Programme (English and French)

Downloadable version (85 MB)

http://libdoc.who.int/hac/CMoR_CDDownloadMultilingualVersion.zip

Online version: http://iawg.net/cmor/

Hepatitis

Hepatitis A

http://www.who.int/csr/disease/hepatitis/whocdscsredc2007/en/

Hepatitis E

http://www.who.int/csr/disease/hepatitis/whocdscsredc200112/en/

http://www.who.int/mediacentre/factsheets/fs280/en/

HIV/AIDS

Guidelines for addressing HIV in Humanitarian settings: Inter-Agency Standing Committee (IASC) guidelines(2009)

http://www.who.int/hac/techguidance/pht/IASCHIV2009En.pdf

Infection prevention and control in health care

WHO Aide – memoire: Standard Infection control precautions in health care, 2006

http://www.who.int/csr/resources/publications/standardprecautions/en/index.html

Infection prevention and control in health care for confirmed or suspected cases of pandemic (H1N1) 2009 and influenza-like illnesses, 2009

http://www.who.int/csr/resources/publications/swineflu/swineinfinfcont/en/index.html

WHO Policy on TB Infection Control in Health-Care Facilities, Congregate Settings and Households, 2009

http://whqlibdoc.who.int/publications/2009/9789241598323_eng.pdf

Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care WHO Interim Guidelines, 2007

http://www.who.int/csr/resources/publications/swineflu/WHO_CD_EPR_2007_6/en/index.html

Injection safety (see also Patient safety below)

http://www.who.int/injection_safety/en/

http://www.who.int/injection_safety/Injection_safety_final-web.pdf

http://www.who.int/injection_safety/Guiding_Principals_FR.pdf

http://www.who.int/injection_safety/WHOGuidPrinciplesInjEquipFinal.pdf

Immunization, vaccines and biologicals

http://www.who.int/immunization/en/

Laboratory specimen collection

Guidelines for the collection of clinical specimens during field investigation of outbreaks (WHO, 2000)

http://www.who.int/csr/resources/publications/surveillance/WHO_CDS_CSR_EDC_2000_4/en/

Leptospirosis

http://www.who.int/water_sanitation_health/diseases/leptospirosis/en/

Lymphatic filariasis

http://www.who.int/mediacentre/factsheets/fs102/en/

Malaria

Global Malaria Programme: Epidemics and emergencies

http://malaria.who.int/epidemicsandemergencies.html

Guidelines for the treatment of malaria (WHO, 2006)

http://www.who.int/malaria/docs/TreatmentGuidelines2006.pdf

Malaria control in complex emergencies. An inter-agency field handbook (WHO, 2005) [pdf-1500kb]
http://www.who.int/malaria/publications/atoz/924159389X/en/index.html

Malnutrition

Communicable diseases and severe food shortage situations (WHO, 2005) [pdf-250kb]
http://www.who.int/diseasecontrol_emergencies/guidelines/Severe_food_shortages.pdf

The management of nutrition in major emergencies.(WHO, 2000) [pdf-12 800kb]
http://www.who.int/nutrition/publications/emergencies/en/index.html
http://whqlibdoc.who.int/publications/2000/9241545208.pdf

Infant and Young Child Feeding in Emergencies. Operational guidance for emergency relief staff and programme managers (IFE, 2007) [pdf-870kb]
http://www.ennonline.net/pool/files/ife/ops-guidance-2-1-english-010307.pdf

Guidelines for the inpatient treatment of severely malnourished children (WHO, 2003) [pdf-400kb]
http://www.who.int/nutrition/publications/guide_inpatient_text.pdf

Management of the child with a serious infection or severe malnutrition: guidelines at first referral level in developing countries (WHO, 2000)
http://www.who.int/child_adolescent_health/documents/fch_cah_00_1/en/index.html
http://whqlibdoc.who.int/hq/2002/WHO_FCH_CAH_00.1_fre.pdf

Nutrition in emergencies publications
http://www.who.int/nutrition/publications/nut_emergencies/en/

Management of dead bodies

Management of dead bodies after disasters: a field manual for first responders (PAHO, 2006) [pdf-1100kb]
http://www.paho.org/english/dd/ped/DeadBodiesFieldManual.pdf

Management of dead bodies in disaster situations (WHO, 2004)
http://www.paho.org/english/DD/PED/DeadBodiesBook.pdf

