

Partnering with the Healthcare Supply Chain During Disasters

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Introduction

The healthcare supply chain is complex. It supports patient care on a daily basis by producing and delivering medications as well as products ranging from gloves and gowns, to diagnostics, to pharmaceuticals and biomedical equipment, to surgical supplies.

Around the world, the healthcare supply chain is confronted with countless challenges every day. During disasters or other catastrophic events, the healthcare supply chain can experience distinct strains depending on the nature of the event and the impact on surrounding infrastructure.

Purpose: This document is intended to provide an overview of the emergency planning and response considerations of healthcare supply chain owners, operators, and end users, as well as insights for healthcare coalitions (HCCs) working with healthcare supply chain partners on preparedness, response, and recovery. It is not intended to be a comprehensive listing but aims to capture **key changes** during serious or catastrophic events, compared to normal supply chain operations, as well as planning and response contingencies.

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Healthcare Supply Chain Operations

The healthcare supply chain involves the flow of numerous product types from manufacturer to patient and requires the participation of various stakeholders who work in concert to achieve the goal of meeting patient care needs.

Healthcare supply chain stakeholders include:

- Manufacturers
- Distributors
- Providers
- Patients
- Healthcare Coalitions
- Federal Programs¹

Descriptions of each stakeholder, their roles in the supply chain, and a few key vulnerabilities to plan for are included on the next few pages.

Under normal conditions, the complex processes that make up the supply chain are nearly invisible due to steady-state production and delivery of healthcare products. Healthcare supply chain stakeholders adhere to their daily roles and standard operating procedures.

The following infographic displays the normal operations and activities of healthcare supply chain stakeholders and key vulnerabilities for each stakeholder.

¹ Although the healthcare supply chain is largely owned and operated by the private sector, several federal offices and agencies have a role in supporting the continuity of supply chain operations during emergencies and events that could impact healthcare operations and have established partnerships with key components of the supply chain in order to accomplish this. [Appendix C](#) outlines some of the key federal partners roles “at-a-glance” that are consistent with the purpose of this particular document.

Healthcare Supply Chain Under Normal Operations



Manufacturers
Plants for production and research, labs, biologists, and vaccinologists

Role in Supply Chain

- Research and develop new products
- Create and manufacture medical products (branded and generic pharmaceuticals, medical, and surgical supplies)
- Monitor and respond to shortages
- Produce disposable and durable products, medications, electrolytes, dialysis products, sterilization and medical gases, and IV fluids

Key Vulnerabilities:

- Raw materials/ production disruption
- Spike in demand outpaces production
- Limited number of vendors for needed products
- Damage to factory/ utilities
- Overseas production vulnerability



Distributors
Wholesale distributors and logistic partners (including third-party logistics)

Role in Supply Chain

- Deliver medicines and supplies from manufacturers to providers and healthcare facilities
- 92% of prescription drug sales are handled by distributors

Key Vulnerabilities:

- Access and re-entry to disaster-affected facilities/areas
- Secure transportation need
- Spikes in customer orders
- Road damage/ infrastructure damage
- Product shortage(s)
- Impacts to labor force and transportation



Providers
Hospitals, pharmacies, emergency medical services agencies, dialysis centers, urgent care facilities, assisted living facilities, and long-term care facilities

Role in Supply Chain

- Receive medicines and products from distributors
- Prescribe and dispense medicines and products to patients
- Use products in hospitals/healthcare facilities

Key Vulnerabilities:

- Lack of redundancy in vendors and suppliers
- Limited substitutes
- Product shortages; just-in-time inventory; medical surge
- Pharmacy/healthcare infrastructure impacts
- Inadequate supplies for demand; hoarding



Patients
Consumers, patients, and communities

Role in Supply Chain

- Unique medical needs that require specific products
- Influence the demand for medicines and products
- Care for and use products according to directions/labeling (e.g., refrigerate)

Key Vulnerabilities:

- Difficulty finding options to meet patient's needs
- Insurance issues
- Cost/limited ability to stockpile medicines and medical products
- Utilities failures Access delivery/ transportation issues

The Healthcare Coalition Role in Supply Chain Operations

Healthcare coalitions (HCCs) play a key role linking public sector response agencies, including emergency management agencies and public health departments, and private healthcare facilities that serve as points of service. HCCs are key stakeholders and though not direct components of the supply chain, they may be able to act as a coordination point between multiple vendors/suppliers and healthcare facilities to address supply disruptions. During normal operations, HCCs play an important role in working with members on supply chain readiness and response planning.

By serving as a coordination and information-sharing hub, HCCs can: encourage best practices in communicating and engaging with supply chain components, standardize and provide guidance on activities that impact supply chain operations during emergency events, and provide opportunities for supply chain components and coalition members to train and exercise with one another. HCCs can also play a role in helping healthcare facilities share information and coordinate strategies in their area to cope with specific supply (medication, equipment, dialysis solutions) shortages affecting their stakeholders.

HCCs serve as a unifier of healthcare preparedness and response activities across a community – working to link the disaster preparedness and response plans to provide care and protect public health in their area. All HCCs should be able to act as information-sharing hubs for distributors and providers and have the ability to share product and delivery information and strategy. For HCCs with a broader role in emergency response, primary activities may include tracking impediments to product delivery, resource request management and brokering, and monitoring operational status and needs of healthcare facilities within the HCC.

Supply Chain Hazards, Threats, and Vulnerabilities

The healthcare supply chain is dependent on many variables including raw material availability, machinery and parts, workforce, standards compliance, delivery methods, contracts and regulatory requirements, and underlying critical infrastructure systems such as power, telecommunications systems, and transportation (including vehicle and roadway, airport, railroad, and port components). When one element is compromised there can be cascading effects up and down the supply chain. Disruptions to these systems can be caused by various hazards, underlying vulnerabilities, and threats that can directly impact every level of the supply chain. Examples include the following:

- **Natural Disasters** – While hazards vary from region to region, natural disasters have the potential to disrupt the healthcare supply chain in all parts of the world. Common hazards include hurricanes, snowstorms, tornadoes, flooding, wildfires, and earthquakes. All phases and components of the chain may be affected after events regardless of notice and may require assistance with response and recovery efforts.
- **Human-Caused Disasters** – These hazards also vary and can include cyber-attacks, acts of terrorism, and unintentional catastrophes like an oil spill, damage or impacts to goods during delivery accidents, or even unforeseen equipment breakdown.
- **Public Health Threats** – Biological threats can impact the healthcare supply chain by creating both dramatically increased and sustained demand for products, especially medical supplies. These events include disease outbreaks (of both commonly occurring and emerging diseases) and biological attacks.

Supply chain implications for public health-centric events differ from those of a natural hazard in that public sector partners – via public health officials (state, local, and federal, including the Strategic National Stockpile [SNS]) – can play a significant role in supply chain operations through activation of programs, language included in emergency declarations and public messaging, and more. Vendors for commonly needed products during these events, including vaccines and personal protective equipment (PPE), are often limited. Depending on the nature of the event, demand for these products can far exceed production capacity.

Supply Chain Vignette: Federal Response

Following the significant disruption to manufacturing operations in Puerto Rico due to Hurricane Maria in 2017, ASPR Critical Infrastructure Prevention (CIP) worked with commercial members to address challenges of obtaining and transporting materials required to ensure availability of key medical products. Additionally, in 2018, prior to landfall of Hurricane Florence, CIP coordinated with emergency response leaders to ensure visibility of significant manufacturing infrastructure in the anticipated impact area, identify potential resource requests, communicate with commercial partners in the Carolinas to identify support needs related to product movement, and encouraged activation of continuity plans to reduce disruption to production and shipping.

Steady-State Supply Chain Challenges

To meet patient care demands, all stakeholders should focus on mitigating the supply chain hazards, threats, and vulnerabilities unique to their area while identifying key actions that will enhance resilience during incidents. Some impacts can be greatly reduced through integrated mitigation and planning. Working with providers in the community and distributors to forecast ordering for different scenarios, including emergencies, can help set use and delivery expectations and plans and highlight areas where back up options are required.

Usual system vulnerabilities (upstream and downstream) may include:

- **Industrial and personnel** – Work stoppages, fluctuating transportation costs or fuel supply issues, geopolitical events, sabotage, market forces, and technological failures may have negative effects impacts on components of the supply chain, especially those companies responsible for production and manufacturing.
- **Operational** – These can include production or supply problems such as lack of raw materials, lack of machine parts, regulatory actions (including product recalls), compressed manufacturing timeframes, product liability challenges, just-in-time ordering processes, disparate data systems, product cycles (obsolescence), and data silos between suppliers and providers.
- **Just-in-time or low unit of measure programs** – Healthcare providers often rely on these programs from their distributors. These programs keep costs down for providers and allow them to reduce labor costs, time, and space required to stock and rotate medical products. While these programs are efficient, they can also lead to fragile supply-demand relationships, especially during emergencies.

- Just-in-time (JIT) inventory delivery means distributors are servicing provider customers almost daily in order to keep minimal stock (or “par” levels) at the facility.
 - In low-unit-of-measure (LUM) programs, distributors are the central source of product for facilities and will deliver to the specific departments on demand. In these programs, distributors “break down” product to the “each.” (*The “each” is the unit that is used on the patient. For example, distributors may take a box of 100 individually packaged items, break it down, and deliver 5.*)
 - Hospitals relying on JIT and LUM strategies can be vulnerable to both increased demand for supplies due to patient surges of patients and/or delayed delivery as a result of the effect of the disaster on distributors.
- **Consumer or provider brand (or product) preference for usual medications, equipment, or consumer distrust of novel medications/ vaccines.**

Pre-Event, Response, and Recovery Considerations

The following sections provide pre-event, response, and recovery considerations for various components of the healthcare supply chain. High-level considerations for HCCs are captured at the end of each section as well as in a separate table in [Appendix A](#).

Supply Chain Vignette: Collaboration to Ease Drug Shortages

Manufacturers, distributors, group purchasing organizations (GPOs), and providers worked together to reduce the impact of the recent intravenous (IV) solution shortage. This shortage added costs and sometimes necessitated a change in site of care. In some cases, patients had to stay in the hospital where IV solutions were more likely to be available, rather than being transferred to less-costly home care settings. Through ongoing collaboration, suppliers and their clinical clients were able to ensure that available product was sent where it was needed most. Providers also found ways to make substitutions when necessary and identified ways to reduce product waste such as eliminating the use of IV bags in kits if they were not essential.

