GLOBAL CENTER FOR HEALTH SECURITY

NCDMPH Uniformed Services University

Building on the Fly by Design: Scenario Development Overview

Goal

The primary objective is to design a truly catastrophic scenario that allows participants to not be bound by prior assumptions regarding the civilian and military health system capabilities that would hold true in most disaster settings. Design of scenario is structured around extensive morbidity and mortality from kinetic and asymmetric large scale combat operations with a near-peer adversary.

Scenario Development

The following three example scenarios are being provided to attendees of the first Building on the Fly by Design Meeting, to be held in Omaha, Nebraska March 26-27. These three scenarios are provided as examples of scenario elements that could be included in a final scenario to be used during a national tabletop exercise that will be held at the second Building on the Fly by Design meeting in June in Washington, DC.

During the planning meeting in March, attendees will collectively design a scenario that is truly unprecedented and catastrophic; something that pushes the boundaries of anything we've ever faced as a nation, intentionally stressing the system to its breaking point, and generating innovative thinking about what could be done in potentially unconstrained environments. These scenarios have been drafted by the UNMC team, in partnership with NCDMPH, and test high-priority requirements, identified through our experiences and discussions with partners. During the March meeting, these scenarios will be presented and discussed; collectively, attendees will agree upon the key elements of the scenario that will be used for the June tabletop exercise.

Threat Elements

The scenario will be built around the NDMS Pilot scenario of 1000 patients per day returning to the United States during a **large-scale combat operation (LSCO)**, including many casualties with high-velocity penetrating trauma, overpressure blast injury, traumatic brain injury, and burns. This includes the expectation for full mobilization of Reserve and National Guard medical personnel.

The assumption for the Building on the Fly by Design scenario is that if the US were engaged in a military conflict with a near peer adversary, there would be simultaneous attacks occurring within the United States and targeting service members overseas aimed at disrupting support of US war operations and logistics, deteriorating US morale and resolve, and sowing chaos. These could include but not be limited to **cyberattack and information warfare** targeting the healthcare system, critical infrastructure, and/or the entire power grid. Moreover, **natural disasters** and **seasonal surge** (e.g., respiratory virus season), will continue to occur and require local and regional medical capacity in competition with the LSCO support. Scenario injects will assess vulnerabilities from specific threats.

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Scenario 1: Cyberattack impacting patient movement and tracking

Background: The US healthcare system is under unprecedented strain due to the evacuation of military members from an overseas conflict. Over the preceding 10 weeks, it is estimated that over 75,000 warfighters have been evacuated and distributed across the CONUS-based private healthcare system for various levels of acute and rehabilitative care. Many facilities are operating well beyond traditional maximal capacity, coordinating patient movement and care for evacuees requiring a range of services, including trauma, burn, and rehabilitation. Meeting the surge in military patients on top of ongoing civilian baseline, crucial medical needs is challenged by complex logistics, staffing shortages, and resource depletion, and thus is testing the resilience of US healthcare infrastructure.

Scenario Overview: A coordinated and sophisticated cyberattack targets critical civilian healthcare infrastructure, disrupting electronic health records systems, patient tracking platforms, scheduling systems, and credentialing databases. These disruptions affect hospitals, clinics, patient reception sites, and transportation agencies, creating delays and confusion. The cyberattack cripples the ability to coordinate patient care, requiring reversion to manual processes that delay critical movement and treatments. Patient-tracking platforms become inoperable, creating confusion as patients are moved between facilities with limitations to documentation of their clinical information and care plans. Computerized physician order entry is impacted. Care is delayed, causing backups in hospitals and exacerbating critical resource strains. Additionally, attempts to implement surge staffing strategies are complicated as cyberattacks disrupt state credentialing systems and hinder secure validation of emergency hires. There are also concerns that targeted attacks on medical devices (e.g., infusion pumps, key operating room electronic equipment such as anesthesia devices) are imminent, jeopardizing patient and medical personnel safety. Community communication is complicated by misinformation and panic about patient care delays and missing service members. Some families are unable to locate loved ones, creating widespread frustration and eroding trust in the response.

Key Elements

- **Tracking of patient movement** and coordination across civilian and military systems in cyber-compromised conditions.
- **Communication and interoperability of critical clinical information systems** across the care continuum with limited or hampered access to electronic systems.
- **Medical logistics,** including equitable distribution of resources and supplies.
- Strategies for deploying and validating **surge staffing**, including confirmation of the identity and qualifications in the absence or delay of electronic credentialing systems and non-professional volunteers working under expanded scopes of practice.
- Risks associated with **compromised medical devices and equipment**.
- Risks associated with **prolonged down-time to electronic health record systems**.
- Pathways for **communicating to families and the community** about care delays and patient locations.

