Ready or Not, Patients Will Present: Improving Urban Pandemic Preparedness

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ABSTRACT

Over the past century, society has achieved great gains in medicine, public health, and health-care infrastructure, particularly in the areas of vaccines, antibiotics, sanitation, intensive care and medical technology. Still, despite these developments, infectious diseases are emerging at unprecedented rates around the globe. Large urban centers are particularly vulnerable to communicable disease events, and must have well-prepared response systems, including on the front-line level. In November 2018, the United States' largest municipal health-care delivery system, New York City Health + Hospitals, hosted a half-day executive-level pandemic response workshop, which sought to illustrate the complexity of preparing for, responding to, and recovering from modern-day infectious diseases impacting urban environments. Attendees were subjected to a condensed, plausible, pandemic influenza scenario and asked to simulate the high-level strategic decisions made by leaders by internal (eg, Chief Medical Officer, Chief Nursing Officer, and Legal Affairs) and external (eg, city, state, and federal public health and emergency management entities) partners across an integrated system of acute, postacute, and ambulatory sites, challenging players to question their assumptions about managing the consequences of a highly pathogenic pandemic.

Key Words: urban, pandemic, healthcare system, severe respiratory disease, frontline

Over the past century, we have achieved great gains in medicine, public health, and health-care infrastructure, particularly in the areas of vaccines, antibiotics, sanitation, intensive care, and medical technology. Still, despite these developments, infectious diseases are not only spreading faster at an unprecedented rate around the globe, they appear to be emerging at a faster rate,[1] and are capable of spreading around our world in 36 h or less.[2] Large urban centers are particularly vulnerable to communicable disease events, and must have well-prepared response systems, including on the front-line level. In November 2018, the United States' largest municipal health-care delivery system, New York City Health + Hospitals (NYC H+H), hosted a half-day executive-level pandemic response workshop, which sought to illustrate the complexity of preparing for, responding to and recovering from modern-day infectious diseases impacting urban environments. More than 100 health-care executives, senior advisors, emergency managers, academics, and government officials as well as local, state, national, and international public health community members attended the workshop. Attendees were subjected to a condensed, plausible pandemic influenza scenario and asked to simulate the high-level strategic decisions made by leaders by internal (eg, Chief Medical Officer, Chief Nursing Officer, and Legal Affairs) and external partners

(eg, city, state, and federal public health and emergency management entities) across an integrated system of acute, post-acute, and ambulatory sites, challenging players to question their assumptions about managing the consequences of a highly pathogenic pandemic.

The event revealed, from a systems perspective, distant, isolated disease outbreaks would have little effect on day-to-day operations unless specific actions were recommended from public health agencies. However, as the hypothetical outbreak became more widespread, recurrent themes of needs became increasingly evident.

First, when dealing with large-scale outbreaks in urban areas, enhanced resources and tools need to be made immediately available to those on the ground. Local surveillance systems now hold the ability to incorporate real-time data from local, regional, and national databases into decision support tools, but these technologies are rendered inconsequential should resources not be allocated appropriately or in a timely fashion. In the United States, state and federal stockpiles of medical supplies exist can be rapidly distributed,[3] but a pandemic scenario is likely to complicate resource allocation on local and sub-national levels because of competing areas of similar need, limiting the allocation and deployment of these resources.

This bottleneck could be ameliorated through technology by decreasing our reliance on human estimation thresholds of when to galvanize action. During emergencies, decision-makers may be inundated with data and information leading to improvident action, or worse, inaction. Tools and technology that automate the presentation of data to decision-makers could help by triggering alerts and pushing messages indicating aberrancy to both decision-makers and front-line staff. Theoretically, this technological dashboard with decision support tools would improve outbreak response by leading to the earlier mobilization of resources. This technology also holds the potential to provide front -line staff with diagnostic tools, staffing resources, and supply chain management priorities in scalable, deployable fashions separate from current modeling by providing triggers and notifications in real time when preset warning thresholds are crossed.

Acknowledging ongoing events places a large burden on systems, and financial assistance is critical for public resources to sustain sufficient stockpiles and implement additional services related to outbreak response, the coordination of resources is also of the utmost importance. Technologies and tools for triggering for the request of resources at the local, state, and national levels should be developed and implemented, as should sequences for quantifying the severity and need for requisition, accessing, and distributing resources during an outbreak response.