Measles

WHO/UNICEF Joint Statement on reducing measles mortality in emergencies [pdf-640kb]
http://whqlibdoc.who.int/hq/2004/WHO_V&B_04.03.pdf
http://www.unicef.org/publications/index_19531.html

WHO Measles Vaccine Position paper
http://www.who.int/immunization/wer7914measles_April2004_position_paper.pdf

*Response to measles outbreaks in measles mortality reduction settings (*This publication replaces "WHO Guidelines for Epidemic Preparedness and Response to Measles Outbreaks", May 1999.)
http://www.who.int/immunization/documents/WHO_IVB_09.03/en/index.html
http://www.who.int/immunization/documents/date/en/index.html

WHO measles information
http://www.who.int/immunization/topics/measles/en/index.html
http://www.who.int/immunization/wer7914measles_April2004_position_paper.pdf

Measles fact sheet
http://www.who.int/mediacentre/factsheets/fs286/en/

Medical waste in emergencies

http://www.who.int/water_sanitation_health/medicalwaste/emergmedwaste/en/

Guidelines for Safe Disposal of Unwanted Pharmaceuticals in and after Emergencies (WHO, 1999)
http://www.healthcarewaste.org/en/documents.html?id=15&suivant=16

Four steps for the sound management of health-care waste in emergencies (WHO, 2005)
http://www.healthcarewaste.org/en/documents.html?id=184&suivant=8

Meningitis

Control of epidemic meningococcal disease. WHO practical guideline, 2nd edition (WHO, 1998)
http://www.who.int/csr/resources/publications/meningitis/WHO_EMC_BAC_98_3_EN/en/
http://www.who.int/csr/resources/publications/meningitis/whoemcbac983f.pdf

Mental health in emergencies

http://www.who.int/mental_health/emergencies/en/

IASC Guidelines on Mental Health and Psychosocial support in Emergency settings (2007) [pdf-800kb]

http://www.humanitarianinfo.org/iasc/content/products/docs/Guidelines%20IASC%20Mental%20Health%20Psychosocial.pdf

http://www.humanitarianinfo.org/iascweb2/pageloader.aspx?page=content-products-products&productcatid=22

http://www.humanitarianinfo.org/iascweb2/downloaddoc.aspx?docID=4453&type=pdf

Ministry of Health Haiti

http://www.mspphaiti.org/indexy.html

Pandemic Influenza

Global Influenza Program

http://www.who.int/csr/disease/influenza/en/

Pandemic influenza preparedness and mitigation in refugee and displaced populations. Second edition May 2008.[pdf -550 kb]

http://www.who.int/diseasecontrol_emergencies/HSE_EPR_DCE_2008_3rweb.pdf

Patient safety (see also Injection safety above)

http://www.who.int/patientsafety/en/

Polio

WHO-recommended surveillance standard of poliomyelitis

http://www.who.int/immunization_monitoring/diseases/poliomyelitis_surveillance/en/index.html

Rabies

WHO-Guide for post-exposure prophylaxis

http://www.who.int/rabies/human/postexp/en/

WHO- Rabies page

http://www.who.int/topics/rabies/en/

PAHO-Elimination of Neglected Diseases and other poverty-related infections

http://new.paho.org/hq/index.php?option=com_content&task=view&id=1640&Itemid=1425&lang=en

OPS-Plan de Acción para la Prevención y el Control de la Rabia en las Américas, Etapa 2005—2009

http://www.paho.org/spanish/ad/dpc/vp/rabia-plan-05-09.htm

Reproductive and Sexual Health in Emergencies (see also Gender and Gender based violence above)

http://www.who.int/topics/reproductive_health/en/

Minimal Initial Service package (MISP) for Reproductive Health in Crisis Situations

http://www.searo.who.int/LinkFiles/Publications_MISP.pdf

http://www.iawg.net/resources/MISP%20cheat%20sheet%2012%2017%2009_FINAL.pdf

Reproductive Health in Emergencies (general)

http://www.who.int/reproductivehealth/topics/emergencies/en/index.html

http://www.iawg.net/resources/

Key steps for maternal and newborn health in humanitarian crisis

http://www.who.int/making_pregnancy_safer/documents/keysteps/en/index.html

Reproductive Health in refugee situations

http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/a61939/en/

http://whqlibdoc.who.int/hq/1999/a85180.pdf

Risk communication

Information management and communication in emergencies and disasters.

http://new.paho.org/disasters/index.php?option=com_content&task=view&id=997&Itemid=1

WHO Outbreak Communication Planning Guide, 2008.