— HIDA, [Supply Chain Collaborative Newsletter](#) (June 2019)

Manufacturers

Manufacturers create products – including pharmaceuticals, medical, and surgical supplies – using raw materials on-site in manufacturing plants and labs. As a part of the manufacturing process, these companies identify and develop needed products, determine quantities necessary to meet demand, acquire raw materials, conduct safety trials and obtain regulatory approvals as required, and then make and package products for distribution. Manufacturing is a diverse and complex discipline, and the field is made up of countless different stakeholders, including brand and generic pharmaceutical manufacturers, medical supply and device manufacturers, and scores of others. International sources of raw materials and manufacturing sites are common. The following considerations and mitigation and response strategies capture high-level themes common across the different types of manufacturers.

Stage	Considerations	Mitigation and Response Strategies
<p>Pre-event</p>	<ul style="list-style-type: none"> • Identify hazards, vulnerabilities, and threats – In particular, events that could result in potential shortages in critical supplies (e.g., PPE, medications, medical devices) or damage to a production facility. <ul style="list-style-type: none"> ▪ Raw materials disruptions – A variety of events, including natural hazards, can disrupt manufacturer access to quality raw materials. ▪ Production disruptions – These can include small-scale disruptions, such as a facility fire or machine breakdown, and larger-scale disruptions, such as a natural disaster in the area. This can also be due to staffing shortages after a disaster, work stoppage actions, or during an epidemic. ▪ Product shortages – Shortages in production can occur for a variety of reasons – availability of raw materials, demand outweighing supply, and more. 	<ul style="list-style-type: none"> • Design business continuity and disaster recovery plans around hazards, vulnerabilities, and threats identified in hazard vulnerability analysis (HVAs) and risk assessments. • Ensure redundant production capacity or alternate vendors. • Ensure business continuity plans clearly identify alternate materials sources and delivery methods and routes based on predicted hazards when available. In addition, develop plans for redundant production capabilities (e.g., identification of plants and facilities that can scale production when needed). • Comply with U.S. Food and Drug Administration (FDA) requirements for product shortage notification. Verified information on shortages is publicly available on the FDA website. • Forecast product demand using historical events (e.g., past flu seasons) and reviewing/revising formularies with distributors and providers. Also determine when products

Stage	Considerations	Mitigation and Response Strategies
	<ul style="list-style-type: none"> • Anticipate common supply needs – Sustained demand for select products is common during disease outbreaks. For example, during the H1N1 outbreak of 2009, demand for PPE, including N95 masks, increased drastically. 	<p>with low production/use might be in high demand if primary products in the marketplace are in shortage.</p>
Response	<ul style="list-style-type: none"> • Feasibility of surge production – Depending on the event, rapid surges in production may be required. • Damage assessment – Depending on the event, manufacturing may be compromised due to direct impact on the plant, loss of utilities, or impaired transportation. Determining the damage, systems affected, and assistance needed is critical to rapidly restore services. 	<ul style="list-style-type: none"> • Develop business continuity plans that identify and describe means for scaling production, such as reallocating material use and shifting production schedules for products with less demand, shift/workforce changes, raw materials available, machinery, scheduling, and re-tooling. • Identify other vendors for same/substitute product; ensure ability to coordinate with and refer to in an emergency. • For public health and natural hazard events, manufacturers can use models and experiences from previous events to try to anticipate demand, but production timelines and capacity can limit flexibility to increase production. • Expedite approvals from the FDA to import approved products from abroad. • Obtain assistance through insurance providers, local, state, and federal emergency management to restore utilities and essential services or other assistance needed to resume production. Work with emergency management to help communicate what the site produces and the consequences of interrupted production prior to an event and during the response phase.

Stage	Considerations	Mitigation and Response Strategies
Recovery	<ul style="list-style-type: none"> • Resume normal operations and, if needed, repair damage. • Assess the impact of the event to staff, products, etc. • Communicate resumption of normal allocation/delivery/activities. 	<ul style="list-style-type: none"> • Coordinate with distributors to resume normal delivery. • Coordinate, as appropriate, with partners on product availability if event caused a shortage.

Coalitions and Manufacturing

Manufacturing occurs “upstream” in the supply chain. Given HCCs’ key role in preparedness, response, and recovery coordination, which occurs further “downstream” in the supply chain, it is not common for HCCs to engage directly with manufacturers. HCCs can – and should – keep current and informed on significant impacts to manufacturing capabilities, such as drug or PPE shortages. HCCs should consider the need to share information and strategies for addressing the shortage between providers in their HCCs as well as potentially coordinate information exchange between distributors and providers.

Distributors

Distributors and logistics partners, including third-party logistics providers, acquire medical supplies from manufacturers and deliver them to providers and healthcare facilities. As part of this complex process, they may repackage, re-label, and ensure special handling for products, such as cold chain products requiring climate-controlled environments. A pharmaceutical distributor is more often referred to as “wholesaler,” whereas in the medical product supply chain, the term “distributor” is more often used. For purposes of this document, the term “distributor” is used throughout for consistency and clarity.

It is important to note that the primary pharmaceutical distributor for a healthcare facility will likely be different than the primary medical product distributor for the facility. Additionally, many distributors have a primary healthcare provider market, which means the primary distributor for the local hospital may not be the same as the one providing the same supplies for the nearby nursing home.

Providers have primary distributors for medical products and pharmaceuticals. However, they often have secondary distributors and specialty distributors that may focus on specific surgical procedures or equipment. It is important to understand those specialty products that are only available from a single source.

The pharmaceutical supply chain has three large national/multinational distribution companies that control 90% of the market. The companies, known as the “Big 3,” are

Strategic National Stockpile (SNS)

The SNS relies on partnerships with commercial distributors as these companies are already integrated into the market and can effectively move assets from the SNS to medical countermeasures (MCM) dispensing sites with established modes of transport, transportation routes, and accompanying security.

Allocation

When there is a product shortage, distributors may institute allocation practices. Allocation is a contractual obligation between the supplier and distributor that ensures customers get some amount of product based on a percentage of their historical purchasing. It does not take into account surge needs during a public health event which may exacerbate existing product shortages. Distributors commonly place regular customers on allocation during shortages and decline orders from new customers during that time.

McKesson, AmerisourceBergen, and Cardinal Health.² There are also several regional companies that may be significant partners, especially in smaller, more rural communities.

The medical product supply chain is more varied with large national companies and regional companies for healthcare facility types or service lines (e.g., homecare). These distributors often have over 5,000 types of products on hand and depending on the product have approximately 20 to 30 days of inventory that reflects normal customer usage/consumption patterns.³ Most urban healthcare centers are within 50 miles of a distribution center and most distributors can deliver within 24 hours of an order.

Pharmaceutical and medical product supply chains may utilize the services of third-party logistic providers (3PLs) such as FedEx, UPS, and others depending on their business and service model. 3PLs can minimize costs and allow for local distribution through local companies familiar with the community. 3PLs can also enable more frequent deliveries from regional or local distribution centers (some facilities receive up to 4 deliveries per day.)

Third-party Logistics Providers (3PLs)

3PLs range from FedEx and other large postal service providers to smaller, regionally- or locally-based companies. 3PLs frequently use unlabeled or unmarked trucks for deliveries. 3PLs play a critical role in “last mile” delivery.

Supply Chain Vignette: Unconventional Delivery Methods

In preparation for Hurricanes Harvey and Irma in 2017, AmerisourceBergen staged healthcare supplies to support at-risk areas and used many unconventional methods to deliver them directly to patients and caregivers after the storms. For example, when many local couriers lost their vehicles due to flooding, AmerisourceBergen responded by sourcing rental trucks for them from other states to continue making their deliveries. The couriers communicated via two-way radios with AmerisourceBergen scout drivers to find the best routes to complete deliveries to hospitals, pharmacies, and clinics. AmerisourceBergen also used duck boats and helicopters to deliver supplies directly to clients.

— Healthcare Ready, [Heroes of the Supply Chain: Manufactures and Distributors](#).

² Healthcare Distribution Alliance (2018). 89th Edition HDA Factbook: The Facts, Figures, and Trends in Healthcare. Retrieved from: <https://www.hda.org/resources/>

³ Health Industry Distributors Association (2018). Health Systems Rely on Distribution. Retrieved from: <https://www.hida.org/distribution/resources/infographics/Health-Systems-Rely-On-Distribution.aspx>

Stage	Considerations	Mitigation and Response Strategies
Pre-event	<ul style="list-style-type: none"> • Determine and communicate product shortages – When caching is not an option, or when stockpiles are depleted, distributors work with suppliers and customers to communicate availability of product(s) and viable alternatives/substitutions. • Communicating to customers – Distributors often offer to provide inventory consultation to their customers, gauging their needs and allowing them to place advance orders to prepare for an event. • Pre-positioning supplies – Increasing product inventory in warehouses and onsite at customer facilities (par levels), when possible, is an important pre-event activity distributors and facilities should work together to execute. These may be permanent increases (e.g., for mass casualty events) or temporary (e.g., in anticipation of a hurricane or blizzard). Distributors will often pre-position trucks with supplies along highways to get into the disaster zone promptly after an event (e.g., nearby exits or in rest stops to be able to make local deliveries once roads re-open). • Anticipating common supply needs – Similar to manufacturers, distributors work to anticipate common supply needs and stock warehouses and customers accordingly. A spike in customer orders can be due to actual demand, anticipated demand, or multiple orders being placed with multiple vendors by the same entity in the hopes that one will get filled. 	<ul style="list-style-type: none"> • Develop critical supply lists based on potential events. Work with HCCs and facilities to create distributor or facility-based caches or “push” lists to be delivered in case a disaster strikes and a request is received from the facility to activate their list. In some cases, distributors are included in healthcare facility disaster notifications and will automatically activate the distribution. • Agree to alternatives and substitutions ahead of time. Understand communications and establish alternate forms of communication if primary ordering systems are down. • Work with HCCs and providers to ensure understanding of specific delivery timeframes and vulnerabilities (e.g., if flooding closes a specific bridge, does this compromise delivery from a distributor, or does the distributor potentially need access to high clearance vehicles?) • Work with all stakeholders to understand true demand during an event. Providers placing multiple excessive orders with multiple distributors only exacerbates shortages and places additional strain on the supply chain. • Coordinate through Business Emergency Operations Centers (BEOCs), when applicable and available. • Develop priorities specific to community incidents that will result in common supply needs (e.g., earthquakes, hurricanes, pandemic, Ebola/VHF cases, mass violence incident based on geography and patient population)

