

# How Digital Technology Can Enhance Healthcare Preparedness for Catastrophic Events



## Catastrophic health event response in the age of COVID-19

The most severe public health crisis in recent memory, the COVID-19 pandemic represents an ongoing challenge to the global healthcare sector. Some of the most advanced public health systems came perilously close to complete collapse under the combined weight of COVID-19 patient surges and acute, if temporary, shortages in protective and life-saving equipment, healthcare personnel, facilities, and other critical resources.

Early hotspots might have since cooled, but the pandemic itself remains resilient. Cases are surging around the world. And most epidemiological forecasts predict persistent case growth over the next one to two years until 60 to 70 percent of the population is immune<sup>i</sup>. That case growth, in turn, will continue to put pressure on the healthcare system for the foreseeable future.

What's more, the healthcare system now remains more vulnerable than ever to a simultaneous hit by a second catastrophic health event, a natural or manmade incident that results in a number of ill or injured persons sufficient to overwhelm the capabilities of immediate local and regional emergency response and health care systems<sup>ii</sup>. That second large-scale emergency might even require evacuations of the populations most vulnerable to severe Covid-19 infection, while generally complicating the fulfilling of social distancing mandates.

Add to that, health systems might have mobilised the necessary technical resources (e.g. PPE for healthcare personnel and ventilators for patients) to respond to the pandemic. But after six months of response, their human resources remain stretched dangerously thin.

Nor did the sector's baseline level of preparedness go unquestioned before the pandemic. For instance, a 2018 American College of Emergency Physicians survey found that 93 percent of emergency room doctors thought that their emergency departments were not fully prepared for a surge of patients in the event of a disaster<sup>iii</sup>. In the same poll, 90 percent of doctors said there was a shortage or absence of critical medication in their emergency rooms, and that over the last years those shortages had only gotten worse<sup>iv</sup>.

What could keep healthcare systems better prepared for and more resilient to catastrophic health events in the age of COVID-19? Digital crisis and emergency management technology can help support the clinical workflow in moments of crisis, by better preparing healthcare actors (including hospitals, clinics, aged-care facilities, coalitions, health boards and agencies) to accommodate the inevitable surges in demand that accompany any emergency or disaster. Not sure how? The guide lays out the facts, starting with an examination of typical challenges to catastrophic health event response that this technology is purpose built to address.

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## Structural barriers to effective catastrophic health event response

By their very nature, catastrophic health events pose a response challenge many orders of magnitude greater than common medical disasters. Casualty numbers are higher. Critical healthcare infrastructure is more likely to be degraded and incident command to be harmed.

Furthermore, the event itself usually leads to the temporary loss of situational awareness, information sources, and/or communications capacities at the most critical phase of the response, usually the very beginning. These losses impair the ability of healthcare emergency coordinators (and others) to effectively allocate available medical resources or patients, which then effects patient care, public perception, even the viability of the healthcare system as a whole.

For instance, 89 percent of the hospitals in the area affected by Super Storm Sandy in the U.S. reported experiencing substantial challenges in responding to the storm, including infrastructure breakdowns (e.g. electrical and communication failures), community-collaboration resource issues, including fuel, transportation, hospital beds, and public shelters<sup>v</sup>.

Indeed, the hospitals in question were all subject to regulations mandating facility emergency preparedness. However, emergency-related deficiency citations levied before the storm revealed stark gaps in planning and execution; insufficient community-wide coordination was also a common challenge<sup>vi</sup>. Why did the quality of preparation vary across the sector: disposable resources (not just cost but also time and personnel) tended to be the most important factor. The factor holds outside of the Super Storm Sandy example, as well.

Rural care facilities, in particular, are more likely to find compliance with emergency preparedness rules the most difficult for this reason. Resource-constrained rural hospitals might be able to meet the common requirement to build and update emergency operations plans (EOPs)<sup>vii</sup>. However, conducting regular emergency exercises, another likely element of the mandate, proves more challenging.

Why's that? The facilities in question often lack sufficient personnel to conduct exercises in the hospital setting, while still continuing revenue-generating active patient care. Ensuring patient safety (e.g. post-op patients, non-ambulatory patients, and mental health patients) and basic continuity of services during those exercises are also concerns. For these facilities, the end-result is that training, a critical component of emergency preparedness, gets short-changed.