Exercise participants advocated for the establishment of a multidisciplinary group of subject matter experts prior to an emergency to serve as a brain bank for the city. The timeline in an emergency is rapid, and patients will present to hospitals regardless of public health or clinical guidance being available. Currently, conflicting standards are too often communicated to the public and the front-line staff. This group of experts should engage in dialogue regarding crisis standards and clinical care protocols for health-care delivery systems during an outbreak to produce messaging that is consistent, reliable, reproducible, and relevant to the population.

The relationships formed in the brain bank in the group, through collaborations and, ideally, regular exercises, also hold the potential to improve operations during an emergency. During an event, this pre-established brain bank could provide intermittent guidance based on the best available data and provide consistent and reliable communication between public health agencies and health-care delivery systems. Encouraging collaboration and improving coordination among stakeholders on various levels will be essential to ensuring an effective response, as it could reduce duplicative efforts and requests for information, which burden systems already at or above safe capacity. These efforts would also improve transparency and could streamline nomenclature by means of a common language for case definitions and guidance.

Finally, for frontline health-care workers, improved trainings represent another actionable recommendation for improving preparedness. To move the needle of preparedness, NYC H+H System-wide Special Pathogens Program has developed a number of training resources for frontline clinicians both within its health-care delivery system and open to the national audience to maintain competency and readiness during potential outbreak events. This includes (1) a 1-day, 8-h immersive simulation course that offers didactic and hands-on clinical simulation with focus on safety precautions while in personal protective equipment, live donning/doffing technique, and exercise on patient transfer and transport scenarios, including clinical stations for immediate bodily fluid disinfection and clean up and collection of laboratory specimens; (2) using a mobile emergency department, a team of emergency department staff are submerged into a severe respiratory disease outbreak simulation based on the 2003 outbreak of severe acute respiratory syndrome (SARS) with increasing patient acuity. Using innovative teaching methods and clinical simulation technology with part-task and hi-fidelity simulators, each team is presented with realistic patient scenarios; (3) ongoing 1-h in-service trainings for frontline clinicians on how to best identify, isolate, implement infection control measures, notify and preliminarily managing highly infectious disease patients; and (4) continue to practice what we preach and test our plans and processes through ongoing drills and exercises varying in scope, scenario and intensity throughout the acute, postacute, and ambulatory service lines. All 4 training offerings and operations- and discussion-based exercises can be on the NYC H+H system's website in the form of templates for other sites to customize and use. We strongly urge other health systems to adopt, customize, and use these resources to ensure all health-care facilities are given the ongoing opportunity to train and exercise. After all, we are as strong as our weakest link.

More specifically, Just-In-Time (JIT) Training will allow providers to have the minimum necessary skills in advance of an outbreak and then provided the last set of actionable skillsets just prior to deployment. As most skills degrade over time, JIT Training improves clinical skills to prepare individuals for the management of atypical tasks during emergencies within their scope of practice; this will be essential for the preservation of resources during an emergency. Workshop participants suggested that regional training centers could train key staff in health-care delivery systems and expand local capacities for both proactive and reactive trainings that would improve outbreak response.

This workshop and the associated recommendations presented above represent a step toward improving urban pandemic preparedness. Our goal was intentionally broad and high level to accomplish more than simply working through a scenario, but to emphasize the importance of collaboration, distribution of scarce shared resources, and joint decision-making. We are the most resource-rich country in the world, yet we chronically

underutilize integrated decision-making to improve the value and quality care for our patients. We have a moral obligation to appropriately allocate resources; from grant funds, to staff, to equipment and supplies, we must distribute each thoughtfully and justifiably, with a focus on our frontlines. We must continue this important work and to think critically, discuss openly, and act humbly when preparing for pandemics and other public health emergencies in the cities so many of us call home, because after all, ready or not, patients will present.