Stage	Considerations	Mitigation and Response Strategies
	<ul style="list-style-type: none"> • Access and Re-entry – Facility access may be a challenge for third-party logistics providers transporting supplies in unmarked vehicles that may need to cross police lines. After a criminal event such as a terrorist attack, additional precautions would need to be taken to verify the origin of delivery vehicles. 	<ul style="list-style-type: none"> ▪ Annual influenza season is often used as a model to understand usage/consumption. • Collaborate with state and local authorities and private sector partners to develop a local program for pre-registration of supplier companies and personnel (include 3PLs, law enforcement, and other key stakeholders). <ul style="list-style-type: none"> ▪ Send delivery drivers letters of access on company letterhead or special "codes" or placards issued by law enforcement to expedite deliveries. ▪ Identify distributor as a key (known) vendor/partner. • Develop coalition member agreements for storage and distribution of critical supplies as required. <ul style="list-style-type: none"> ▪ May include Disaster Response Centers where a large facility serves as the hub for storage and distribution to smaller facilities within a region. • Ensure distributors have a means of communicating with coalition and emergency management and understand how they receive assistance during a disaster that affects distributor operations.
Response	<ul style="list-style-type: none"> • Alternative ordering – During a response, customers often place larger orders than usual. In these instances, distributors will confirm an order that is out of the "norm" before processing. • Feasibility of Surge Deliveries – Depending on the event, expedited deliveries may be requested, as well as more frequent deliveries. Considerations for these surge 	<ul style="list-style-type: none"> • Create a streamlined communication process for efficient ordering, confirmation, and work to pre-populate orders, including an alternate communications plan. Ensure that the facility is not placing duplicate orders for the same items with multiple vendors (a common situation that leads to significant miscalculation of actual need by distributors and manufacturers).

Stage	Considerations	Mitigation and Response Strategies
	<p>deliveries include those noted below in this section, as well as staff and product availability.</p> <ul style="list-style-type: none"> • Alternative transportation and routes – Identify navigable routes for delivery vehicles, and alternative delivery sites, as required. • Securely transport deliveries – Distributors may work closely with law enforcement to receive assistance (routes, escorts). This is especially important during events when road access is compromised. 	<ul style="list-style-type: none"> • Provide customers with specific allocation limit amounts for operational planning at healthcare delivery sites. • Work with manufacturers and parent (corporate) healthcare systems to anticipate needs and move additional materials to the distribution centers ahead of the event or requests. • Be prepared to switch to alternative products when necessary and determine how deliveries will be prioritized if requests exceed inventory. Ensure providers understand how allocation and prioritization will work. • Climate-control technologies in delivery vehicles should be sufficient for prolonged delays in transport. • Source or create processes for obtaining specialty vehicles that may be needed (such as high-water vehicles, boats, and snowmobiles) as well as additional standard vehicles/drivers to meet increased delivery demands. • Establish relationships and contacts with local emergency management – these may be helpful in restoring services and access to the distribution center, securing specialized vehicles, and allowing access to secure or restricted areas as well as obtaining current information on road status and hazards. Emergency management often does not have awareness of the distributors in their area and the key role they play in disaster response.
Recovery	<ul style="list-style-type: none"> • Resume normal operations and communicate the resumption of normal allocation/delivery/activities. 	<ul style="list-style-type: none"> • Coordinate with local authorities on primary delivery route restoration if event caused the need for alternative routes. • Adjust delivery schedules as needed for facilities.

Stage	Considerations	Mitigation and Response Strategies
	<ul style="list-style-type: none"> • Coordinate with manufacturers and providers as needed on product substitutions (which ideally should be identified and agreed to prior to an event) and transition back to primary product when available. <ul style="list-style-type: none"> ▪ Distributors coordinate on substitutions of the same medical product (e.g., substituting the same generic medicine from a different manufacturer.) They are not involved in decisions regarding substitutions when there is a medical and patient care consideration. 	<ul style="list-style-type: none"> • Communicate transition plan and timing back to primary products and normal supply and delivery process.

Coalitions and Distributors

The plans and activities of distributors and HCCs can – and often do – directly impact one another. Accordingly, robust information sharing, collaboration, and partnerships between distributors and HCCs contribute to a strong preparedness, response, and recovery posture for a region. Integrating distributors into ESF-8 and meeting face-to-face on a regular basis through coalition meetings, trainings and exercises, and the like will highlight the importance of these relationships and also identify key contacts that can be called upon during a response. Distributors should have a clear understanding of the role the local coalition plays during a disaster and how the coalition and distributor interface with the formal emergency management response structure in the jurisdiction so that information and resource requests can be managed according to local policy (including how to connect with local and state emergency management). During shortages, HCCs can play a key role integrating clinical options (from the provider level) and vendor options (from the distributor level) to define appropriate and consistent strategies.

Providers

Providers are a large and diverse group of facilities and professionals licensed to supply healthcare services and expertise, to include disbursing and dispensing medicines and products to patients. Key activities they undertake within the supply chain include submitting orders to distributors and providing data and information on healthcare services and needs that help identify shortages and potential distribution challenges. The considerations and mitigation and response strategies differ among provider groups considerably. The following table captures high-level considerations generally consistent across provider types but is not intended to be exhaustive.

Supply Chain Vignette: Serving Affected Communities

During the devastating 2017 hurricane season, providers such as CVS Health and Walgreens found innovative ways to continue serving their communities. Both deployed “pop up” pharmacies to multiple shelter locations. CVS Pharmacy and CVS Caremark activated a process allowing pharmacists to conduct one-time emergency refills of a 10-day supply of prescription medicines for those in need. Within a few days after Hurricane Irma, Walgreens reopened 700 of their 930 stores in Florida.

— Healthcare Ready, [Heroes of the Supply Chain: Dispensers and Providers](#).

Stage	Considerations	Mitigation and Response Strategies
Pre-event	<ul style="list-style-type: none"> • Identify hazards, vulnerabilities, and threats – Focus on events that could significantly disrupt supply delivery or compromise current supplies (e.g., by damage or consumption) and those that are most likely in specific regions. • Define triggers or thresholds for activation of emergency plans – Emergency plans should include policies and procedures for requesting supplies and managing disruptions in supply chains 	<ul style="list-style-type: none"> • Develop emergency response and business continuity plans informed by HVAs and risk assessment tools. • Based on HVA and other tools, anticipate commonly needed medications and supplies and consider caching or increasing par levels of those supplies at the facility (space and shelf-life permitting). This may include non-medical supplies such as cots and food or water. • Consider “push” lists of commonly needed medications and supplies to replenish or augment facility stock that the

Stage	Considerations	Mitigation and Response Strategies
	<ul style="list-style-type: none"> • Identify alternative mechanisms for ordering, receiving, and tracking supplies. • Identify multiple delivery locations – Depending on the situation, distributors may make deliveries to individual healthcare facilities/ alternate care facilities or a central warehouse where items will be later redistributed. • Stockpile non-medical product(s) – Not all supplies providers may need during an emergency are stocked in large quantities by suppliers (e.g., hazmat suits). These should be present on-site in adequate quantities to address expected scenarios. • Define triggers and thresholds for changes to standards of care – While implementing crisis standards of care is a last resort, discussing and planning for a system and procedures for operating under these conditions is important, and can have implications on supply orders (e.g., implementing re-use of N95 masks). • Work with key stakeholders to establish Memoranda of Understanding (MOUs) or Memoranda of Agreement (MOA) – MOU/MOAs between HCCs, providers, and other supply chain stakeholders can assist in managing expectations of additional support available during an emergency. 	<p>distributor can have available and establish policies on when to request these.</p> <ul style="list-style-type: none"> • Scenario-based exercises should allow providers to identify thresholds for instituting substitution and conservation procedures and document the process through which this occurs. Exercises should be used to document and determine how these strategies and situational information are communicated to key partners including the coalition. • Implement pilot programs and training to integrate new products into electronic health records and educate providers on labeling changes. • The facility steady-state drug shortage processes may have applicability for developing disaster shortage policies. • Maintain communications with distributors to understand shortages and delivery issues. Establish alternate communications plan with major distributors in case primary means fail. • Establish an alternate distributors list for critical supplies as well as understand the location, transport time, and potential interruptions in delivery between the distributors and provider. • Identify alternate methods and routes for deliveries based on predicted hazards. • Determine the coalition’s role in for planning, information sharing, indexing, and managing resource requests/brokering with distributors during an incident.

