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# Reimagining health preparedness in the aftermath of COVID-19

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## Summary

Efficiency is an essential part of sustainable healthcare, especially in emergency and acute care (including surgical) settings. Waste minimisation, streamlined processes, and lean principles are all important for responsible stewardship of finite health resources. However, the promotion of efficiency above all else has effectively subordinated preparedness as a form of waste. Investment in preparedness is an essential part of resilient healthcare. The ongoing COVID-19 pandemic has exposed the gap between efficient processes and resilient systems in many health settings. In anticipation of future pandemics, natural disasters, and mass casualty incidents, health systems, and individual healthcare workers, must prioritise preparedness to be ready for the unexpected or for crises. This requires a reframing of priorities to view preparedness as crucial insurance against system failure during disasters, by taking advantage of lessons learnt preparing for war and mass casualty incidents.

**Keywords:** COVID-19; efficiency; health systems; mass casualty incidents; preparedness; resilience

Efficiency is not the enemy of resilience, but subordinating preparedness has left hospitals and health systems exposed during the COVID-19 pandemic. In the tight budgets and rising costs of healthcare, preparedness for an over-the-horizon event can seem an unnecessary expense, a waste, or at worst, a luxury. In the health management world of lean targets and just-in-time supply models, investing for just-in-case has not been prioritised.[1]

Former US Health and Human Services Secretary Michael Leavitt presciently said, in 2007, 'Everything we do before a pandemic will seem alarmist, everything we do after a pandemic will seem inadequate'.[2] Our day to day is now a realisation of that statement. Multiple health systems across high-, middle-, and low-income nations have come up lacking against the COVID-19 pandemic, and so how do we, in healthcare, reset our preconditions for future success and prioritise resilience in healthcare as our next great challenge and opportunity?[3] There are several lessons to be learned from experiences of preparing for war and in the management of mass casualty incidents (MCIs) that are of particular relevance to anaesthetists and hospitals.

## Ready now and future ready

Much has been made during the COVID-19 pandemic of the 'frontline' worker 'fighting' against an unseen 'enemy'. The warfighting metaphor fits for some of the challenges in confronting an evolving pandemic. However, there is more to it than acknowledging the individual heroism of many healthcare workers. Professional defence forces are, for example, obsessively focused on readiness.[4,5] Deployments to war are thankfully rare, so most military personnel will spend the majority of their careers maintaining readiness and being prepared, rather than actively at war. Large-scale 'war games' and multinational exercises, involving years of planning, often tens of thousands of troops, and many millions of dollars, are seen as an essential investment in both national preparedness and threat deterrence.[6,7]

Whilst hospitals and clinicians are busy treating patients most of the time, we should never be too busy to prepare. COVID-19 has revealed the inadequacy of health system preparedness across a range of domains, including workforce, physical infrastructure, and equipment.[8–10] To be future ready for the next disaster, hospitals and health systems must adopt

this readiness mindset with a focus on regular, whole-system exercises and preparedness drills that engage with frontline clinicians. To be effective, readiness exercises must be seen on an equal footing to clinical service delivery, not simply as a way to train if there is time.[7]

Anaesthesiologists are well equipped to support and lead this. We are a 'ready' profession and already possess the non-technical skills and professional culture of preparing for the unexpected. Drills for the unanticipated difficult airway, early adoption of checklists and cognitive aids, and use of simulation sessions to practice rare clinical crises are all examples of our clinical readiness.[11,12] However, our focus has often (necessarily) been singular. The one patient, in the one operating theatre, with the one crisis. Although we still have more work to do in managing the tension between efficient patient care and taking time to train for the unexpected, we could leverage our experience in crisis management to help health systems embrace the bigger picture of preparedness.

## Prioritising health system resilience and lessons from MCIs

The Reform for Resilience commission, in their Interim Report to the G7,[13] identified health resilience as a key component not just of population health, but also of economic 'health'. They argue that without resilience built into healthcare planning, future system shocks will be poorly absorbed, which will inevitably impact economic growth.

The USA, with an advanced (albeit heavily privatised) healthcare system, suffered from COVID-19-induced system shock. Recent US Centers for Disease Control and Prevention reporting showed an estimated full-year decline in life expectancy in the USA (from 78.8 in 2019 to 77.8 in 2020), even though the report only accounts for the first 6 months of 2020 (before the full impact of infections was realised).[14]

COVID-19 may represent a once-in-a-century pandemic, but the 'stress test' it has presented to healthcare systems is not unique nor even uncommon. The challenges of doing more with less, managing increased staff shortages (whether by illness, injury, or compulsory furlough), and increased emergency presentations are not unique to pandemics.

MCIs regularly challenge health services, and natural disaster MCIs can have local (e.g. the evacuation of some New York City hospitals during Hurricane Sandy[15]) or widespread (e.g. White Island, New Zealand volcano victims exceeding the burns capacity of the New Zealand burns network[16]) effects. Most MCIs in high-income countries are short-lived (hours to days) rather than years in the case of the COVID-19 pandemic.[17] However, the COVID-19 pandemic could be viewed as the most severe kind of MCI given its ability to wreak havoc on hospital capability, whilst producing a steady stream of casualties over a prolonged period.[18]

## Health system resilience

The resilience of a health system refers to its ability to resist, tolerate, absorb, recover from, prepare for, or adapt to an adverse occurrence that causes harm, destruction, or loss. This includes physical infrastructure, personnel and staffing, supply chains, equipment and pharmaceutical stocks, and internal processes.[19] Put another way, this represents the process and mechanisms by which health systems can face unexpected loading (e.g. an MCI) without critical degradation of healthcare delivery and with a reasonable return to 'normal service'.

