

severity (including severe pain) such that the absence of immediate medical attention could reasonably be expected to result in placing the patient's health in serious jeopardy, serious impairment to bodily functions, or serious dysfunction of any bodily organ or part. In other words, there must be a chance of serious long-term consequences (even death) if treatment is not obtained immediately.

This definition is perfectly fine for the purposes of this discussion, although it can be asked who makes the final determination of whether it is an actual emergency. Keep in mind that physicians or other medical practitioners might not always be available at the project site. There is currently no internationally accepted definition of a medical emergency.

Occupational medical emergencies at the project site can include:

- Open fractures and lacerations, resulting in bleeding that cannot be controlled by pressure alone;
- Bleeding from internal injuries resulting in pain, distress and loss of consciousness;
- Burns over large parts of the body, including chemical burns from hazardous chemical spills;
- Ambient heat-related illnesses such as dehydration, heat exhaustion, heat cramps, and heat stroke (also known as sun stroke); and
- Loss of consciousness from entering closed vessels.

Non-occupational medical emergencies at the project site can include:

- Cardiopulmonary emergencies, including cardiac arrest, ventricular tachycardia and ventricular fibrillation;
- Neurological emergencies, including seizures, unrelenting headaches and strokes;
- Psychiatric emergencies, including hallucinations, suicide ideation, or any life-threatening behaviour directed at self or others;
- Hypoglycaemia, or low blood sugar levels, in insulin-dependent diabetics;
- Anaphylactic reactions or life-threatening allergic reactions, to foods, insect stings, medications and latex;
- Sudden onset pain, possibly from appendicitis, gall stones or kidney stones;
- Snake and spider bites, where the venom may cause bleeding, kidney failure, a severe allergic reaction, tissue death around the bite, and/or breathing problems;.and
- Breathing difficulties and shortness of breath.

Of course, medical emergencies can involve a single patient, or multiple patients, depending on the nature of the incident that resulted in the injuries.

The medical emergency response plan

Opening remarks

In this section we'll discuss what must be included in a medical emergency response plan, especially for projects in remote sites or in third world countries. A medical emergency response plan is a roadmap for how to respond to, and transport an ill or injured person from the project site to a definitive care facility.

Figure 1 lists eight components or sections of a typical medical emergency response plan. Each of these is discussed in turn below.

