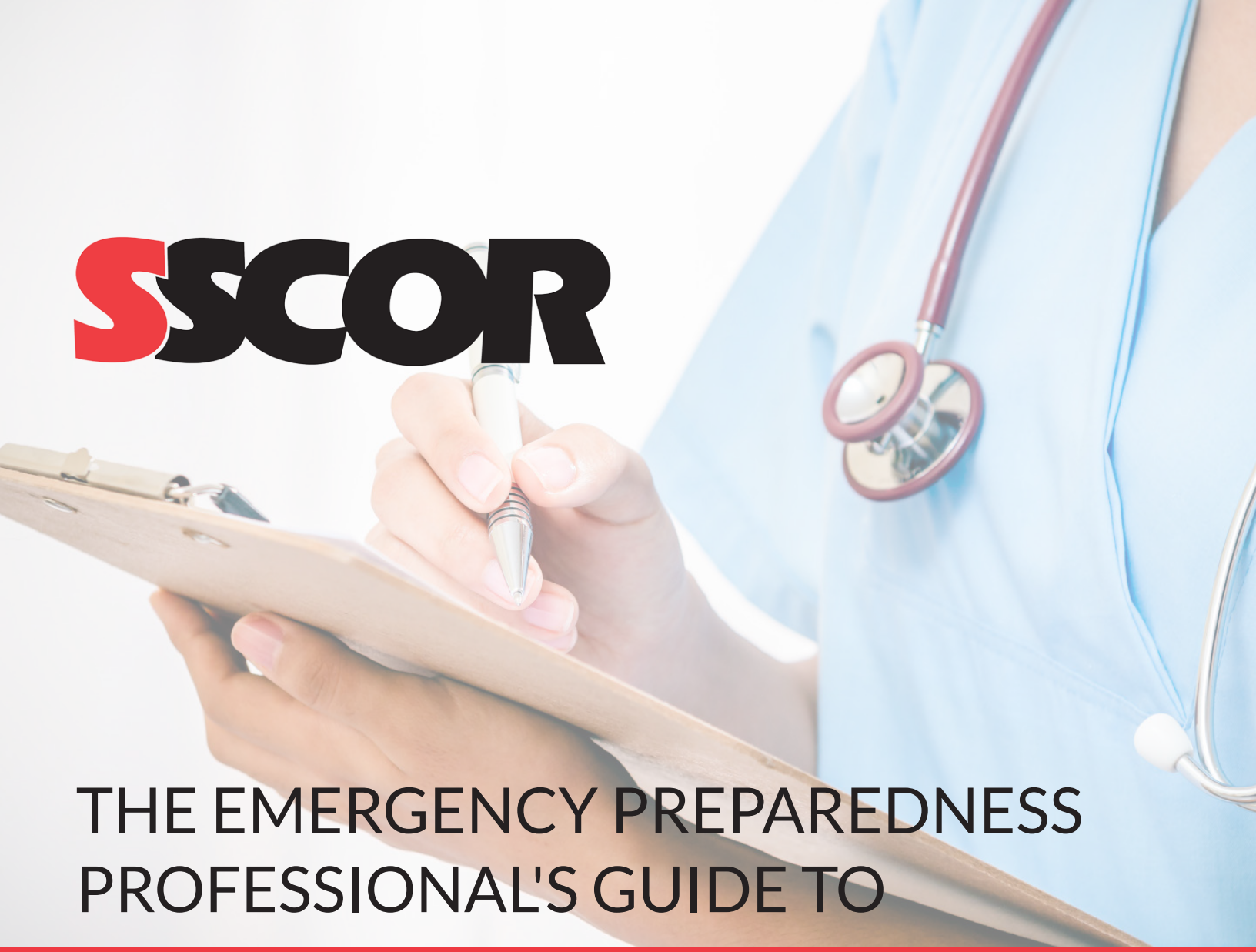


SSCOR

THE EMERGENCY PREPAREDNESS PROFESSIONAL'S GUIDE TO

PLANNING FOR HOSPITAL SUPPLY LINE DISRUPTIONS

INTRODUCTION

Recent natural disasters such as Hurricane Katrina and Superstorm Sandy have demonstrated that hospitals can suffer crippling blows during times of crisis. But at the same time, hospitals are expected to provide continuous and safe patient care amidst these challenges.