## Common issues in the COVID-19 response

Unfortunately, resource constraints aren't the only barriers to effective catastrophic health event response, since the events themselves pose significant, structural challenges to the standard protocols adopted in the healthcare sector. During the course of the COVID-19 healthcare response, we saw many of these issues come to a head:



### Spotty communications.

Managing the flow of information when things are happening quickly is difficult in most crisis situations. The pandemic proved no different, when reliably getting important messages out to healthcare personnel and centralising the capture of information that came in across the entire organisation became a serious challenge.

The issue was multi-faceted. Firstly, healthcare personnel were busy, focussed on patient care. As such, getting in touch with them while they were working on the hospital floor wasn't easy.

Nor was email (often, the default communications method) the best means to relay critical messages to healthcare personnel – updates which included the latest technical guidance on using PPE, or infection control, or return-to-work criteria for recovered workers.

Why? Well, the email form ran up against the practical reality that critical information in the clinical setting is mostly communicated verbally during handover. What's more, busy healthcare workers themselves don't have time to check email throughout their shift, only so during the beginning or end – even handover time is mostly used up discussing patient care.

Other methods to reach out to healthcare workers weren't without issue, either. Workarounds like disseminating updates on social media, while inventive, were inadequate to a large-scale disaster context, like COVID-19. For one, those uncontrolled messaging platforms tend to be unsecure. They also fail to provide a necessary feedback loop, so that healthcare personnel can easily provide updates of their own (e.g. welfare updates).



### Fragmented information capture.

The methods used to track personnel updates received or situation reports that went out also had limitations. Emergency coordination teams managing the COVID-19 response often relied on Word docs and Excel spreadsheets to deal with the flood of information pertaining to the pandemic. The information those teams created were spread out across multiple inboxes.

In turn, teams spent an inordinate amount of time sifting through multiple locations for valuable information, anything from a task status to the latest decision made on supply decisions necessary to keeping critical supplies flowing to operations.



### Limited situational awareness.

Of course, information captured in real time helps create situational awareness to ensure informed decisions are made. Centralised information gathering also facilitates meeting reporting obligations to external parties, whether a health board, senior management team, or a centralised franchisor in the aged-care sector, who want a consolidated view of all regional providers.

As such, fragmented information flow limits situational awareness, a knowledge of what's been happening and what's happening now. That knowledge is needed in the crisis surge scenario to make accurate forecasts.

In the pandemic context, specifically, what was needed was a whole of hospital view into the total number of COVID-19 patients treated to date, current number of COVID-19 patients, ICU beds (both adult and paediatric), ventilators, available healthcare personnel, and other metrics and data points at the level of the whole health system. A view into current availabilities across the whole system and a means of anticipating where shortages will be was also necessary, whether for executive-level reporting or decisions to address potential shortages across all facilities holistically (See below).

What's more, the consolidated view required included a look at routine or business-as-usual operations. After all, resources (including beds, rooms, etc.) were being deployed from routine operations into COVID-19 operations. Nor did the decisions made only affect COVID-19 operations, either. For example, decisions concerning how the public at large can enter a facility affects "routine operations," even if the change itself is precipitated by the pandemic.



### Overly standardised response protocols.

The specificity of the pandemic (a more protracted event) exposed other challenges to established ways of responding to catastrophic health events, in which patients swarm to hospitals all at once rather than over time. Healthcare organisations could only rely on those standardised emergency response protocols up to a point.

Along the same lines, well-intentioned planning efforts didn't necessarily scale. For instance, organisations might have invested heavily in coming up with business continuity plans. Though the quality of those plans was high, the fact that the plans themselves were paper based made it too difficult to seriously engage with during the fast-moving crisis.



“Do you have the people to take care of the patients? The space, the intensive care unit, to take care of them? Do you have all the devices – ventilators, IV pumps – to deliver medication, monitors to monitor how the patient is doing.”

Richard Branson, respiratory therapist and professor in the College of Medicine at the University of Cincinnati, quoted in “U.S. Hospitals Are Wildly Unprepared to Deal With How Bad the Coronavirus Pandemic Could Get”

## How digital technology can help improve catastrophic health event response

Given the inherent challenges to efficient response to catastrophic health events, the sector going forward must consider which sets of processes, procedures, and (most importantly) technologies will provide real-time information sharing and situational analysis across the entire organisation, be that organisation a single clinic, alternate site, hospital, aged-care centre, or entire health or regional aged-care system.