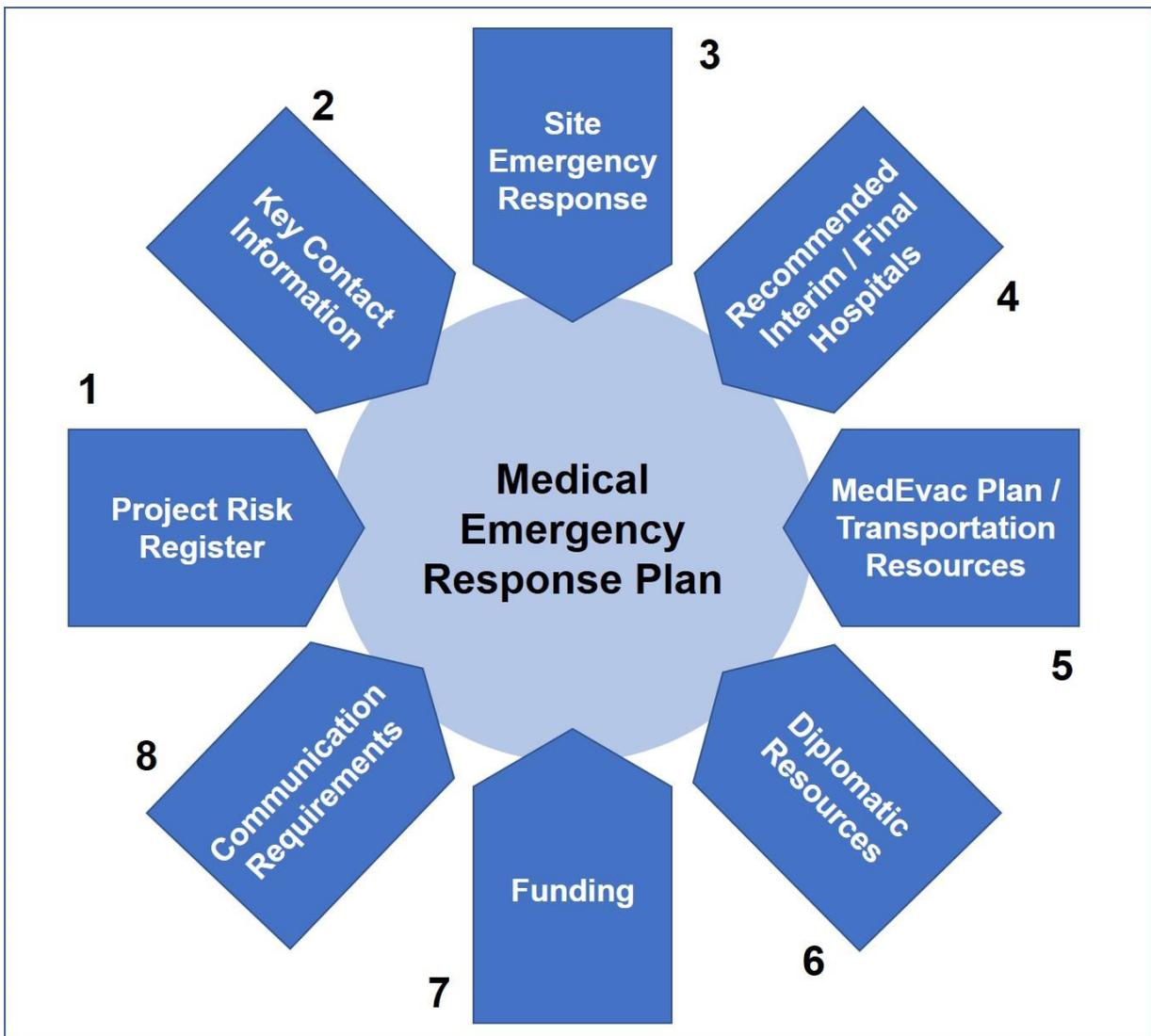


Figure 1: Components of a medical emergency response plan

Project risk register

When operating internationally, each project location comes with its own risks. Many viruses are more prevalent in warmer areas of the world, and political instability can

lead to violence and injury. Ensure that site specific health and security risks are included in the risk register for the project so that these can be assessed, and preventive and mitigation actions can be put in place.

Knowing the types and symptoms of infectious diseases in an area (e.g. malaria and dengue fever) can help medical personnel identify deadly infections early. If an area is known for poisonous snakes, spiders and scorpions, this must also be addressed in the project risk register. Political instability and the potential for terrorism can pose serious risk to project staff.

The project risk register is a working document and is continually updated. Make sure that new health risks identified for the project site are carried through to the medical emergency response plan.

Key contact information

This section of the medical emergency response plan should include the contact information for key project team members, relevant government departments, local emergency services, transport services, air evacuation support, telemedicine services and embassies. In addition to names and phone numbers for contacts, including e-mail addresses and even time zones can be helpful, especially when developing an emergency medical response plan for a remote project site.

Much of the contact information may be repeated in other parts of the medical emergency response plan, or included in flowcharts, but it is good to have all key contact information in one easily accessible place.

Site emergency response

If your company does not have a formal medical programme, you may want to investigate ways to provide timeous medical and first-aid services. If medical facilities are available near your worksite, you can arrange for them to handle emergency cases. In the case of project sites in remote locations, you will have to be able to provide primary emergency response. This means that several members of the project team must have adequate training in first aid. Treatment of a serious injury should begin within three to four minutes of the accident.