http://www.who.int/ihr/elibrary/WHOOutbreakCommsPlanngGuide.pdf

WHO Outbreak communication guidelines

http://www.who.int/infectious-disease-news/IDdocs/whocds200528/whocds200528en.pdf

Specific messages:

Hand hygiene:
http://www.who.int/gpsc/5may/How_To_HandWash_Poster.pdf
Food safety:
http://www.who.int/foodsafety/publications/consumer/5keys/en/index.html
http://www.who.int/foodsafety/publications/consumer/en/5keys_fr.pdf
http://www.who.int/foodsafety/publications/consumer/5keys_creole.pdf
Preventing water-related diseases:
http://www.who.int/features/qa/31/en/

Snakebite
Guidelines for the clinical management of snakebite in the South-East Asia Region
http://www.searo.who.int/LinkFiles/SDE_mgmt_snake-bite.pdf

Surgical care (see also Tetanus and Wounds and Injuries sections below)
Integrated Management of Essential and Emergency Surgical Care (IMEESC) tool kit
http://www.who.int/surgery/publications/imeesc/en/index.html

Tetanus
Immunological basis of immunisation – tetanus
http://www.who.int/immunization/documents/ISBN9789241595551/en/index.html
WHO Position Paper on Tetanus Immunisation
http://www.who.int/immunization/wer8120tetanus_May06_position_paper.pdf

Travel advice
Guide on Safe Food for Travellers
http://www.who.int/foodsafety/publications/consumer/travellers/en/index.html
http://www.who.int/foodsafety/publications/consumer/travellers_fr.pdf
International Travel and Health (2009)
http://www.who.int/ith/en/

Tuberculosis
Tuberculosis care and control in refugee and displaced populations. An interagency field manual (2007). [pdf-960kb]
http://whqlibdoc.who.int/publications/2007/9789241595421_eng.pdf.

Vector control
Integrated vector management
http://www.who.int/malaria/vector_control/ivm/en/index.html
http://www.who.int/malaria/vector_control/ivm/en/index.html
Malaria vector control
http://www.who.int/malaria/vectorcontrol.html
Pesticides and their application for the control of vectors and pests of public health importance (2006) [pdf-820kb]
http://whqlibdoc.who.int/hq/2006/WHO_CDS_NTD_WHOPES_GCDPP_2006.1_eng.pdf

Water and Sanitation

Guidelines for drinking-water quality, third edition, incorporating first addendum
http://www.who.int/water_sanitation_health/dwq/gdwq3rev/en/index.html
Environmental health in emergencies and disasters: a practical guide
http://www.who.int/water_sanitation_health/emergencies/emergencies2002/en/index.html
WHO Technical notes for emergencies
http://www.who.int/water_sanitation_health/hygiene/envsan/technotes/en/index.html
Frequently asked questions in case of emergencies
http://www.who.int/water_sanitation_health/emergencies/qa/en/index.html
Four steps for the sound management of health-care waste in emergencies
http://www.healthcarewaste.org/en/documents.html?id=184&suivant=25

Wounds and Injuries (See also Tetanus above)

Prevention and management of wound infection [pdf-40kb]

http://www.who.int/hac/techguidance/tools/guidelines_prevention_and_management_wound_infection.pdf

Integrated Management of Essential and Emergency Surgical Care (IMEESC) tool kit

http://www.who.int/surgery/publications/imeesc/en/index.html

Best Practice Guidelines on Emergency Surgical Care in Disaster Situations [pdf-2254kb]

http://www.who.int/surgery/publications/BestPracticeGuidelinesonESCinDisasters.pdf

WHO generic essential emergency equipment list [pdf-111kb]

http://www.who.int/surgery/publications/EEEGenericListFormatted%2006.pdf

Zoonotic diseases

http://www.who.int/zoonoses/resources/en/

5. WHO-RECOMMENDED CASE DEFINITIONS

ACUTE DIARRHOEA
Acute diarrhoea (passage of 3 or more loose stools in the past 24 hours) with or without dehydration.

SUSPECTED CHOLERA
In an area where cholera is not known to be present: a person aged >5 years with severe dehydration or death from acute watery diarrhoea with or without vomiting.
In an area where there is a cholera outbreak: a person aged >5 years with acute watery diarrhoea with or without vomiting.

To confirm a case of cholera:
Isolation of *Vibrio cholera* O1 or O139 from a diarrhoeal stool sample.