This can only occur if hospitals have access to needed supplies and equipment to maintain normal operations and accommodate a potential patient surge. The Joint Commission requires that hospitals have enough supply to be self-sufficient for at least 96 hours. A well-thought out emergency preparedness plan will address the hospital supply chain to ensure this continuous provision, even when typical supply lines are disrupted.

This guide will serve as a helpful reminder to make sure you have covered all of your bases in order to keep your supply lines flowing so that the focus can remain where it counts: treating patients in need.

SYSTEMS AFFECTED DURING AN EMERGENCY OR DISASTER

Whether the result of natural or manmade causes, a disaster can impact many systems within the hospital. Let's take a look at each system in more depth and present strategies to minimize supply disruption.

Electrical Power

When electrical power loss occurs within a hospital, the effect can be immediate and tremendous. Countless systems are dependent on electricity to function—lighting, critical medical equipment, computers, elevators, air conditioning, and so on. And though hospitals have backup generators to protect them from this, there is much to be considered to ensure they will function properly in the time of need.

The Joint Commission requires that emergency power is supplied to areas in which loss of power could result in harm to the patient, but it does not specify where generators should be placed. The best location for a generator is dependent on the area in which the hospital resides and what weather risks are most likely.

Facilities in flood-prone areas should not have a generator in the basement, and Tornado Alley hospitals should not place their generators on the highest level. Your hospital's Hazard Vulnerability Assessment (HVA) should help guide you in choosing the best location. If feasible, having multiple generators in different areas of the building is ideal.

Regular inspection, maintenance, and testing of your hospital's generators are extremely important. According to the Joint Commission standards, the generators and their automatic transfer switches should be tested 12 times per year, for 30 minutes at a time, and tested once every three years for four hours.[i]

Additionally, consider that in an extreme emergency, your generators may require enough fuel to power them for days. Make sure that your emergency plan addresses not only how you will obtain an adequate amount of fuel, but also how it will be delivered if elevators and normal methods of transport are not functioning.

Even with the best laid plans, a generator may fail to work in an emergency, as happened with NYU's Langone Medical Center during Superstorm Sandy. In this case, hospitals should be prepared to manage critically ill patients with battery-powered or manually powered equipment. Make sure all intubated patients have a bag-valve mask at their bedsides so that they can be hand-ventilated if necessary. Keep a ready supply of battery-powered portable suction units available for these patients as well. Flashlights will be needed in patient care areas and for moving in hospital corridors.

Questions to consider

How many days of fuel do you have on hand?

How does your hospital get extra fuel?

When did you last test your generator?

Do you have a strong supply of manual and battery-powered equipment (including spare batteries) in the event of total power failure?

Water

A water outage impacts a hospital on many levels. Water is essential for both clinical and facility needs, and as such, it is important that every hospital conduct a Water Use Audit. This will help determine the amount of water required for the hospital to operate under normal conditions, identify which functions are essential, and determine how to proceed when faced with a disruption in the water supply. The CDC provides useful tools for this in its comprehensive "Emergency Water Supply Planning Guide for Hospitals and Health Care Facilities" Table 6.4-1.[ii]

TABLE 6.4-1

Functions	Water Needs Under Normal Operating Conditions(gpd)	Critical to Total Facility Operations (Yes or No)	Waterless Alternatives Possible (Yes or No)	Water Needs Under Water Restriction Situation(gpd)	Essential to Specific Operations (Yes or No)
Building					
HVAC					
Fire suppression sprinkler system					
Food service					
Sanitation					
Drinking water					
Laundry					
Laboratory					
Radiology					
Medical care					
Other					
Other					
Total minimum water needs to keep facility open and meet patients' needs					

The CDC generalizes that most hospitals can routinely handle an eight-hour water interruption by employing water restriction strategies. Short-term water restriction includes limiting water to only critical functions, using bottled water for drinking, use backup wells if available, using non-potable water for HVAC operations, using large containers for hand washing and food prep, using large containers for toilet flushing, and labeling faucets “DO NOT DRINK.”