Stage	Considerations	Mitigation and Response Strategies
		<ul style="list-style-type: none"> • Develop and test protocols and redundant communication channels with coalitions and emergency management agencies for reporting supply status and needs during incidents. • When crisis standards of care are necessary, ensure a coalition-level plan for communicating the criteria and strategies to all stakeholders and determining timelines and product needs and availability with distributors. • Providers should become established customers ahead of a disaster (not during) and maintain contacts with industries that manufacture supplies (e.g., orthopedic hardware) as required. • Request and review memoranda of understanding (MOUs) from sister facilities or coalition members have in place with supply chain components. For example, major chains and Federal facilities may receive designated “preferred status” through an MOU with supply chain components. This status helps these facilities to be prioritized during emergencies. • Provide information to at-risk patients about planning for disasters including delivery interruption, medication access, and storage requirements.
Response	<ul style="list-style-type: none"> • Forecasting needs – Ability to provide care hinges on having needed supplies on-site and a plan for replenishment. Anticipating supply needs, and capacity for receiving and storing them, are key activities for responses. • Supply chain support activities – Providers should alter their practices as appropriate (ideally without compromising 	<ul style="list-style-type: none"> • Use models, especially those based on past events (e.g., recent catastrophic hurricanes, severe flu seasons) to help determine likely supply needs and quantities and proactively try to obtain them prior to shortage (also understand the potential to return items to the distributor)

Stage	Considerations	Mitigation and Response Strategies
	<p>quality of care) to decrease demand and increase the safety of substituted supplies. Examples include revising downtime procedures and refrigeration prioritization.</p> <ul style="list-style-type: none"> • Coordinate with public sector responders – Public health and medical sector (ESF-8) typically receives information about supply needs from a facility, and mainly engage with distributors after healthcare facilities report an expected lag in availability of a needed product. • Partnerships across relevant supply chains – Relationships with all components of the healthcare supply chain (e.g., linen and blood) and other sector supply chains (e.g., fuel and food) may be leveraged for ad hoc solutions. • Mitigate or adjust to staff shortages – Staff absenteeism during events may occur, especially for downstream components (distributors, last mile, and healthcare facilities). This can be a challenge to maintaining healthcare operations during events, especially for healthcare facilities – including ancillary care. 	<ul style="list-style-type: none"> ▪ Population health data for the surrounding area can inform forecasting efforts. • Work with the coalition to communicate and share strategies with other facilities, including developing guidance for adapting to crisis conditions when required. • Ensure a mechanism at the facility level for development of clinical recommendations for substitution, conservation, adaptation, re-use, and re-allocation of supplies to ensure consistency. • Contribute to supply chain efficiencies during crises by conserving and using substitute medical and non-medical supplies (e.g., pharmaceuticals, blood products, fuel, medical gases, refrigeration). • Maintain current ESF-8 contacts through trainings, exercises, and other methods. • Activate mutual aid agreements within your healthcare coalition or with facilities not impacted by the hazard. • Explore and look for options from parent or “sister” facilities for resources if usual methods are not an option or do not provide sufficient resources. • Ensure disaster augmentation plans for pharmacy and supply personnel. Plan for workforce shortages including information for other providers to fill supply/warehouse/distribution roles and explore and engage with medical volunteer programs including the Medical Reserve Corps (MRC) and Emergency System for

Stage	Considerations	Mitigation and Response Strategies
		<p>Advance Registration of Volunteer Health Professionals (ESAR-VHP).</p> <ul style="list-style-type: none"> • Ensure information sharing with patients regarding services provided, facility status, and any changes they should be aware of with pharmacy supplies and home delivery of medications and medical supplies (e.g., nutrition, oxygen).
Recovery	<ul style="list-style-type: none"> • Resume normal operations and communicate the resumption of normal allocation/delivery/activities with distributors and coalition partners. • Communicate to patients and providers about resumption of normal activities/processes. • Manage transition back to daily operations/usual products and practices. 	<ul style="list-style-type: none"> • Disseminate supply chain disruption situation reports to local, regional, and state health authorities as requested. • Coordinate with distributors and others as needed on product substitutions and transitions back to primary product if event caused a shortage. • Share information on sustained supply chain impacts. • Work with distributors to resume normal operations, distribution volumes, and schedule.

Coalitions and Providers

As both key members and stakeholders of HCCs, providers drive coalition activities. HCCs play an important role in developing and disseminating information between their stakeholders (including emergency management) and with distributors, monitoring impact, and coordinating response activities during emergencies as per local ESF-8 plans. Providers look to HCCs for information sharing and standardization of activities, including those related to the supply chain such as substitution and conservation guidance. HCCs may also play a role in resource management and requests depending on the region. HCCs help prevent multiple providers from engaging multiple distributors about the same issues during emergencies and thereby can serve as a single point of contact between distributors and providers and can also engage emergency management if formal resource requests or community assets are needed. HCCs can use their After Action Reports (AARs) following exercises or events to highlight supply issues and encourage changes in policy and practice as part of corrective improvements.

Resources

- [ASPR emPOWER](#)
- [ASPR TRACIE Pharmacy Disaster Calculator](#)
- [CDC Supply Chain Disaster Preparedness Manual](#)
- [Health Industry Distributors Association. Lessons Learned: Pandemics and Medical Supplies](#)
- [Health Industry Distributors Association. Role of Medical Products Distributors in Emergency Preparedness](#)
- [Healthcare Ready. How it Works: The Supply Chain](#)
- [Healthcare Ready. How it Works: The Supply Chain in Disasters and Disease Outbreaks](#)
- [Healthcare Ready. Partnering with the Pharmaceutical Supply Chain](#)
- [Institute of Medicine. Crisis Standards of Care](#)

Patients

Patients and their caregivers are the primary end-users in the supply chain and typically only engage with providers although certain materials (e.g., nutrition, home dialysis supplies) are sometimes directly delivered to patients by distributors. The diverse needs of patients – from acute care needs, to chronic conditions, to unique demands from different demographic groups like pediatric patients – contribute to the complexity of this aspect of the supply chain.

Stage	Considerations	Mitigation and Response Strategies
<p>Pre-event</p>	<ul style="list-style-type: none"> • Understand insurer limitations on filling prescriptions – Generally, insurance plans prevent patients from obtaining a prescription refill before their current supply is depleted or close to it. During a declared disaster, a no refill order may be lifted. • Identify and plan for critical healthcare equipment delivery and maintenance – An important preparedness activity for patients is to ensure access to their homes for deliveries of critical supplies such as durable medical equipment (DME) and oxygen, and also to ensure proper refrigeration (if needed) of temperature sensitive medical products. 	<ul style="list-style-type: none"> • “Refill too soon” overrides may be allowed through an emergency declaration or at the discretion of insurance plans during emergencies. These overrides can allow patients to receive a 30-day supply of prescription medicines in advance of a forecasted event. As this is not always the case, it is important for patients to be educated on this issue and know what options they have. • Follow instructions on labels or patient instructions given by providers to help make sure medical supplies are properly administered and maintained by patients. • Plan with distributors to ensure continued access during a disaster for home-delivered products and plan how the patient can communicate their new location to a distributor if the patient is forced to relocate during a disaster. • Plan alternate source of refrigeration, if needed (e.g., portable cooler, locations that may have back-up power near the patient).

Stage	Considerations	Mitigation and Response Strategies
Response	<ul style="list-style-type: none"> • Disseminate information on open facilities and how to access them – Evacuated patients may not be familiar with or know of nearby open facilities. • Knowledge of waivers and sources of information (e.g., insurance hotlines) – Coverage may change during an emergency due to waivers and other exemptions. 	<ul style="list-style-type: none"> • Plan with healthcare providers in advance of an event to identify back up facilities, particularly ones within the insurance network. • Use locator services like Rx Open to identify open pharmacy facilities. • Follow training and awareness campaigns and seek patient resources during emergencies. • Consult with a medical provider in advance if possible if a medication shortage or difficulty accessing medication ensues. An alternate strategy or medication may be temporarily needed (e.g., going to a clinic to receive insulin versus storing it at home). • Understand how health insurance benefits and restrictions may change during a disaster (e.g., in-network coverage changes)
Recovery	<ul style="list-style-type: none"> • Transition care and services to a new or temporary facility. 	<ul style="list-style-type: none"> • Develop continuity of care plans with care teams, including primary care providers, pharmacists, and insurance providers. • Understand timeline for restoration of services / deliveries. • Resume usual medications and schedules. • Plan for deliveries and supply chain needs if temporary healthcare facilities are used or patients relocated.

Coalitions and Patients

Though HCCs do not connect directly with patients, they may help coordinate risk communication to the community and development of consistent information for patients that can be provided through an emergency management Joint Information System. Further, HCCs may have a role with coordinating medical support of shelter and relocation activities that can require provider and distributor solutions to problems of delivery and maintenance of products.

Resources

- CDC: [Prepare Your Health](#)
- Healthcare Ready: [Protect Your Health Before A Disaster](#)
- Healthcare Ready: [Protect Your Health During A Disaster](#)
- Healthcare Ready: [Protect Your Health After A Disaster](#)
- [Ready.gov](#)
- [RxOpen.org](#)

Coalitions

Healthcare coalitions (HCCs) serve as a unifier of healthcare preparedness, response, and recovery activities across a community – working to link the disaster partners and plans to provide care and protect public health in their area. All HCCs should be able to act as an information-sharing hub for distributors and providers, including product and delivery information and strategy sharing. For HCCs with a broader role in emergency response, activities may include tracking barriers to product delivery, resource request management and brokering, and monitoring operational status and needs of healthcare facilities within the HCC. HCCs also play a key role creating liaison between public sector response agencies, including emergency management agencies and public health departments, and private healthcare entities that serve as points of service.

Stage	Considerations	Mitigation and Response Strategies
Pre-event	<ul style="list-style-type: none"> • Reconcile and align private sector member business continuity plans and public sector member emergency response plans – With diverse members, HCCs can help set emergency response priorities and translate resources, needs, and concerns across and between members. With healthcare owned and operated by the private sector but public sector agencies charged with responding, mediation and understanding before an event is essential. • Foster and forge relationships with supply chain components – HCCs play an important role in establishing key external relationships and fostering collaboration and partnerships during steady state. • Determine emergency protocols and procedures – HCCs can play a lead role in developing and disseminating guidance within their membership on how to conserve, substitute, adapt, re-use, and re-allocate supplies. • Establish information-sharing protocols and reporting flow – HCCs should determine how information about impacts to 	<ul style="list-style-type: none"> • Facilitate relationships through routine coalition interactions (e.g., inviting distributors to coalition meetings, trainings, and exercises). • Understand and document the major distributors in the area including key product lines, location(s), points of contact, and means of delivery. This may include distribution points owned and operated by major healthcare systems. • Understand the process for resource requests – when do healthcare facilities rely on their distributors, alternate distributors, and/or other facilities (in their system or in the coalition) or emergency management? What is the process for resource requests to the coalition/emergency management? This could include requests that need to come from the SNS, for example. • Understand the role of the coalition in drug and supply shortages when emergency management is not activated (e.g., during steady state operations).