BLOODY DIARRHOEA
Acute diarrhoea with visible blood in the stool.
To confirm a case of epidemic bacillary dysentery: take a stool specimen for culture and blood for serology; isolation of *Shigella dysenteriae* type 1.

ACUTE FLACCID PARALYSIS (SUSPECTED POLIOMYELITIS)
Acute flaccid paralysis in a child aged <15 years, including Guillain–Barré syndrome, or any acute paralytic illness in a person of any age in whom poliomyelitis is suspected.

ACUTE HAEMORRHAGIC FEVER SYNDROME
Acute onset of fever (duration of less than 3 weeks) and any of the following:

- haemorrhagic or purpuric rash
- vomiting with blood
- cough with blood
- blood in stools
- epistaxis
- other haemorrhagic symptoms.

ACUTE JAUNDICE SYNDROME
Illness with acute onset of jaundice **and** absence of any known precipitating factors **and/or** fever.

ACUTE LOWER RESPIRATORY TRACT INFECTIONS/ PNEUMONIA IN CHILDREN AGED <5 YEARS
Cough or difficulty breathing
and
Breathing 50 or more times per minute for infants aged 2 months to 1 year
Breathing 40 or more times per minute for children aged 1 to 5 years
and
No chest indrawing, no stridor, no general danger signs.

Note: **Severe pneumonia** = cough or difficulty breathing **+ one or more of the following** (inability to drink or breastfeed, severe vomiting, convulsions, lethargy or unconsciousness) or chest indrawing or stridor in a otherwise calm child

MALARIA

Person with current fever or history of fever within the past 48 hours (with or without other symptoms such as nausea, vomiting and diarrhoea, headache, back pain, chills, muscle pain) with positive laboratory test for malaria parasites (blood film (thick or thin smear) or rapid diagnostic test).

In children

Uncomplicated malaria

Fever AND no general danger signs such as lethargy or unconsciousness, convulsions, or inability to eat or drink. Where possible, confirm malaria with laboratory test.

Severe malaria

Fever AND general danger signs (lethargy or unconsciousness, convulsions, or inability to eat or drink).

MEASLES

Fever **and** maculopapular rash (i.e. non-vesicular) **and** cough, coryza (i.e. runny nose) or conjunctivitis (i.e. red eyes).

or

Any person in whom a clinical health worker suspects measles infection.

To confirm a case of measles:

Presence of measles-specific IgM antibodies.

MENINGITIS

Suspected case

Sudden onset of fever (>38.5 °C) with stiff neck.

In patients aged ≤12 months, a suspected case of meningitis occurs when fever is accompanied by a bulging fontanelle.

Probable case of bacterial meningitis

Suspected case of acute meningitis, as defined above, with turbid cerebrospinal fluid.

Probable case of meningococcal meningitis

Suspected case of meningitis, as defined above **and** gram stain showing gram-negative diplococcus **or** ongoing epidemic **or** petechial or purpural rash.

Confirmed case of meningococcal meningitis

Suspected or probable case, as defined above, with **either** positive-CSF antigen detection for *Neisseria meningitidis* **or** positive CSF culture or blood with identification of *N. meningitidis*.

TETANUS

Adult tetanus

Either of the following signs 3–21 days following an injury or wound:

- trismus of the facial muscles or risus sardonicus
- painful muscular contractions.

Neonatal tetanus

Any neonate with normal ability to suck and cry during the first 2 days of life who, between day 3 and day 28, cannot suck normally, or any neonate who becomes stiff or has spasms or both.

UNEXPLAINED FEVER

Fever (body temperature >38.5 °C) for >48 hours and without other known etiology.

UNEXPLAINED CLUSTER OF HEALTH EVENTS

An aggregation of cases with similar symptoms and signs of unknown cause that are closely grouped in time and/or place.

6. Staff health

Vaccinations and malaria prophylaxis recommended for staff deployed to Haiti

Emergency settings differ vastly in their nature but also by epidemiological context. It is thus essential that medical preparation is as comprehensive as possible (with the limitations imposed by departure at short notice) and tailored specifically for Haiti.

A minimum period of time is needed to build up protective levels of antibodies after immunization, which additionally may require several injections. If possible vaccinations should be received 2 weeks in advance of departure (see table below). The duration of the mission may influence choice of vaccines in case of immediate departure.

Personal protection against mosquito bites day and night is important in preventing vector-borne diseases such as dengue and malaria (long-sleeved clothes, repellents, insecticide-treated mosquito nets).