For water outages that are expected to last longer than eight hours or are unknown in length, the above strategies should also be applied and external water should be utilized. Your emergency plan should identify nearby potable water tanks or other functioning public water supply locations, tanker trucks, and necessary equipment such as pumps and hoses to deliver the water to critical areas of the hospital. Water can also be stored in large storage tanks or smaller containers on individuals units. However, keep in mind the water may need to be tested, filtered and/or treated with chlorine prior to use.

Questions to consider

How many days of water supply do you have stocked?

Have you identified alternate sources of water nearby?

Food

Similar to water, an assessment of your hospital's food requirements should be done during the planning phase. Tools, such as this one developed by the California Hospital Association, can be used to help determine emergency food supply needs.[iii] Such plans take into account your typical population, staff, and visitors and calculate the amount of protein, starch, vegetables, and fruits that would be needed to provide adequate nutrition for an extended period of time.

This supply of food should be on premise and regularly inventoried. Perishable items are expensive and require more storage space, so the bulk of your supply should be non-perishable.

> **When an event triggers the Emergency Operation Plan and there appears to be a possibility for supply chain disruption, the Emergency Food Plan should be initiated.**

The CHA tool can also be used to create an Emergency Food Plan, which shows how to break down the food supply into three balanced meals and one snack per day for each patient and staff member. When an event triggers the Emergency Operation Plan and there appears to be a possibility for supply chain disruption, the Emergency Food Plan should be initiated. Perishable items should be consumed first while carefully leveraging food supply versus demand. The cafeteria should be closed, and meals should be rationed per the plan.

Questions to consider

Do you have enough food to feed your patients and staff for 3-4 days?

How will this food be stored?

How will you handle food distribution during an emergency?

Blood Products

During a disaster, the need for blood generally falls into three phases. The first 24 hours have a primary need for Type O red blood cells (RBCs). One to 10 days after the disaster, the need continues for red blood cells of all types, as well as platelets. For days 11 to 30 days, red blood cells, platelets, stem cells, and bone marrow (if due to a radiologic event) are all required.[iv]

Using this as a strategy guideline, your hospital should plan to have a minimum of a three-day supply of Type O RBCs in stock at all times. For hospitals with known disaster risks, stock should be increased during the appropriate times (e.g., a hospital in a hurricane zone should bump up its supply of blood products on site during hurricane season). When a disaster occurs, depending upon the scope of the event, nearby blood providers should be contacted if the local inventory will not be sufficient.

Additionally, when there is forewarning of an emergency situation occurring, contact nearby blood providers to transport additional blood products in advance. Extra blood products can be stored in patient care areas if the blood bank has reached its capacity.

Questions to consider

Does your blood bank track your typical daily use of blood products?

Do you have a regional blood center that you can contact on a 24-hour basis?

How will you handle food distribution during an emergency?

Medical Gases

The ability to deliver oxygen to patients is a critical function of a hospital during both normal operation and in a disaster situation. Hospitals generally rely on liquid oxygen (LOX) as their main source of oxygen. However if the system is damaged in a disaster, alternate means of oxygen delivery must be available.

If the system hasn't been completely destroyed and lines run outside, it is possible for an oxygen tanker truck to backfill the system. But if the system is unusable or the hospital is inaccessible, it is imperative to have a backup supply of high-pressure oxygen cylinders. Large cylinders can be used to backfill the system with oxygen if the lines are still functioning. Smaller oxygen cylinders, such as those used during patient transport, can be utilized for patients who use a lower flow of oxygen.

Oxygen cylinders are heavy and require much storage space. Additionally, emergency preparedness professionals must also be mindful of the National Fire Protection Association's specifications for how to store pressurized oxygen. Although essential, these regulations can make keeping enough cylinders on hand to maintain sufficient oxygen supply for an extended period of time a difficult task.

For this reason, when planning for disasters, your hospital may also want to consider investing in portable oxygen concentrators or mass oxygen distribution centers. Maintaining contracts with outside oxygen supply services is invaluable as well.

Questions to consider

How many days can your facility run using only your backup oxygen?

Are your oxygen cylinders properly stored?