Depending of the remoteness of the project site, project scope, and the inherent project risks identified, it may be prudent to appoint a full-time paramedic, nursing staff and/or a physician on the project team. A facility with the appropriate first-aid supplies for emergencies should be available for medical staff to stabilise patients on the project site. Consult with a physician to order the appropriate first-aid supplies for the project. It is always beneficial for medical personnel to be accessible to provide advice and consultation in resolving health problems that occur in the workplace. Provide clear guidance about what should be done in case of a medical emergency. The paramedics

should be given vital information about the nature of the emergency and the exact location of the response.

Consider purchasing a portable automated external defibrillator to deal with cardiac events. These are relatively inexpensive, easy to operate with limited training, and can save lives. Depending on the availability of a trustworthy ambulance service near the project site, it may be necessary to buy an ambulance for the project to transport injured or ill workers. At the very least, a suitable vehicle should be dedicated to the medical emergency response team

Recommended hospitals

A list of local hospitals, if any, is an essential part of every medical emergency response plan. The list should include the specialist competencies and capabilities of each hospital in order to make decisions regarding the best options for the patient. Depending on the distance between the project site and definitive care, it can be beneficial to include both a stabilisation hospital (interim) and a definitive care hospital (final). Where there are no hospitals near the project site, a well-stocked and site-based emergency treatment centre is essential for stabilisation of patients.

The capabilities of each hospital should be thoroughly vetted by a physician before being included in the response plan. Some hospitals in third world countries may look impressive from the outside, but the quality of care may be lacking.

Expatriate project team members might insist on being transported back to their countries of origin for definitive care.

Medevac plan

Medical evacuation, often shortened to medevac, is the timely and efficient movement and en-route care provided by medical personnel to injured or ill patients being evacuated from the project site, or the scene of an accident, to receiving medical facilities using ground vehicles (ambulances) or aircraft (air ambulances). The term is also used when transporting patients from a rural hospital to a better-equipped facility. An example of an air ambulance is shown in Figure 2.

The medevac plan lays out all the steps that should be taken when a medical emergency arises. The medevac plan is normally displayed as a flowchart, and should include the following steps (adapted from Remote Medical International, 2017):

- **Primary response:** Who responds to the injured or ill party, when alarm is made and what are their responsibilities? Will there be anybody at the project site with medical training (i.e. a paramedic or physician)?
- **Evaluation:** Evaluation of the injury or illness to determine if it's a medical emergency. Who makes the call and what to do if the patient is treated on-site, but their condition worsens? Consider using telemedicine services when uncertain;

- **Evacuation:** Decide on the preferred medical service provider and ensure you have the exact coordinates and fastest route to their facilities. Transport, or arrange for transport, of the patient by an evacuation provider to the medical service provider. Medevac plans should include information for both ground and air transport service providers. Note that the median charge for an air ambulance trip is approximately US\$40 000 (Abudeff, 2019).
- **Dealing with expatriates:** Expatriate project team members wishing to return to their countries of origin for definitive care, make the evacuation process significantly more complicated and may require the involvement of diplomatic resources.

This flowchart should be easy for anyone to follow, including non-medical professionals. The relevant project team members should be trained in the use of the evacuation plan and mock emergencies should be staged on an annual basis.



Figure 2: Example of an air ambulance

Diplomatic resources

Transport of seriously ill or injured patients across a country's borders to enable expatriates to receive treatment in their home countries will often require assistance from diplomatic resources of the home country. It is therefore essential to have contact details of relevant authorities at the embassies of the home countries of expatriate project team members.

Address, GPS coordinates, phone number, email, website, and office hours should be included in the medical emergency response plan for each embassy. Ideally, the

project team should visit the different embassies and obtain names and numbers of officials who can be of assistance during an emergency trans-border medevac.

Funding

Maintaining a medical presence, such as a paramedic or a physician, on a project site is expensive. Depending on the remoteness of the project site, and/or the need for trans-boundary evacuation of expatriates, medevac expenditure can be extremely high. Somebody must pay for it. Most project team members will have some form of medical insurance which may or may not cover the medevac cost. However, there will not be time for such negotiations in a real medical emergency.