Basic knowledge on First Aid and stress is important. Some teams may have to handle large numbers of dead bodies. The emotional overload in performing such an unusual and heavy task without specific training can provoke significant reactions of traumatic stress and even lead to psychological trauma, or a rapid onset of burn-out. Even if this is not always avoidable, good preparation can be useful for preventing and limiting stress. (For additional information, see section 4, *Travel advice*).

A. Vaccination recommendations

	Vaccine	Validity	Comments
Strongly recommended			
	Diphtheria	10 years	Can be combined with tetanus.
	Tetanus	10 years	Booster dose is recommended if not taken in the last 10 years
	Polio	10 years	
	Typhoid	3 years	
	Hepatitis A	life	If there is no proof of immunity by vaccine or illness, even if departure at short notice. Can be combined with Hepatitis B.
	Hepatitis B	Life	Provided complete course given.
Optional			
	Rabies	5 years	Day 0,7 and 21
	Measles		Potential risk in emergency situation. If not fully immunized in childhood, obtain vaccination.

NB: A Yellow Fever vaccination certificate is required from travelers coming from infected areas

B. Malaria prophylaxis and treatment

- Malaria is an acute febrile illness with an incubation period of 7 days or longer. Falciparum malaria may be fatal if treatment is delayed beyond 24 hours after the onset of clinical symptoms.
- Malaria risk, exclusively due to *P. falciparum*, exists throughout the year in the entire country. The recommended prevention is weekly chloroquine chemoprophylaxis in combination with mosquito bite prevention between dusk and dawn (e.g. use of insecticide-treated bednets, repellents, protective clothing). Malaria chemoprophylaxis with atovaquone–proguanil, doxycycline or mefloquine can also be used.

It is recommended that a stand-by emergency **treatment** for *P.falciparum* be carried with the individual for all missions lasting more than 8 days in view of the potential difficulty in accessing health services. If the traveler takes chemoprophylaxis, the same medicine should not be used for treatment. For this reason the recommended medication for stand-by emergency treatment is **artemether–lumefantrine** (Coartem™), which is never used for prophylaxis.

C. Other precautions

Teams should be prepared to be completely self-sufficient, including:

- Medical kits including chlorine tablets for water purification
- PEP kit
- Surgical masks
- Gloves
- Food and water: given that there will be an extreme shortage of basic food and drinking water.
- Tents
- Personnel equipment (torches etc)
- Adequate supplies of personnel medications.

The information given above may need to be updated given the evolving situation regarding health issues in Haiti.

Annex 1.

Department of Violence and Injury Prevention and Disability
World Health Organization

Prevention and management of wound infection

Guidance from WHO's Department of Violence and Injury Prevention and Disability and the Department of Essential Health Technologies

Introduction

Open injuries have a potential for serious bacterial wound infections, including gas gangrene and tetanus, and these in turn may lead to long term disabilities, chronic wound or bone infection, and death. Wound infection is particularly of concern when injured patients present late for definitive care, or in disasters where large numbers of injured survivors exceed available trauma care capacity. Appropriate management of injuries is important to reduce the likelihood of wound infections. The following core principles and protocols provide guidance for appropriate prevention and management of infected wounds.

Core Principles

- **Never close infected wounds**[1]. Systematically perform wound toilet and surgical debridement (described in Protocol 1 given below). Continue the cycle of surgical debridement and saline irrigation until the wound is completely clean.
- **Do not close contaminated wounds**[2] **and clean wounds that are more than six hours old**. Manage these with surgical toilet, leave open and then close 48 hours later. This is known as **delayed primary closure**.
- **To prevent wound infection**:
    - Restore breathing and blood circulation as soon as possible after injury.
    - Warm the victim and at the earliest opportunity provide high-energy nutrition and pain relief.
    - Do not use tourniquets.
    - Perform wound toilet and debridement as soon as possible (within 8 hours if possible).
    - Respect universal precautions to avoid transmission of infection.
    - Give antibiotic prophylaxis to victims with deep wounds and other indications (described in Protocol 3).
- **Antibiotics do not reach the source of the wound infection**. Antibiotics only reach the area around the wound; they are necessary but not sufficient and need to be combined with appropriate debridement and wound toilet as described above.
- **Use of topical antibiotics and washing wounds with antibiotic solutions are not recommended**.

1. An ***infected wound*** is a wound with pus present.
2. A ***contaminated wound*** is a wound containing foreign or infected material.