RECOMMENDATIONS
Recommendation 1: Strong Focus on the Frontlines of Health-Care Delivery: Decision Support Tools, Diagnostic Resources, and Training

- Health-care delivery systems need travel-screening platforms built into electronic medical records system to facilitate routine travel and illness screening.
- Health-care delivery systems need to gain access to regional and national public health databases established to track trends, suspected cases, outbreaks, survivors, and other relevant data to assist in tailoring response and interventions.
- Optimize ability to upscale clinical evaluation capacity and diagnostic capabilities, including robust surge plans in anticipation of need to expand clinical care delivery space (eg, tents, trailers, re-opening closed "brick and mortar" clinical units) to increase throughput.
- Rapid lab turn-around time for routine use can be scaled upward during enhanced volume (eg, increase quantitative polymerase chain reaction analyzers available) and optimizing use of point-of-care diagnostic testing.
- Help frontline staff prepare to manage atypical tasks for their positions during critical need. Design Just-In-Time Training, adaptability, and cross-training, including basic ventilator use, medication pumps, pressure bag implementation, and equipment troubleshooting for non-intensive care unit staff. Nonspecialty physician, nurse practitioner, and physician assistants training in life-saving procedures (eg endotracheal intubation, cricothyroidotomy, needle decompression, etc.).
- Increase training center capabilities for both ongoing as well as upscaling for Just-in-Time training, including establishing regional training centers need to be developed to train key staff at health systems who will conduct the ongoing and Just-in-Time Training.

Recommendation 2: Interdisciplinary Network: A "Brain Bank" to Provide Guidance to Health-Care Delivery System and Answer Questions Regarding Clinical Care Protocols in Real Time

- Establish a multidisciplinary group of subject matter experts to engage in in-depth dialogue regarding crisis standards of care and proactive methods for managing the impact to the health-care delivery system during an outbreak.
- Create a sector of the interdisciplinary team specifically responsible for guidance of intensive care unit interventions in a crisis environment. The team's suggested interventions and guidance to support crisis standards of care would grant temporary permission to thoughtfully improvise during the event of a pandemic.

- Develop networks of experienced professionals equipped to answer questions and provide methodological advice using best information available.
- To develop this "brain bank," public health agencies should be contacted to begin identifying subject matter experts from around the world who can serve in such a capacity.

Recommendation 3: Consistent and Reliable Communication, Coordination, and Collaboration Between Public Health Agencies and Health-Care Delivery Systems via Emergency Management Structures and Processes

- Communication: Develop and implement functional plans for public communication of a unified and coordinated message for local, state, national, and international partners, including the United Nations, Centers for Disease Control and Prevention, Assistant Secretary for Preparedness and Response, NYC Department of Health and Mental Hygiene, to ensure transparent information sharing.
- Guidance from various public health and federal agencies should be consistent and in agreement with one another. Clinicians often rely upon these official guidance announcements, especially during emergencies. A unified message is key to promoting a standardized approach to clinical practices across multiple health-care systems. This guidance includes elements such as accurate case definitions (eg, incubation period, symptomology, and exposure), managing ill staff, and vaccine protocols and standards).
- Coordination: Develop and implement qualitative and quantitative triggers to access public health and emergency management resources at the local, state, and national levels to support health-care delivery systems.
- Collaboration: Ongoing collaboration with the health community, effective information sharing, and coordination of response activities in preparing for and responding to a pandemic. Increase engagement with public health authorities to promote a rapid response to lessen the burden on a health-care delivery system before and during surge.

Recommendation 4: Financial Assistance to Health-Care Delivery Systems to Prepare for, Respond to, and Recover From a Pandemic

- Emergency financial aid should be granted to health-care delivery systems who are severely affected by a pandemic through local, state, or public health funds or emergency supplemental funding.
- Financing workers compensation to allow additional sick time/disability allotments for those health-care workers who become ill as a direct result of their care delivery during the pandemic.
- Demobilization costs may be substantial, including terminal cleanings, decommissioning temporary clinical surge care areas, restocking depleted supplies, and accounting for lost/deferred revenues, eg, due to canceled/postponed elective procedures.
- These financial costs can be estimated based on a number of factors including use and consumption of resources, staff time and extra human resources used, bed-occupancy rates, missed revenue due to cancellation of services, and other miscellaneous cost drivers.

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