Stage	Considerations	Mitigation and Response Strategies
	<p>healthcare services and supply alternatives will be shared throughout the coalition. (e.g., through Situation Reports, coordinating conference calls, and event dashboards).</p> <ul style="list-style-type: none"> • Include supply chain representatives, specifically distributors and potentially manufacturers, in coalition meetings and activities. 	<ul style="list-style-type: none"> • Review agreements, protocols and procedures of nearby or more mature HCCs to identify components that may work for your coalition. • Codify essential elements of information (EIs) relevant to supply chain in emergency operations plans as well as roles and responsibilities for compiling and disseminating information through Situation Reports and other mechanisms. • Ensure that the coalition role in response is understood by both distributors and providers and that the mechanisms for obtaining emergency management assistance are understood. • Conduct trainings to build capacity and identify key coordination points across coalition members. • Include supply chain objectives in community-wide exercises to improve engagement and understanding of key issues and solutions.
Response	<ul style="list-style-type: none"> • Coordinate response activities across members – Including through coordination calls, development, and dissemination of Situation Reports, dashboard updates (if applicable), liaising with ESF-8 and emergency management partners. • Collect and aggregate EIs from members and provide this data to local, state, and federal partners. • Create and share common strategies for scarce resource management among members. 	<ul style="list-style-type: none"> • Establish coordination conference calls or use other information platforms to share information. • Establish communications with major distributors and share hazard/impact information relevant to supply deliveries and security concerns as well as anticipated needs. • Monitor and/or manage response requests, determine allocations and delivery and other operations according to the coalition role in the jurisdiction.

Stage	Considerations	Mitigation and Response Strategies
	<ul style="list-style-type: none"> • Broker or allocate resource requests (depending on the defined coalition role). 	<ul style="list-style-type: none"> • Coordinate guidance for local implementation of crisis recommendations during protracted events (in conjunction with state-level efforts and local subject matter experts). • Share identified EEIs with supply chain partners (e.g., distributors, 3PLs) to establish information-sharing expectations and requests.
Recovery	<ul style="list-style-type: none"> • Communicate transition from response to recovery – This might be signaled through emergency operation centers (EOCs) standing down and information sharing cadences slowing. • Facilitate resumption of normal supply delivery and clinical use. • After-action reports and identify lessons learned – Coordinate with stakeholders to identify opportunities for improvement. • Incorporate lessons learned – Integrating lessons learned and best practices into future supply chain integrity assessments as needed for HPP capability requirements. 	<ul style="list-style-type: none"> • Ensure consistency of delivery/care across region – moving from crisis to contingency and then conventional status for materials use. • Monitor situation and share information until conventional delivery and supply use is attained. • Share lessons learned with local, regional, and state health authorities.

Resources

- AHRMM. [Medical-Surgical Supply Formulary by Disaster Scenario](#)
- Arizona Alliance for Community Health Centers. [Disaster Preparedness Inventory List: Systems, Equipment, and Supplies](#)
- ASPR. [2017-2022 Health Care Preparedness and Response Capabilities](#)

- [ASPR TRACIE Healthcare Coalition Planning Tools](#)
- [ASPR TRACIE Healthcare Coalition Recovery Plan Template](#)
- [ASPR TRACIE Healthcare Coalition Resources](#)
- [ASPR TRACIE Hospital Pharmacy Disaster Calculator](#)
- [CDC. Public Health Emergency Preparedness and Response Capabilities: National Standards for State, Local, Tribal, and Territorial Public Health \(updated 2019\)](#)
- [FEMA. Supply Chain Resilience Guide](#)
- [ASPR TRACIE Partnering with the Healthcare Supply Chain to Improve Disaster Response. Appendix B: Disaster Supplies for Consideration](#)



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Appendix A: Supply Chain Integrity Self-Assessment - A Resource for Healthcare Coalitions

Introduction

Specific language from the 2019 ASPR Hospital Preparedness Program (HPP) Funding Opportunity Announcement (FOA) includes requirements for both recipients and healthcare coalitions (HCCs) to conduct a supply chain integrity assessment to evaluate equipment and supplies that will be in demand during emergencies and develop mitigation strategies to address potential shortfalls at the HCC level. The recipient must provide documentation that this assessment was conducted, along with corresponding mitigation strategies to ASPR. Specifically, the HCC “should examine its supply chain vulnerabilities by collaborating with manufacturers and distributors to determine access to critical supplies, amounts available in regional systems, and potential alternate delivery options in the case that access or infrastructure is compromised. The HCC should then collect and use this information to coordinate effectively within the region, in collaboration with the ESF-8 lead agency. The HCC should further collaborate with healthcare organization members and other stakeholders to develop joint understanding and strategies to address supply chain vulnerabilities.”⁴

ASPR TRACIE was asked to develop a self-assessment checklist for HCCs to meet this capability requirement and assist them in examining the disaster readiness of their member organizations, with an emphasis on their individual supply chains. *HCCs are not required to use this tool if they have an alternate means or method of meeting the HPP FOA requirements.* There is not an expectation that individual supplies and their vulnerabilities are addressed. However, common supply and pharmacy needs (e.g., PPE, sterile supplies, commonly needed medications) have been provided in [Appendix B](#) for facility planning as well as discussion with distributors and within the HCC about the need for local caches as well as strategies to increase facility par levels. These general strategies and conclusions should be documented along with local distributor capacity to meet facility needs. Documentation of any specific supply quantities or analysis is not required to fulfill the requirement. The goals that should be achieved and documented are:

- Promote engagement and relationships between supply chain and coalition partners.
- Understand the strengths and vulnerabilities of the supply chain in the coalition (and by extension, the recipient) area.

⁴ The [2017-2022 Healthcare Preparedness and Response Capabilities](#) (Capability 3, Objective 3, Activity 1- Assess Supply Chain Integrity), Page 62.

- Analyze, at the facility and coalition level, the general types of supplies that will be required in disasters likely to affect the area, the local distributors providing them, and strategies to assure those supplies are readily available for patients in need.
- Determine mitigation and potential response strategies for supply chain interruptions (e.g., caching materials, alternative delivery vehicles, pre-event delivery of supplies).

The following checklist is informed by the mitigation and response strategies noted within this document. The strategies are intended to provide a starting point. Each HCC will need to determine the priority risks for their communities and the key private sector healthcare supply chain partners to be engaged in collaboration. Facilitating these discussions in each HCC will likely lead to other mitigation strategies specific to their communities and population. Not all items in the assessment are applicable to all coalitions and some will be much more important than others depending upon geography, the number and type of distributors and healthcare facilities in the area, and local hazards. Finally, HCCs (and their members) must work with each jurisdiction's legislatively and legally defined ESF-8 structure to determine local expectations for medical supply request and fulfillment processes during disasters (e.g., in some cases, the medical sector is required to work with their vendors and other facilities until all possibilities are exhausted before involving emergency management).

Process

The checklist supports the previously listed goals and contains a variety of activities for the coalition to complete, divided into three sections:

1. Risk and Vulnerability Assessment
2. Coalition Supply Chain Partner Engagement
3. Coalition Planning

HCC leaders can use this tool as a basis for discussion between and among coalition members and regional supply chain partners. This assessment is designed to produce a general impression of the gaps to be addressed in order to bolster supply chain preparedness.

For each function, the activity should be assessed on a 0-5 scale⁵, based on the estimated level of effort required to attain adequate operational function:

⁵ This scale is consistent with scales used in other ASPR TRACIE Resources such as [HCC Influenza Pandemic Checklist](#) and [HCC Resource and Gap Analysis Tool](#).

- 5 – No plan or asset currently exists
- 4 – Inadequate plan or assets exist
- 3 – Potentially adequate plans or assets exists, but have not been evaluated or tested, and/or are incomplete
- 2 – Adequate plans or assets exist, but require minor modifications based on exercises, events, or other evaluation
- 1 – No work remaining – plans or assets have been tested in exercises and/or real-world events and currently require no further modification
- 0 – Not applicable – activity outside the scope of coalition responsibilities or capabilities.

This assessment may help coalitions determine priorities for supply chain contingency planning. Each activity identifies the primary supply chain components involved in executing or meeting the activity goal.

1. Risk and Vulnerability Assessment

This set of activities is designed to help HCCs identify the sites and members within their coalition most vulnerable to supply chain disruptions. It also presents activities that can help increase awareness and understanding of supply chain operations and dependencies within the HCC as well as identify critical medication and supply gaps to address with distributors.