Protocols

Protocol 1: Wound toilet and surgical debridement

Apply one of these two antiseptics to the wound:

- ***Polyvidone-iodine 10%*** solution apply undiluted twice daily.
  The application to large open wounds may produce systemic adverse effects.
- ***Cetrimide 15% + chlorhexidine gluconate 1.5%***

Note: The freshly prepared aqueous solution (0.05%) of ***Chlorhexidine gluconate 5%*** is not recommended in emergency situations (risk of flakes according to water quality)

1. **Wash the wound** with large quantities of soap and boiled water for 10 minutes, and then irrigate the wound with saline.
2. **Debridement**: mechanically remove dirt particles and other foreign matter from the wound and use surgical techniques to cut away damaged and dead tissue. Dead tissue does not bleed when cut. Irrigate the wound again. If a local anaesthetic is needed, use 1% ***lidocaine*** without epinephrine.
3. **Leave the wound open**. Pack it lightly with damp saline disinfected or clean gauze and cover the packed wound with dry dressing. Change the packing and dressing at least daily.

Protocol 2: Management of tetanus-prone wounds

1. Wounds are considered to be tetanus-prone if they are sustained either more than 6 hours before surgical treatment of the wound or at any interval after injury and show one or more of the following: a puncture-type wound, a significant degree of devitalized tissue, clinical evidence of sepsis, contamination with soil/manure likely to contain tetanus organisms, burns, frostbite, and high velocity missile injuries.
2. For patients with tetanus-prone injuries, WHO recommends TT or Td and TIG.
3. When tetanus vaccine and tetanus immunoglobulin are administered at the same time, they should be administered using separate syringes and separates sites.

Tetanus vaccine

ADULT and CHILDREN over 10 years:

- ***Active immunization with tetanus toxoid (TT) or with tetanus and diphtheria vaccine (Td)***

  1 dose (0.5 ml) by intramuscular or deep subcutaneous injection. Follow up: 6weeks, 6 months.

CHILDREN under 10 years:

Diphtheria and tetanus vaccine **(DT)**
0.5 ml by intramuscular or deep subcutaneous injection. Follow up at least 4 weeks and 8 weeks.

Tetanus immune globulin (TIG)

In addition to wound toilet and absorbed tetanus vaccine. Also consider if antibacterial prophylaxis (Protocol 3 below) is indicated.

ADULT and CHILD

- ***Tetanus immunoglobulin (human)*** 500 units/vial
  250 units by intramuscular injection, increased to 500 units if any of the following conditions apply: wound older than 12 hours; presence, or risk of, heavy contamination; or if patient weights more than 90 kg.

Note: national recommendations may vary

Protocol 3: Antibiotic prophylaxis and treatment

Antibiotic prophylaxis

Antibiotic prophylaxis is indicated in situations or wounds at high risk to become infected such as: contaminated wounds, penetrating wounds, abdominal trauma, compound fractures, lacerations greater than 5 cm, wounds with devitalized tissue, high risk anatomical sites such as hand or foot. etc. These indications apply for injuries which may or may not require surgical intervention. For injuries requiring surgical intervention, antibiotic prophylaxis is also indicated and should be administered prior to surgery, within the 2 hour period before the skin is cut.

Recommended prophylaxis consists of penicillin G and metronidazole given once (more than once if the surgical procedure is > 6 hours).

- ***Penicillin G*** ADULT: IV 8-12 million IU once. CHILD: IV 200,000 IU/kg once.
- ***Metronidazole*** ADULT: IV 1,500 mg once (infused over 30 min). CHILD: IV 20 mg/kg once.

Antibiotic treatment

If infection is present or likely, administer antibiotics via intravenous and not intramuscular route.

Penicillin G and metronidazole for 5-7 days provide good coverage.

- ***Penicillin G*** ADULT: IV 1 - 5 MIU every 6 hours.
  After 2 days it is possible to use oral Penicillin: Penicillin V 2 tablets every 6 hours.
  CHILD: IV 100mg/kg daily divided doses (with higher doses in severe infections),
  In case of known allergy to penicillin use erythromycin.

  In case of sudden allergy reaction (seldom):
  IM adrenaline 0.5 - 1.0 mg to adults. 0.1 mg/ 10 kg body weight to children.

- ***Metronidazole*** ADULT: IV 500 mg every 8 hours (infused over 20 minutes).
  CHILD: IV 7.5 mg/kg every 8 hours.