The project company must be willing and able to pay for medevac cost up-front, even for non-occupational medical emergencies. Air ambulance services and helicopter services may require proof of payment before they even respond to a call-out. Attempts can be made at a later stage to recover the expenses from medical insurance.

Communication requirements

A good medical emergency response plan can be thwarted with an ineffective communication system. This means that reliable communication systems should be in place at the project site and that those to be informed of the incident are clearly indicated with their contact details.

The first requirement is a system to raise alarm and initiate the emergency response plan. Emergencies should be reported effectively to first response support teams, site and project management, patients' families, project team members, and other interested parties. Depending on the nature of the incident, it may be required to inform the Department of Labour of the host country.

Responsibilities of the project owner

It is the responsibility of the project owner and the project management team to ensure a safe work environment during project execution. This is normally well defined in government regulations, environmental and social impact assessments, company policy and project financier requirements.

As a minimum, project owners are responsible for the following:

- **Effective risk management:** Identify and analyse risks and undertake the necessary preventive and mitigation steps;
- **Emergency planning:** Plan for the worst possible scenarios as far as medical emergencies are concerned and be ready for whatever happens;
- **Safe work procedures:** Develop safe work procedures for every activity on the project and enforce the use thereof;

- **Emergency response teams:** Appoint, develop and train members of the project team as emergency responders;
- **Medical support:** If medical support cannot reach the site within a reasonable time, the project owner should appoint medical professionals;
- **Medical equipment:** A well-stocked medical facility should be available on remote project sites for stabilisation of ill or injured patients;
- **Transport:** Dedicated transport, preferably an ambulance, should be available at the project site to transport seriously ill or injured patients;
- **Financial support:** Allocate a portion of the project contingency for medical emergencies. Pre-approve the cost of medevac services;
- **Communication:** Communicate openly and regularly to the families of injured or ill parties. Report injuries as required to the relevant government departments; and
- **Psychological support:** Provide psychological support to the patient and families, as required, to enable them to work through the crisis.

Responsibilities of the individual

Where the project owner focuses on a safe work environment and safe work practices, individual team members are also responsible for their own safety, particularly as far as pre-existing medical conditions are concerned.

As a minimum, individuals are responsible for the following (adapted from Harvard Health Publishing, 2018):

- **Medical insurance:** Project team members, especially expatriates and project consultants, should ensure that they have the appropriate medical insurance for the type and location of the work that they will be doing;
- **Primary care physician:** List the names, addresses, and phone numbers for your health care team, especially your primary care physician and any specialists who treat you on a regular basis;
- **Medical history:** List your current and past medical conditions and surgeries, major illnesses of your immediate family members, and any physical challenges or disabilities you may have (i.e. pacemakers or hearing aids);
- **Current medication:** List all the medications and supplements you currently take. Write down the name, dose, and frequency of each medication. Having a list of medicines used can be beneficial because some can have side effects;
- **Emergency contacts:** List your emergency contacts (note: more than one person, in case someone isn't available). Include each person's name, phone numbers, e-mail addresses, and relationship to you. Tell your emergency contacts in advance that you're putting them on your list.

- **Living will:** This details the kind of medical care you'd like if you're unable to make your own health care decisions. It may be specific, stating if you want any life-sustaining treatments such as antibiotics or dialysis; or it may be more generic, simply stating whether you want to be on life support, or not; and
- **Health care proxy:** Name your health care proxy, the person you designate to make your health care decisions if you lack the capacity to make them. Make sure to have a conversation with your designated proxy about what type of care is preferable. Without this conversation, the proxy will be at a loss at the time of emergency.

This information should be readily available in the individual's personnel file, or a file at the emergency station. One option is to have this information available on one's phone, but the patient and phone may become separated during an emergency.

Concluding remarks

Planning for medical emergencies for a project takes time, effort and the input of several trained professionals. It is essential to include the services of a physician on the planning team, preferably someone with extensive experience in the field of medical evacuation.

It is recommended to practice the medical emergency plan through the staging of mock emergencies. Things which seem logical to us when calm may not be so straight forward during times of crisis.

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