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>1.1 Identify or categorize impact and hazards using a hazard vulnerability assessment (HVA), jurisdictional risk assessment (JRA), and/or other tools.</p> <ul style="list-style-type: none"> ▪ Consult the Healthcare and Public Health Risk Identification and Site Criticality (RISC) Toolkit and other comparable resources to determine healthcare facility criticality and vulnerability. ▪ Document specific risks to the healthcare facilities / service providers that may result in their isolation / make access difficult. How long could these conditions last? (HCC members can provide this input for their respective facilities to the HCC for aggregation). ▪ Document key community injury / illness scenarios that should be addressed in planning (e.g., penetrating trauma event with 25 casualties, 100 person chlorine exposure, or pandemic – also access Activity 1.6). 		Coalitions	
<p>1.2 Share existing and developed risk assessment, vulnerability information, agreements, and contingency plans with neighboring coalitions, key stakeholders, and recipient.</p>		Distributors; Providers; Coalitions; Recipient	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<ul style="list-style-type: none"> Consider reaching out to neighboring coalitions to jointly initiate discussions with regional and state supply chain partners 			
<p>1.3 Determine categories of critical medical product considerations for hospitals and other care sites, such as:</p> <ul style="list-style-type: none"> Likely surge demands and needs relative to par levels. (healthcare facilities may need to look more specifically at the supplies in Partnering with the Healthcare Supply Chain to Improve Disaster Response, Appendix B (Disaster Supply Considerations), and determine for their role in the response what is appropriate to stock) Priority medical products (e.g., blood, pharmaceuticals, sterile/surgical, linen). Available on-site supply, warehousing, or health system local/regional warehouses, facility or coalition-based caches of materials. 		Distributors; Providers	
<p>1.4 Identify distributors (including potential secondary distributors/suppliers) in relevant domains by creating a matrix, list, or map of supply chain “footprints” within the coalition’s jurisdiction. Can also include less commonly used local or regional vendors on the list. These may include:</p> <ul style="list-style-type: none"> Blood banks Medical gas suppliers Fuel suppliers 		Manufacturers; Distributors; Coalitions; Providers; Recipient	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<ul style="list-style-type: none"> ▪ Water suppliers ▪ Emergency power suppliers ▪ Telecommunications suppliers ▪ Transportation (e.g., buses, vans, tractor trailers) ▪ Nutritional suppliers and food vendors ▪ Pharmaceutical wholesalers ▪ Leasing entities for DME and biomedical equipment ▪ Vendors for disposable medical supplies ▪ Personal protective equipment (PPE) distributors and (potentially) manufacturers ▪ Hazardous waste removal services ▪ Linen services 			
<p>1.5 Discuss critical pharmaceutical supplies and their availability during emergencies in your region. Suggested sub-tasks to complete this activity are below:</p> <ul style="list-style-type: none"> ▪ Assess patient population needs and list critical medications (e.g., acute needs such as analgesia and sedation medications, or for chronic conditions such as diabetes, etc. that require medication – refer to Partnering with the Healthcare Supply Chain to Improve Disaster Response, Appendix B). ▪ Assess public health impact of event on both general and vulnerable populations and pharmaceuticals that may be 		Providers; Coalitions	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>needed (e.g., bioterrorism, pandemic) including through SNS or private sources.</p> <ul style="list-style-type: none"> Discuss potential demand increases with supply chain and options to meet the need for a variety of scenarios. 			
<p>1.6 Discuss critical medical supplies and equipment and their availability during emergencies in your region to minimally include mass trauma, HAZMAT, pandemic, Ebola Virus Disease and other special pathogens (based on region), and events that may isolate the facilities from distributors (e.g., hurricane, blizzard). Refer to Partnering with the Healthcare Supply Chain to Improve Disaster Response, Appendix B. Suggested sub-tasks to complete this activity include:</p> <ul style="list-style-type: none"> Assess patient population needs and identify any critical daily medical products (e.g., acute needs such as airway, ventilators, beds; chronic condition needs). Assess impact of public health event on general and vulnerable populations, and medical supplies that may be needed. Assess competing demands of public health efforts (e.g., mass vaccination) on local distributors. 		Distributors; Providers; Coalitions	
<p>1.7 Identify specialty supply considerations (e.g., decontamination, personal protective equipment, orthopedic hardware, pediatric, vulnerable populations).</p> <ul style="list-style-type: none"> Should align with the events identified after conducting the risk assessment in Activity 1.1 (e.g., weather related, 		Distributors; Providers; Coalitions	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>pandemic influenza, cyber, wildfires, utility outages, burn events).</p> <ul style="list-style-type: none"> Communicate what events are a priority and the corresponding list of likely impacted pharmaceutical and medical product supplies as well as their associated mitigation/response strategies with supply chain partners. 			

Resources

- [ASPR. RISC Toolkit](#)
- [ASPR TRACIE Topic Collection: Hazard Vulnerability/Risk Assessment](#)
- [ASPR TRACIE Topic Collection: Incident Management](#)
- [CDC. Supply Chain Disaster Preparedness Manual](#)
- [Kaiser Permanente. Hazard Vulnerability Assessment Tool](#)
- [Northern Utah Healthcare Coalition. Resource Management and Sharing Template](#)

2. Supply Chain Partner Engagement

This set of activities is designed to assist coalitions in assessing the current state of supply chain relationships (including ensuring valid contact information) and vulnerabilities (including understanding normal versus emergency response contacts and operating procedures) in concert with distributors (and manufacturers as appropriate).

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>2.1 Gather and record contact information for account managers and emergency response points of contact (POCs) along the supply chain for those distributors and vendors identified in Activity 1.4, including information for a back-up contact, the location of the facility, potential vulnerabilities for delivery, and potential assistance needed. Private-public coordinators at emergency management agencies should also be listed. This can be done by the facility and coalition, depending on the coalition’s role.</p> <ul style="list-style-type: none"> ▪ Update contact information prior to the known hazard (e.g., forecasted hurricane), hazard season, or at least annually. ▪ Is the POC for planning/administration the same one as for emergencies or 24-hour contact? ▪ Relationships are important, consider creating an educational document on the goals of the partnership and role of each stakeholder. 		Distributors; Manufacturers; Providers; Coalitions	
<p>2.2 Collect and share ESF-8 contact information at the state and local level (including state emergency management agency) with coalition members and relevant distributors.</p>		Coalitions	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>2.3 Coalitions should discuss and update supply plans and policies in consultation with healthcare facilities and emergency management to ensure current understanding of resources and potential issues/needs, at least annually (e.g., coalitions may work with facilities to provide an update to the coalition annually about any changes to vendors, on-site supplies, or other factors that might affect their vulnerability).</p>		Coalition	
<p>2.4 Provide training or guidance to distributors on submitting requests to ESF-8 at the jurisdictional (local and state level) and the potential resources that may be needed/available to them.</p> <ul style="list-style-type: none"> ▪ Define when a facility should work on their own to acquire needed items versus when they are to work with coalition/ESF-8 so as to not duplicate efforts or compete for resources. ▪ Discuss triggers for when the coalition would become the conduit for requests and/or allocation decisions – this may also help ensure there are not disproportionate assets in the community due to parent healthcare systems having different levels of access to materials. 		Coalition	
<p>2.5 Provide training or guidance on the responsibilities of the coalition in brokering and deconflicting resource requests between distributors and healthcare. (Note: some of these situations may not involve an EOC activation – for example shortages of lumbar puncture kits during the 2012 fungal</p>		Coalition	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
contamination of injectable steroid incident.) These policies should be defined and agreed to prior to an incident.			
<p>2.6 Engage supply chain partners in coalition exercise.</p> <ul style="list-style-type: none"> ▪ Options to consider for exercises include virtual exercises, tabletop exercise, and full-scale exercise participation (e.g., movement of products/simulated products, testing access to disaster areas for deliveries, or tests of "pulls" of disaster list materials. ▪ Conduct an after-action review and identify opportunities to improve and test in future exercises. 		Distributors; Coalitions; Providers	
<p>2.7 Provide training or guidance to distributors on submitting requests to ESF-8 at the jurisdictional (local and state level) and the potential resources that may be needed/available to them.</p> <ul style="list-style-type: none"> ▪ Define when a facility should work on their own to acquire needed items versus when they are to work with coalition/ESF-8 so as to not duplicate efforts or compete for resources. ▪ Discuss triggers for when the coalition would become the conduit for requests and/or allocation decisions – this may also help ensure there are not disproportionate assets in the community due to parent healthcare systems having different levels of access to materials. 		Coalition	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>2.8 Invite manufacturers, wholesalers/distributors in the region to coalition meetings, as appropriate.</p> <ul style="list-style-type: none"> ▪ Consider scenario-based discussions between distributors and providers to help providers understand how the distributors (and the coalition) will manage a situation in which there are inadequate resources to meet the requests (e.g., how will allocation be handled if implemented, likely duration if a local event). 		<p>Manufacturers; Distributors; Providers; Coalitions</p>	
<p>2.9 Ensure a process for sharing emergency information that may impact logistics and delivery operations with distributors.</p> <ul style="list-style-type: none"> ▪ Identify “triggers” in these public communications such as road closures and curfews that will affect delivery. ▪ Consider standard communication channels to notify supply chain partners and providers in community about specific impacts and the need to shift to alternative delivery schedules. ▪ Communicate to relevant state and local authorities that alternative schedules and routes are being implemented. ▪ Engage emergency management to request assistance with delivery when available resources are insufficient. Delivery should be based on acuity of need. 		<p>Distributors; Providers</p>	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>2.10 Plan with facilities and law enforcement to ensure relevant supply chain partners (including third-party logistic providers) are identified as key (known) vendors (partners) and ideally have credentials to access facilities that may be within a law enforcement perimeter during a disaster.</p> <ul style="list-style-type: none"> ▪ Some states include supply chain in the governor’s emergency declaration as critical entities. ▪ Consider engaging relevant state and local law enforcement on various requirements. (e.g., certificates, badging). ▪ Communicate plan to supply chain partners and HCC members. 		Distributors; Providers; Recipient	
<p>2.11 Establish a process to share distributor/logistics provider capabilities for delivery should road transport be limited (e.g., use of rotor-wing or boat delivery).</p> <ul style="list-style-type: none"> ▪ If applicable to HCC location and topography, determine if and where high-water vehicles or boats are available to supply chain partners (e.g., during Hurricane Harvey, responders used duck boats) and how those assets are coordinated. ▪ If applicable to geography of HCC, determine options to deliver limited supplies via helicopter if roads are not accessible (e.g., due to earthquake or flooding). 		Distributors; Providers; Coalitions	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<ul style="list-style-type: none"> If applicable, determine availability of alternate vehicles if roads are compromised by snow or ice (e.g., snowmobile, four-wheel drive, all-terrain vehicle). 			
<p>2.12 Understand distributor storage and warehousing capacity in the region and adjacent regions to better gauge regional capacity and timelines for deliveries.</p> <ul style="list-style-type: none"> This may help the facilities and coalition determine priorities for stocking and potentially regional caches in Section 3. 		Providers; Distributors; Coalitions; Recipient	

Resources

- [ASPR. Coalition Emergency Management Program](#)
- [ASPR. The Healthcare Coalition in Emergency Response and Recovery](#)
- [ASPR TRACIE Healthcare Coalition Resource and Gap Analysis Tool](#)
- [ASPR TRACIE Topic Collection: Coalition Models and Functions](#)
- [ASPR TRACIE Topic Collection: Healthcare Coalition Development and Organization](#)
- [ASPR TRACIE Topic Collection: Information Sharing](#)
- [Crisis Event Response and Recovery Access \(CERRA\) Framework](#)
- [FEMA. Supply Chain Resilience Guide](#)
- [Health Industry Distributors Association \(HIDA\)](#)
- [Healthcare Distribution Alliance \(HAD\)](#)
- [Healthcare Ready. Access Denied: Delivery of Critical Healthcare Products and Personnel to Disaster Sites](#)

3. Planning

This set of activities is designed to assist coalitions in assessing available contingency guidance and plans, gaps in needed guidance, and standardizing guidance across members to harmonize response operations. This section also addresses formalizing relationships through joint plans, policies, procedures, memoranda of understanding (MOUs), and contracts.