Medical Equipment

With the patient surge that accompanies a disaster, beds may be filled to capacity, and additional patient care areas may need to be created. Both durable medical equipment and consumable resources will be necessary. The Department of Veterans Affairs (VA) Pandemic Influenza Plan provides a thorough list that serves as a great starting point for creating a stockpile.[v] Even beyond the typical 96-hour goal for self-sustainability, the VA recommends stocking a four-week supply of consumable resources.

Durable resources

- ☐ Mechanical ventilators
- ☐ Manual resuscitators (bag-valve masks)
- ☐ Beds
- ☐ Stretchers/gurneys
- ☐ IV pumps
- ☐ Positive air purifying respirators (PAPRs) or other equivalent respirators
- ☐ Vacuum gauges for suction
- ☐ Portable suction machines
- ☐ Intensive care unit (ICU) monitoring equipment

Consumable resources

- ☐ Hand hygiene supplies (antimicrobial soap and alcohol-based [>60%], waterless hand hygiene gels or foams)
- ☐ Disposable fit-testable N95 respirators
- ☐ Elastomeric respirators with P100 filters
- ☐ Surgical and procedure-type masks
  Goggles
- ☐ Gowns
- ☐ Gloves
- ☐ Facial tissues
- ☐ Central line kits
- ☐ Morgue packs
- ☐ IV equipment and solutions
- ☐ Syringes and needles for vaccine administration
- ☐ Respiratory care equipment
  - ☐ Portable oxygen
  - ☐ Regulators and flow meters
  - ☐ Oxygen and ventilator tubing, cannulae, masks
  - ☐ Endotracheal tubes of various sizes
  - ☐ Suction kits
  - ☐ Tracheotomy tubes

Examine your typical patient census and acuity. During a disaster, expect to add an additional 25 percent to these values. Let this serve as a guideline for the amount and type of medical equipment your hospital will be required to have on hand.

Questions to consider

Do you have an inventory of your stored medical equipment?

How will you distribute the materials in an emergency?

Pharmaceuticals

Due to the vast array of medications in existence, planning for a pharmaceutical supply line disruption when disaster strikes is extremely challenging. Because of this, research has tried to determine how to optimize which pharmaceuticals should be stockpiled. A study published in Prehospital and Disaster Medicine looked at a community ER and compared it with data from two hurricane disasters.[vi] The most common patient complaints were wound treatment and pain. As a result, antibiotics, NSAIDs, and opiates were prescribed significantly more than other classes of drugs. Maintaining a strong supply of these three types of medications would therefore be beneficial to your hospital during an emergency situation.

For a more general and thorough list, the CDC recommends the following categories of medication to be available in a disaster: analgesics; anxiolytics; antipsychotics; antibiotics; IV fluids; burn care medications; ear, nose and throat medications; ocular medications; tetanus and hepatitis vaccines; and medications used during emergency intubations.[vii] Consider keeping these medications stockpiled as well.

Although studies and models can be used to help guide your hospital's decision making, examining the size of the institution and your local population's medication needs is still necessary, taking into account things such as regional antibiotic resistance and likely risks based on HVA results.

Questions to consider

Does your pharmacy monitor the hospital's daily medication use as a means to help determine your stockpile?

Which medications do you have stockpiled? Do they reflect the CDC recommendations or your facility's specific needs?

Communications

Maintaining open lines of communication is essential when managing an emergency. But in a disaster, the typical means of communication may not be operational. Phone lines may be destroyed; computer access may be limited due to power outages. Though cellular phones are widely used, hospitals should not rely on this as a primary source of communication because all forms of IT may be down during a disaster. Ham radio, fixed radio, walkie-talkies, and satellite phones may be more dependable methods of communication, so ensure that your hospital has at least one of these systems available for use.

The ability to communicate effectively has a direct impact on your hospital's supply chain. Maintain a printed and updated list of all emergency contacts, including local and state authorities, supply vendors, and hospital staff. Vendors may need to be contacted for emergency delivery of supplies.

Local authorities will be able to address road closures and alternate routes for the delivery of supplies. Additional hospital staff will need to be called into work to accommodate the patient surge.