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Scenario 2: Natural disaster and mass patient redistribution

Background: During a LSCO event, the US healthcare system is under unprecedented strain with over 1,000 patients per day being evacuated from the overseas conflict. In the preceding 12 weeks, the healthcare system has received and distributed an estimated 75,000 warfighters to CONUS-based facilities. Many of these evacuees arrive with severe trauma and burns from combat injuries, requiring advanced care at US facilities. Burn centers and trauma units are surpassing surge thresholds and struggle to maintain adequate specialized staffing, resources, and operational capacity.

Scenario: A 7.1 magnitude earthquake strikes across the New Madrid fault, causing widespread structural damage and resulting in numerous injuries. Among the physical structures with significant damage, including power outages and structural failures, are several burn and trauma centers and alternate surge locations/post-discharge facilities on both sides of the fault. These sites had been integral to the medical response to the military patients, further straining an overstressed system. Many of the alternate care locations lacked the infrastructure, staffing, and equipment to manage the surge even before the earthquake, and many were without established emergency plans. As a result, emergency generators fail after prolonged use. Facilities are forced to evacuate hundreds of patients, including high-acuity trauma and burn patients, to other care centers, all while simultaneously receiving an influx of earthquake-related trauma cases. Mass patient movement overwhelms air and ground transportation resources, compounded by their use for civilian populations impacted by the earthquake and earthquake-related infrastructure damage. Ground transportation is complicated by impassable roads and fuel shortages, while air transport resources are balancing the movement of patients with delivery of critical supplies to affected communities. Significant disruption to standardized ground EMS transport routes has also occurred. Additional alternate facilities are identified, including pediatric hospitals and rehabilitation centers; however, these facilities face challenges due to limited equipment, insufficient supplies, and staff unfamiliar with the needs of military patients that fall outside of their usual scope. Additionally, communication pathways are strained as families attempt to locate loved ones redistributed to other centers. Crisis Standards of Care have been implemented to prioritize care delivery.

Key Elements

- Simultaneous natural disasters and LSCO-related evacuations cause need for significant medical surge and **mass patient movement**/redistribution.
- **Coordination and interoperability** between civilian and military health systems to manage complex patient needs.
- **Patient tracking and communication systems** to support mass redistribution.
- **Physical capacity** of system to intake, redistribute, and move patients through definitive care.
- **Patient transportation** when resources are limited and during infrastructure disruptions.
- Readiness of **alternate care facilities**.

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Scenario 3: Supply chain and critical infrastructure disruption amidst seasonal respiratory virus patient surge

Background: The US healthcare system is under unprecedented strain due to the evacuation of military members from an overseas conflict. In the third month of the conflict, after the healthcare system has received and distributed an estimated 70,000 military members to CONUS-based facilities, the US is in the height of respiratory virus season where the influenza vaccine match is limited. Hospitals are overwhelmed with surging civilian cases of RSV, influenza, and COVID-19 as well as nosocomial cases including in evacuated servicemembers. The demand for critical care resources for the additional servicemembers and ill civilians is well above traditional maximal capacity, and some equipment are in short supply (e.g., mechanical ventilators). Pediatric hospitals are particularly hard-hit, with ICUs over capacity.

Scenario: A coordinated attack on elements of the supply chain threatens to cripple the system during this time of unprecedented surge. A cyberattack on major pharmaceutical and supply chain distributors disrupts the supply chain for critical medical consumables, including ventilator circuits and associated equipment (e.g., humidification equipment) essential for mechanical ventilation. The largest bulk oxygen manufacturers in the country have also been physically targeted; as a result, many hospitals face disruptions in oxygen delivery due to a limited number of fill trucks and skilled personnel required to replenish bulk oxygen tanks. The critical shortages of key consumables force hospitals to compete for limited resources. Simultaneously, electronic purchasing systems and utilization tracking networks fail due to ransomware, creating significant delays in restocking supplies and real-time inventory management and resupply efforts. Transportation disruptions due to a lack of shipment details further complicate delivery of oxygen and other consumables, especially to rural facilities supporting surge operations. The strain on civilian healthcare infrastructure is impacting the ability to maintain access to specialized care for non-respiratory conditions, including cardiac, trauma, and stroke care.

The combined effects of the respiratory virus surge and coordinated attacks lead to unavoidable widespread care delays. Even well-equipped facilities face significant shortages that prevent them from meeting demand. Mortality rates rise as vulnerable patients experience preventable complications due to resource shortages and delayed interventions. The crisis also exacts a heavy emotional toll on healthcare providers, some of whom are also ill, as they face moral distress in rationing care and making life-or-death decisions amid systemic failures. Patients and families grow increasingly frustrated with delayed treatments and the lack of clarity about resource shortages. Public confidence in the healthcare system erodes.

Key Elements

- **Physical capacity** of system to move patients into and through definitive care.
- **Supply chain management** amid transportation and logistical disruptions.
- **Human resources/staffing** during unprecedented surge, including working outside scope of clinical practice.
- Scarce allocation of life-saving resources and **ethical-decision making.**
- **Responder safety and health behavior**, particularly as it relates to healthcare providers rationing care.