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>3.1 Determine alternate delivery processes should an event limit road transport</p> <ul style="list-style-type: none"> ▪ Consider developing and sharing key planning questions that coalition members can share with distributors on this topic as well as potential solutions (e.g., alternate delivery methods or routes for specific at-risk healthcare facilities). 		Distributors; Providers	
<p>3.2 Consider changes to frequency of deliveries and resupply.</p> <ul style="list-style-type: none"> ▪ Facilities that are resupplied by distributors less frequently or have the ability to store more inventory have different needs than facilities dependent on more frequent deliveries. 		Distributors; Providers	
<p>3.3 Advise coalition members to have contingency plans, should regular ordering processes be unavailable.</p> <ul style="list-style-type: none"> ▪ Examples include paper-based ordering plans, protocols for submitting orders via phone, etc. ▪ Discuss how to utilize coalition members’ corporate support structures where applicable. 		Distributors; Providers; Coalitions	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>3.4 Establish coalition-wide process for developing and implementing guidance for Crisis Standards of Care (in collaboration with state efforts and in consultation with supply chain partners) to include triggers and plan(s) for conservation, substitution, adaptation, reuse, prioritization and reallocation of scarce supplies and consultation with clinical experts.</p>		Providers; Coalitions	
<p>3.5 Determine if an increase in par levels or caching of certain medications and supplies is warranted at the provider, state, and/or coalition levels.</p> <ul style="list-style-type: none"> ▪ Regional caches should prioritize critical supplies with long shelf lives to minimize rotation. Distributor-managed caches may be an option. Policy on request, allocation, distribution, use, and replacement must be in place for any regional assets. 		Providers; Coalition	
<p>3.6 Transportation of medical material: If movement of coalition cache materials is required, HCCs and recipients should determine how transportation of medical materials will occur, put necessary agreements in place and gain pre-approvals as necessary.</p> <ul style="list-style-type: none"> ▪ HPP grant funds can (with prior approval) be used to lease vehicles for movement of materials, supplies and equipment by HCC members. ▪ HPP grant funds can (with prior approval) be used for HCCs to make transportation agreements with commercial carriers for movement of HCC materials, 		Coalitions; Recipient	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>supplies and equipment. Establish a written process for initiating transportation agreements (e.g., contracts, memoranda of understanding, formal written agreements, and/or other letters of agreement).</p> <p>Transportation agreements should include, at a minimum, the following elements (per ASPR HPP 2019 Funding Opportunity Announcement):</p> <ul style="list-style-type: none"> ▪ Type of vendor ▪ Number and type of vehicles, including vehicle load capacity and configuration ▪ Number and type of drivers, including certification of drivers ▪ Number and type of support personnel ▪ Vendor’s response time ▪ Vendor’s ability to maintain cold chain, if necessary to the incident <p>This relationship may be demonstrated by a signed transportation agreement or documentation of transportation planning meeting with the designated vendor. All documentation should be available to the FPO for review if requested.</p>			
<p>3.7 Facilities may wish to work with distributors to establish a “push list” of critical medications or supplies likely to need</p>		<p>Distributors; Providers; Coalition</p>	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>replenishing early in a disaster or in anticipation of a specific incident, and a process to request these supplies.</p> <ul style="list-style-type: none"> Common elements may be standardized across multiple facilities within a coalition for simplicity. 			
<p>3.8 Work with distributors to ensure understanding of restocking/return/rotating options.</p>		<p>Distributors; Providers; Coalition</p>	
<p>3.9 Understand the distributors' redundancies and potential needs during a disaster as well as any resilience issues they are trying to address or have addressed through business continuity planning (e.g., whether they are located in a flood plain, with limited access to their facilities, and whether they have a contingency/continuity plan that is regularly reviewed and tested).</p>		<p>Manufacturers; Distributors; Providers; Coalitions</p>	
<p>3.10 Request members share established distributor memoranda of understanding (MOU) related to emergency operations to better understand status of agreements in the region.</p> <ul style="list-style-type: none"> This identifies instances where multiple coalition members and possibly distributors have identified the same resource solution and that vendor capacity would potentially not be sufficient to fully meet the needs of all. 		<p>Distributors; Providers; Coalitions</p>	

Activities	Coalition Assessment (0-5)	Relevant Supply Chain Component	Coalition Work to Date & Remaining Work Needed
<p>3.11 Consider and plan for the diverse needs of patients related to the supply chain– from acute care needs, to chronic conditions, to unique demands from different demographics like pediatrics.</p> <p>Examples include:</p> <ul style="list-style-type: none"> ▪ Limitations on filling prescriptions by insurers ▪ Identify and plan for critical healthcare equipment delivery and maintenance ▪ Information on and access to open facilities (e.g., Rx Open) ▪ Knowledge of waivers and sources of information (e.g., insurance hotlines) ▪ Transitioning care and services to a new or temporary facility ▪ Partnerships with regional or national organizations to collect and disseminate patient-level guidance, which can be used and amplified by the HCCs 		<p>Providers; Coalitions; Patients</p>	
<p>3.12 Determine alternate delivery processes should an event limit road transport.</p> <ul style="list-style-type: none"> ▪ Consider developing and sharing key planning questions that coalition members can share with distributors on this topic as well as potential solutions (e.g., alternate delivery methods or routes for specific at-risk healthcare facilities). 		<p>Distributors; Providers</p>	

Resources

- [ASPR. 2017-2022 Health Care Preparedness and Response Capabilities](#)
- [ASPR HPP 2019 Funding Opportunity Announcement](#)
- [ASPR TRACIE Coalition Emergency Operations Plan](#)
- [ASPR TRACIE Health Care Coalition Response Plan](#)
- [ASPR TRACIE Topic Collection: Coalition Response Operations \(Including Mutual Aid\)](#)
- [ASPR TRACIE Topic Collection: Continuity of Operations \(COOP\) / Failure Plan](#)
- [ASPR TRACIE Topic Collection: Information Sharing](#)
- [CDC. Public Health Emergency Preparedness and Response Capabilities: National Standards for State, Local, Tribal, and Territorial Public Health \(updated 2019\)](#)
- [FEMA. Business Continuity Plan](#)
- [FEMA. Developing and Maintaining Emergency Operations Plans](#)
- [Rx Open](#)

Appendix B: Disaster Supplies for Consideration

The lists provided in this appendix are intended to serve as a reference point only. HCCs are not expected to develop or maintain lists to this degree of specificity. Similar lists are available from partners in the field.

Pharmacies

Consider the use of the [ASPR TRACIE Hospital Pharmacy Disaster Calculator](#) for facility-level predictions. Note that this list does NOT include medications such as anti-hypertensive agents that may be needed to support patients with chronic conditions during a prolonged event or one that damages infrastructure.

Analgesia

- Narcotic- IV (e.g., Morphine)
- Narcotic- Oral (e.g., Oxycodone)
- Non-narcotic- Oral (e.g., Ibuprofen, Acetaminophen)

Anesthetic

- Local- Inject (e.g., Lidocaine, Bupivivaine)
- Local- Ocular (e.g., Proparacaine)
- General- IV (e.g., Propofol)

Antibiotic

- Narrow spectrum- IV (e.g., Cefazolin, Vancomycin)
- Broad spectrum- IV (e.g., Expanded Spectrum Penicillin, Carbapenem)
- Narrow spectrum- Oral (e.g., Cephalexin)
- Broad spectrum- Oral (e.g., Expanded Spectrum Penicillin, Quinolone)
- Broad spectrum- Topical (e.g., Bacitracin- particularly for burn patients)
- Broad spectrum- Ocular (e.g., Polymixin/Trimethoprim)

Antiemetic

- IV (e.g., Ondansetron)
- Oral (e.g., Ondansetron)

Antiepileptic

- IV (e.g., Ondansetron)
- Oral (e.g., Ondansetron)

Antipsychotic

- IV (e.g., Olanzapine, Haloperidol)
- Oral (e.g., Olanzapine, Haloperidol)

Anti-viral

- Oral (e.g., Oseltamivir)

Atropine

- IV/IM (e.g., Consider USP grade crystalline, autoinjectors in Chempack)

Bronchodilator

- Beta-agonist- Inhaled (e.g., Albuterol)

Buffer

- IV (e.g., Sodium Bicarbonate)

Calcium

- IV (e.g., Calcium Chloride, Calcium Gluconate)

Dextrose

- IV (e.g., D50)

Insulin

- Regular- IV/SQ (e.g., Aspart)
- Long-acting- SQ (e.g., Glargine)

IV Fluids

- Hypertonic- IV (e.g., 3%, 5%)
- Normal Saline- IV (e.g., 100mL, 1000mL)
- Lactated Ringers- IV (e.g., 1000mL)
- D5 ½ NS- IV (e.g., 1000mL)

Paralytic

- IV (e.g., Rocuronium, Atracurium)

Pressor

- IV (e.g., Epinephrine, Norepinephrine, Vasopressin)

Sedative

- IV (e.g., Lorazepam, Midazolam, Ketamine)
- Oral (e.g., Lorazepam)

SSKI

- Oral

Steroid

- IV (e.g., Methylprednisolone, Dexamethasone)
- Oral (e.g., Prednisone, Dexamethasone)

Tetanus Vaccine

- IM (e.g., Tdap)

Tranexamic Acid

- IV

Medical Supplies

This list was assembled from a variety of sources (e.g., Subject Matter Experts, AHRMM, HIGPA, and the U.S. Department of Commerce). It is specific to critical equipment only and is not comprehensive, but provides a starting point. It is critical to also plan for pediatric patients (those eight years of age and younger will require dedicated sizes of equipment) in relation to community resources / hospital role in the community.