Digital crisis and emergency management technology, we argue, can help. By addressing core challenges to communication, collaboration, and coordination, digital technology bolsters emergency preparedness and enhances the quality of catastrophic health event response. But not all technology is created equal. Here are the capabilities that matter most:



### **Offers secure, controlled communications.**

A digital platform used for catastrophic health event response must provide a controlled communications system to enable providers to send out secure messages to health staff in the way that staff prefers to receive them, e.g. mobile, SMS, in-app notifications, etc.

Communications don't just go one way, either. The system must also provide a feedback loop for messages coming back in. Say, if emergency coordinators are reaching out to doctors and nurses requesting updates on their current health status, those same doctors and nurses must be able to provide their current health status updates simply, preferably in the same easy-to-use digital system, accessible on their mobile devices.

Healthcare personnel should get a simplified view of the system once they log in: not an admin's view, but a view tailored to what they need to see and do in the system. Nothing more, nothing less. Examples include providing health updates, seeing the latest situation report, and/or checking what catastrophic health event tasks have been assigned to them.

In the case of health status updates, for instance, healthcare personnel should be able easily record whether they've been experiencing symptoms, screened for COVID-19, or the results of those screenings. Providers might also want to know if healthcare personnel have underlying conditions that would heighten their risk of severe infection, as well as current work status.

In-app chat is another way to secure and control communications, while facilitating collaboration.



### **Facilitates information tracking and sharing.**

Having updates come into the same digital system out of which they go out centralises information flow during a catastrophic health event: not only are updates stored in-system, but the latest decisions made and actions tasked, as well. That way the digital platform provides a single source of truth. Everyone can see what's been decided, who's responsible for which tasks, and what tasks are still outstanding, which helps to streamline the response, ensure accountability, and remove confusion – issues that tend to bedevil catastrophic health event response.

What capabilities matter, here: a simple interface where users can input data without expending a lot of effort. In a hospital setting, for instance, system users should be able to make and save simple changes (say to the number of available paediatric ICU beds) which then update all charts that the emergency coordination team is looking at.

Incident command forms proliferate during emergency response, too, whether coordinators are using HICS, AllMS, or hospital-specific forms. The system should, therefore, be able to store those forms in a centralised place; it should also let users upload updated forms back to the same location.

The same logic applies to situation reports, which provide regular updates to staff and other stakeholders during a catastrophic health event. The system should enable coordinators to easily share the latest report, so as to ensure the best decisions are made with the latest data.



### **Brings digitised plans to life.**

In preparing for and responding to catastrophic health events, providers have plenty of best-practice guidance at their disposal, whether their own plans and scenarios or checklists and other content from the CDC, WHO, or other national health bodies. However, those plans are largely long format and paper based, difficult to engage with in the fast-moving crisis surge context.

Digital technology can help, here. Purpose-built platforms should come with best-practice checklists from trusted health bodies already digitised. With interactive progress indicators set against checklists as specific tasks get completed, digitisation brings those plans to life. It also helps emergency coordinators spot blockages in the progress of checklists, where interventions might be necessary.

Coordinators should also have the in-system ability to assign plan checklist items to specific roles or people in the organisation. The status of those to-do's must be tracked in the system, as well, so as to provide the crucial link between the things that coordinators know their teams should be doing and what is actually getting done.



**Provides situational awareness at the click of a button.**

Generic, one-size-fits-all responses have their limits in catastrophic health events. So, digital technology needs to make the difference, by facilitating a customised response to a specific catastrophic health event, like the COVID-19 pandemic. What's the answer: distinct digital dashboards, views, and workflows for different events and actions.

There's a larger principle at work, too. Digital, mobile, pandemic-specific dashboards, offering a variety of metrics and data points all at the level of the whole health system, help provide the requisite situational awareness needed to enact a pandemic-centric response. Remember, though, the technology in question should make it easy to create those dashboards and/or change workflows.

The aim, of course, is to give coordinators (or executives or health boards) an overview of all of the healthcare operations they might be managing in permanent and temporary facilities. Think of it as a virtual emergency operations centre (EOC), available at the click of a button, which can represent the hospital EOC or an executive-level look into the system, also valuable for fulfilling reporting obligations.