Questions to consider

What type of backup communication systems do you have?

Have you identified staff members who could act as runners in the case of total communication failure?

Are all important points of contact (i.e., vendors, staff, local authorities) available offline?

STOCKPILING STRATEGIES

Having addressed your hospital's risks and determined what supplies will be needed during a potential disaster, decisions must then be made about how to store and manage your stockpiles. Maintaining at least 96 hours' worth of supplies can be costly and requires a lot of space, so several factors should be taken into consideration.

Generally, on-site supplies, as well as additional inventory at distribution centers, should not be all stored in one location. In the event that something happens to that location, your inventory could be completely wiped out. To minimize the risk, the best practice is to spread out your supplies through multiple storage areas.

> **"A detailed inventory of all stockpiled supplies is essential, and be sure to track purchase and expiration dates in your records."**

Stockpiled supplies should be kept in adequately ventilated, temperature-controlled facilities because materials such as latex can break down when exposed to heat and light. In addition, certain medications and blood products may require refrigeration for storage. Such considerations create additional challenges, and each hospital must individually consider their available space. Though a large warehouse may not be feasible, smaller portable pods or trailers may be utilized throughout the hospital grounds.

A detailed inventory of all stockpiled supplies is essential, and be sure to track purchase and expiration dates in your records. Based on these dates, items should be cycled back into normal hospital inventory, and the stockpile should be replenished with newer supplies as necessary. This ensures that items will not be wasted by reaching expiration while sitting in a storage facility. More planning and manpower will be required to accomplish this, but it is a huge cost-savings opportunity for the hospital.

Questions to consider

Where does your facility have the proper space to maintain your stockpile of supplies?

How do you ensure stockpiled items are used before they are expired?

Partnerships: The Key to Ensuring Supply Line Continuity

Prepping for self-sufficiency is important, but as referenced earlier, creating partnerships and agreements with local hospitals, community resources, and supply vendors is essential for supply chain stability. You want to make sure these agreements are established well before the time of need.

Hospitals may enter into a Mutual Aid Agreement (MAA) or Memoranda of Understanding (MOU) with other nearby hospitals to offer assistance to each other during times of emergency. This can constitute a sharing of consumable supplies, durable medical equipment, and pharmaceuticals. It can also allow for the transportation of overflow patients to another facility and the assistance of personnel and medical staff as needed. Similar agreements can be made with additional non-hospital healthcare providers, such as clinics and nursing homes.

Your hospital should also have MOUs in place with your local law enforcement, fire department, emergency medical service providers, and community emergency response team. Also consider organizations such as the Red Cross for assistance. All these groups can assist with transportation, supplies, and security. Look beyond healthcare-related resources in your community, as well.

For example, entering into an MOU with hotels and restaurants nearby can provide additional resources such as food and linens during a crisis situation.