Medication and Fluid Administration

- IV start kits
- IV catheters – 24, 22, 20, 18, 16
- Intraosseous needles / connector sets / drill
- Needles – draw 18/21gauge
- Needle – blunt
- Needle – injection – 23/25/27gauge
- Syringe – saline 10mL preloaded
- Syringe – 1, 3, 10, 35, 60mL
- Insulin syringe with needle
- Piggyback IV set
- IV tubing microdrip
- IV tubing standard drip
- Blood tubing
- IV Pump sets
- Pressure bags
- Central line kits
- Buretol / syringe pumps (if used)
- Arm boards - pediatric

Airway / Breathing

- Nasal airways (assorted)
- Oral airways (assorted – pediatric to adult)

- Laryngoscope / blades (ideally video with direct back up and multiple blades)
- Supraglottic airway (e.g. King, LMA) – pediatric to adult
- Surgical airway tray / supplies
- BVM – pediatric and adult sets
- Endotracheal tubes
- Tube holders / twill
- NG/OG tubes – pediatric to adult
- Nasal cannula
- Oxygen supply tubing
- Non-rebreather mask
- Nebulizer set / nebulizer masks
- Chest decompression needle (e.g. Cook, SPEAR)
- Suction tubing
- Flexible suction catheters
- Yankauer / large bore rigid suction tip
- Syringe cath tip 60mL
- Ventilators

Diagnostics

- BP cuffs (pediatric to adult)
- Oximetry probes (re-usable, disposable, pediatric)

- Arterial line kits and monitoring sets
- Electrodes (ECG leads)
- End-tidal capnography circuits

Laboratory

- Venous sample tubes (Vacutainer)
- Butterfly needles 21/23/25
- Luer to Vacutainer adapter

Urology / Gyn

- Foley catheters – pediatric and adult
- Collection bags

General patient care

- Pillowcases, sheets, blankets
- Gowns
- Towels, washcloths
- Soap
- Emesis bags
- Urinal
- Bedpans
- Facial tissues
- Disinfectant wipes
- Belongings bags
- Garbage bags – construction grade, opaque (for garbage, contaminated clothing, or temporary redress)

- Diapers
- Formula / nipples
- Oral hydration solution / packets

Surgical care

- Tourniquets – e.g. CAT
- Chest tube tray
- Chest tubes – 8-28 sizes
- Suture – per surgical preference
- Scalpels – particularly 11 and 25 blades
- Major procedure (laparotomy) tray (as applicable to facility)
- Vascular tray / bleeder tray (as applicable to facility)
- Trauma packs (prep, drape, cautery, other disposables to accompany trauma case) (as applicable to facility)
- Chest drainage set

Wound care

- Bandage scissor
- Sterile towels
- Roller gauze (e.g. Kerlix)
- Trauma shears
- Chlorhexidine prep
- Suture trays
- Suture – nylon (5-0 to 0)
- Suture – absorbable (5-0, 3-0)
- Irrigation fluid (may substitute clean tap water)
- 2x2 gauze
- 4x4 gauze

- Non-adherent dressing (e.g. Tegaderm, petrolatum gauze)

Orthopedic care

- Cervical collars (pediatric and universal)
- Slings
- Pre-formed splints
- Knee immobilizers
- Crutches
- Canes
- Walkers
- Walking boot (e.g. Cam walker)
- Fiberglass splinting rolls – various sizes
- Plaster splints – various sizes (but especially 5x30 inch and 4x15 inch)
- Plaster rolls – various sizes (but especially 4 inch)
- Webril / cotton batting – various sizes (but especially 4 inch)
- Elastic bandages – various sizes (but especially 4 inch)
- Coban – 3 inch

Burn care

- Petrolatum gauze 5x9
 - Sterile sheets
 - Silver-impregnated dressings
- (Note – large amounts of IV fluids and analgesia will be needed per patient – e.g. roughly 250mg equivalents of morphine/24h in addition to at minimum stretchable roller gauze (e.g. Kerlix) and petrolatum / bacitracin dressings)*

Miscellaneous

- Tape – adhesive, foam, surgical, paper
- Restraints – foam and leather (or equivalent)
- Stuffed animals
- Small dry erase boards and markers
- Large permanent markers
- Pediatric dosing guide (e.g. Handtevy, Broselow)
- Alcohol-based hand cleanser
- Liquid soap

Provider PPE

- Simple mask (fabric, flexible)
- N95 respirator
- PAPR (may be specific for infection control or combined HAZMAT/infection control)
- Waterproof suits for HAZMAT (may be used for EVD/VHF patient assessment/care)
- Isolation gowns (water resistant)
- Waterproof boots/booties
- Butyl gloves (overgloves for decontamination)
- Nitrile gloves (S-XL) for patient care
- Faceshields
- Headcovers (for EVD/VHF care as appropriate)

Scenarios to Consider (for facility and coalition supply planning)

Determine how many casualties is reasonable to plan for given the facility (and its role in the community – e.g., is it a pediatric center or trauma center), surrounding community hazards, and other healthcare resources available in the area:

1. Mass casualty incident – penetrating trauma/blast
 - Primary supply challenges – airway supplies, surgical supplies, blood products, medications (analgesia, sedation, intubation)
2. Mass casualty incident – pediatric
 - Primary supply challenges – age-appropriate intravenous supplies, airway supplies, medications may vary from adults
3. Mass burn incident
 - Primary supply challenges – analgesia, intravenous fluids, dressings, possibly airway supplies
4. HAZMAT – chlorine
 - Primary supply challenges – provider PPE, redress/gowns, possibly airway equipment
5. HAZMAT – organophosphate
 - Primary supply challenges – provider PPE, antidotes - atropine/pralidoxime, airway equipment, pharmaceuticals (e.g. benzodiazepines)
6. Pandemic
 - Primary supply challenges – provider PPE, critical care supplies and medications, antivirals, antibiotics, sedation/analgesia, airway supplies, general patient care supplies
7. Ebola Virus disease/VHF suspect case
 - Primary supply challenges – specialty provider PPE, waste containment

Appendix C: Key Federal Programs and Agencies

Although the healthcare supply chain is largely owned and operated by the private sector, several federal offices and agencies have a role in supporting the continuity of supply chain operations during emergencies and events that could impact healthcare operations, and have established partnerships with key components of the supply chain in order to accomplish this. Below is provided as a brief overview (not-exhaustive) of some of the key federal partners involved in healthcare supply chain issues.

- The US Department of Health and Human Services (HHS), Office of the Assistant Secretary for Preparedness and Response (ASPR), Division of [Strategic National Stockpile \(SNS\)](#) partners with industry, particularly distributors, to ensure timely delivery of select medicines and medical products in the event of a large-scale public health emergency. The SNS works to quickly distribute and deliver assets in the stockpile by leveraging commercial supply chain operations in place through contracts and memoranda of understanding (MOUs). The SNS also works with manufacturers and distributors to understand additional capacity in the system and how that might be used during a disaster as well as anticipate and help mitigate barriers to rapid delivery that benefit all participants in the supply chain. For examples of SNS response activities, [click here](#).
- [ASPR's Division of Critical Infrastructure Protection \(CIP\)](#) engages national-level public and private sector partners to identify supply chain threats, and to collaborate on solutions. CIP facilitates the Healthcare and Public Health Sector on behalf of HHS as the lead agency responsible for the protection of our nation's health critical infrastructure. This includes convening forums to advance the sector's understanding of emergency-response supply chain concerns and how to proactively mitigate these issues. CIP works with an advisory group of federal and private sector representatives to advance bidirectional communication and problem-solving in steady state and response situations. CIP also works to identify potential and current threats to the supply chain in order to gather relevant information and determine approaches to reduce or eliminate the disaster's impact.
 - ASPR CIP also leads a public-private partnership, the [Healthcare and Public Health Sector Critical Infrastructure Security and Resilience Partnership](#). This partnership supports information sharing and coordination during emergency events and is comprised of the Government Coordinating Council (GCC) and Sector Coordinating Council (SCC.) The GCC represents government interests and perspectives and includes ASPR, U.S. Department of Homeland Security, and the U.S. Food and Drug Administration in its membership. The SCC represents private sector interests and perspectives and includes supply chain trade associations and companies in its membership.

- [This blog](#) by ASPR CIP describes how gas manufacturers, healthcare facilities, and the federal and territorial government closely coordinated to help patients and manufacturers of critical medical devices receive the gas they needed after Hurricane Maria. They note four critical partners for facilities to be: local HCC, the healthcare and public health partnership, ASPR TRACIE, and the [FEMA National Business Emergency Operations Center \(NBEOC\)](#). During an incident, the NBEOC shares updates on interdependent lifeline sectors such as transportation, communication, water, and power outages and restoration.
- Sector-based [Information Sharing and Analysis Centers \(ISACs\)](#) collaborate and share information within and across the DHS-designated 16 critical infrastructure sectors. ISACs are trusted entities established by critical infrastructure owners and operators to foster information sharing and best practices about physical and cyber threats and mitigation. They provide incident response coordination and share information during emergency events. The Healthcare and Public Health Sector designated two organizations as the Sector's ISACs: Healthcare Ready and the Health ISAC, or H-ISAC.
- [ASPR's Hospital Preparedness Program](#) set forth the [2017-2022 Health Care Preparedness and Response Capabilities](#) which outlines high-level objectives that the nation's health care delivery system, including HCC's and healthcare organizations, should undertake to prepare for, respond to, and recover from emergencies. Within the continuity of health service delivery capability objectives, healthcare organizations (with support from their local HCC's) are encouraged to identify essential functions for health care delivery, to include supply chain management and assess its supply chain vulnerabilities.
- The [Centers for Disease Control and Prevention \(CDC\)](#) outlines the [Public Health Emergency Preparedness and Response Capabilities: National Standards for State, Local, Tribal, and Territorial Public Health](#) (2018) which outlines the capability for (and associated functions) for medical material management and distribution. CDC's Public Health Emergency Preparedness (PHEP) cooperative agreement program is administered by the Division of State and Local Readiness and provides eligible recipients guidance and funding to help build and operationalize public health response capability and consideration strategies. CDC also develops guidance and policies related to protective personal equipment (PPE) and outlines basic principles to help healthcare supply chain managers prepare for disasters by highlighting the advantages and ways to achieve a whole-community, coordinated effort.
- The [Food and Drug Administration \(FDA\)](#) is responsible for protecting the public health by ensuring the safety, efficacy, and security of human and veterinary drugs, biological products, and medical devices. FDA also plays a significant role in the Nation's counterterrorism capability. FDA fulfills this responsibility by ensuring the security of the food supply and by fostering development of medical products to respond to deliberate and naturally emerging public health threats.