The platform should also be set up for those providers to log in directly to a response launchpad, with a map view of all relevant facilities. From there, coordinators would be a click away from boards that would give them a deeper dive into event-specific use cases. During the COVID-19 pandemic response, the most resonant use cases have been facilities and supplies, healthcare workers, assignments, etc. (See more below).



**Controls the sharing of resources across all facilities.**

To handle the inevitable surge in demand across healthcare systems during a catastrophic health event, it's vital for providers to know the latest capacities available across their facilities, staff, supplies, and equipment – and not just at the moment, either, over time, as well, so as to establish trends and make decisions based on accurate forecasts.

In the case of the COVID-19 response, in particular, it's been important to keep data on bed capacity, patients, and workers, as well as blood products, ventilators, PPE, consumables, including urgent pharmaceuticals. The types of healthcare facilities requiring tracking have included hospitals, aged care facilities, clinics, alternate sites, or testing facilities.

How, then, can digital technology help? The technology in question should provide a centralised location for all updates, key decisions, and actions pertaining to the resources necessary to keep critical supplies flowing to operations.

As opposed to an inventory tracker, a view isolated to urgent shortages would give coordinators a deeper look, so that an executive level can address shortages across all facilities holistically. Similarly, a statistics tab would provide key metrics related to important resources, helpful for a health district or aged care franchisor who needs to make decisions about available resources across an entire system (See examples below).

**An example of indicators, triggers, and strategies**

The resource and supply data captured across the entire health system contribute to situational awareness, constituting indicators of pending problems. Those problems then potentially trigger a change in response strategy.

Indicator	Trigger	Selected strategies
Community cases (confirmed or ED/clinic volumes)	Sustained community-wide transmission	Institute enhanced infection control techniques, separate suspect cases from other patients, and augment patient flow in clinics and EDs
AllIR rooms	No AllIR rooms available	Convert to semi-private rooms if possible, cohort cases in unit with restricted access and adjusted airflow, and/or add in-room HEPA filtration units
Manufacturer/distributor information and facility supply chain	Supply/medication shortage	Implement PPE, medication, or supply conservation, adaptation, or other procedures according to items in shortage and impact
Unit staffing – needs versus available, staff absenteeism	Unable to maintain usual staffing	Implement alternative staffing models, provide childcare, housing, and other staff support, and consider limitation of elective or highly intensive treatments
ICU census, facility, and region	No available ICU beds	Regional ICU referral process, provide positive pressure ventilation on other units, suspend elective surgeries, and use other monitored areas

Source: John L. Hick et al., National Academy of Medicine: Duty to Plan: Health Care, Crisis Standards of Care, and Novel Coronavirus SARS-CoV-2

Finally, catastrophic health events are here to stay. What's more, the ongoing pandemic makes the healthcare system more vulnerable than ever to a second disaster, while resources and capabilities are stretched so thin.

Fortunately, from communities of best practice to best-practice preparedness guidance from trusted health bodies, there are available resources in the healthcare sector to improve preparedness. Taken alone, those resources establish a high benchmark for resilience.

But in the age of COVID-19, even that benchmark isn't enough. Supplement your resilience efforts with purpose-built, digital crisis and emergency management technologies, like Noggin's, which put best-practice resources in an interactive, adaptable, digital format, best suited to streamline your response, ensure accountability, and remove confusion during catastrophic health events.

## Citations

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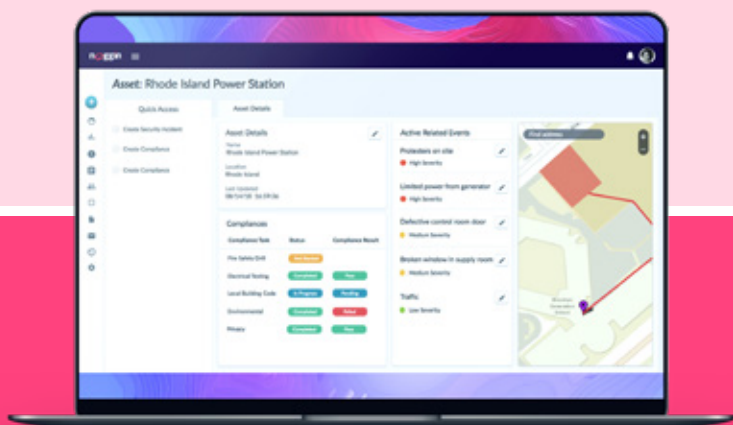
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