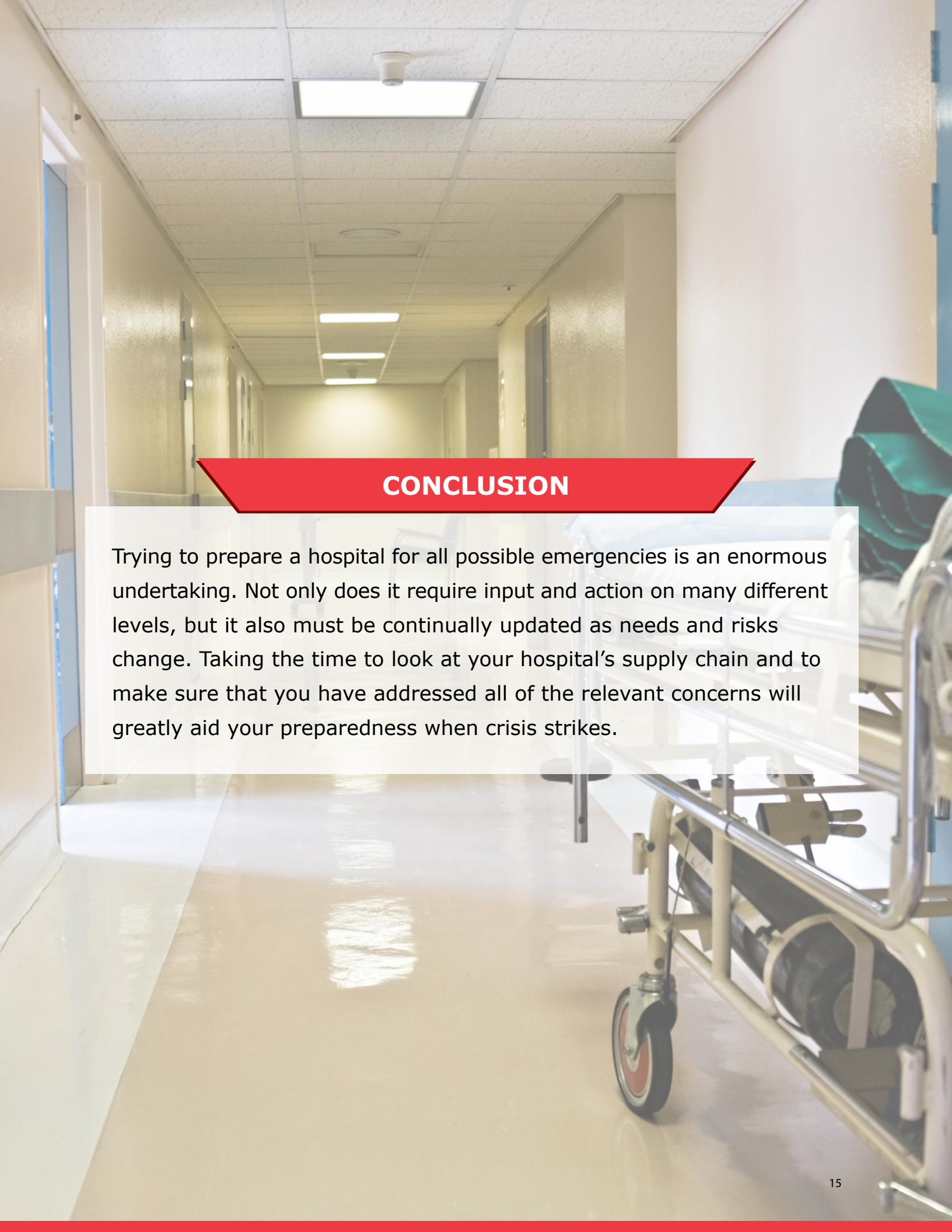
Contracts should be in place with vendors of both healthcare and non-healthcare resources. MOUs with vendors should specify 24-hour contact information so that they can be reached at any time. Consider also having an MOU with secondary vendors for all supplies as a backup.

Continue to work up the ladder from local to regional to state and national resources to ensure provision of supplies. For example, during large-scale disasters, the Strategic National Stockpile (SNS) can be utilized when local inventory is insufficient for the demand. Your state department of health can request assistance, and if approved, medications from the SNS will be delivered within 12 hours. These "push packages" contain antibiotics, emergency medications, IV fluids, and additional medical supplies to cover most common needs. If more precise information is known, the SNS can deliver supplies specifically suited to the disaster within 24-36 hours. This may include vaccines, antitoxins, surgical supplies, and ventilators.

Questions to consider

What resources in your community have you entered into MOUs with?

What are your guidelines for determining when you need to contact these resources?



CONCLUSION

Trying to prepare a hospital for all possible emergencies is an enormous undertaking. Not only does it require input and action on many different levels, but it also must be continually updated as needs and risks change. Taking the time to look at your hospital's supply chain and to make sure that you have addressed all of the relevant concerns will greatly aid your preparedness when crisis strikes.

ABOUT SSCOR

Since 1980, our family-owned business has manufactured medical devices that help clear the airway. Unlike some companies that manufacture thousands of different kinds of medical devices, we focus on doing one thing and doing it extremely well: portable suction machines.

We are an FDA registered establishment. Many of our products are CE marked and used throughout Europe and the rest of the world. Since our inception, SSCOR has relied on the input of healthcare professionals to develop portable suction machines that meet their needs. We welcome your feedback on the content of this eBook and will gladly answer any questions you may have about our suction devices.

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