In an ideal resilience model, the system may even return to better-than-usual function by virtue of improved processes found under the 'stress test' of a disruption. In practical terms, recovery may represent return to elective operating in a surgical setting, time from triage to assessment in an emergency department, or acceptable time to bed allocation for a new inpatient. '… resilience is the process by which health, economic and environmental systems can face change and shocks in such a way that they evolve and innovate together, to continue to deliver healthy growth for the population'.[13]

## Preparing the future health workforce for disaster (and keeping them healthy afterwards)

COVID-19 has exposed the fragility of interdependent international supply chains, especially for medical equipment and personal protective equipment (PPE).[20] Like bullets and body armour for combat troops, supplies of PPE should be seen as a national strategic asset. In the opening months of COVID-19, high-income countries (including the USA, UK, and Australia) struggled to acquire adequate supply of N95 mask respirators to meet perceived demand. This was not a failure of the market to produce adequate stock, but a failure of policy and planning to diversify supply chains.[21]

It is easy to see how this could occur in the pre-pandemic minds of procurement officers and hospital administrators: who would not want the cheapest deal on N95s to keep costs down? However, it should never be allowed to happen again. Just as sovereign nations prioritise the maintenance of domestic production or stockpiles for certain items in the national interest (such as defence matériel),[22] so too must PPE be seen through this strategic lens in the future.

Healthcare workers have also proved to be strategic assets during the past 18 months. Maintenance of this asset, however, will take effort. The negative impact of the COVID-19 pandemic on the mental health of frontline and public health workers is well documented.[23–25] To extend the wartime analogy, these healthcare workers have been exposed to 'extended combat operations' and need appropriate support to continue in this 'hostile' environment.

This prolonged exposure to workplace stressors and physical risk without access to the usual mechanisms to decompress (such as social supports, holidays, and other hobbies) is new to most medical practice. The attrition of health workers because of sickness and mandatory quarantine during the pandemic, without a ready 'reserve force' to call on in most cases, placed the health workforce under enormous strain.[26] Deployed service personnel are potentially exposed to similar preconditions for burnout; however, research within the veteran population shows that it is the *prolonged* exposure to combat that worsens mental health outcomes in returned personnel, not simply being deployed away from usual supports.[27]

There are clearly differences between the deployed service member on overseas combat operations and the healthcare worker confronting a local, national, or international disaster. However, preparing our health workforce for future disasters needs careful consideration, not only of how the individual healthcare worker can be best prepared and supported in

crisis, but also how the health workforce can be staffed to absorb personnel losses in future pandemics or prolonged major incidents.

## Linking core business efficiency and surge capacity

Provision of routine healthcare in hospitals, which may include outpatient clinics, elective surgery, radiology, and pathology services, is 'core business' and, while complex, exhibits a degree of predictability suited to lean processes. Hospitals and funding organisations (governments or otherwise) can expect that the costs associated with core business to be predictable and recurrent.[28] Within this core business, increasing efficiency is the driving principle in healthcare operations. Optimising bed occupancy, minimising length of stay, streamlining service delivery, and increasing home-based outreach services all play a role in attempts to decrease healthcare delivery costs through cost-effectiveness and efficient processes.

Support services, such as radiology and pathology (not routinely staffed with surge capacity in mind), are vital for effective clinical operations, but are a potential source of bottleneck for patient flow during an MCI or disaster. Therefore, part of core business must involve being ready for the unexpected.[29] After the Nice intentional vehicular attack in 2016, electronic access to images was a significant limiting factor in care provision, with some hospitals being forced to revert to physical films and lightboxes. This may seem like a simple fix, but unless the provisions for shifting between digital and analogue diagnostics have been developed (and practiced) in advance for business continuity, they are prone to failure.[30]

Significant unexpected system stressors (such as an MCI) impact the ability of healthcare workers and hospitals at large to 'weather the storm' and maintain core business throughout a crisis of any duration, which is why being ready for disaster is an important core function.

## Resilient emergency response and surge capacity

While not impossible, it is more difficult to predict the workload resulting from emergencies, especially MCI and other large-scale crises, including future pandemics.[31] A single MCI can rapidly overwhelm individual hospitals, and even statewide and nationwide health services. Ventilated beds (and trained ICU staff) can be exhausted quickly in a respiratory viral pandemic, for example.[8]

Whether by natural disaster, terrorism, major motor vehicle or industrial trauma, or hazardous material incident, MCIs place significant stressors on ambulance services (and other emergency services) emergency departments, operating theatres, and ICU beds.

Elective access to operating theatres is often impacted during an MCI, although the effect is typically short-lived (if the MCI is dealt with swiftly), and managing surge capacity in the operating suite is an essential part of MCI preparedness.[17] However, using this 'surge' paradigm has seen the deferment of elective surgery as a key feature of sustaining hospital operations during the COVID-19 pandemic, which becomes less sustainable the longer the 'surge' runs.

As the COVID-19 pandemic has persisted, a significant backlog of elective (but important) surgery has developed.[32,33] The impact of this backlog will be seen for years to come, with some estimates of greater than one million cases in arrears across the USA by the end of 2021.[34] Elective surgery deferred in crisis only adds to (strained) waiting lists. In ongoing management of the COVID-19 pandemic, and in readiness for future disasters, it may be necessary to develop systems to maintain elective surgery when the duration of the disaster persists beyond the days to weeks of a 'typical' MCI.[35,36]

## Conclusions

Health system preparedness is an essential insurance policy against disaster. At all levels, investing in readiness is money well spent. Spending time, money, and personnel hours from the health budget on being ready now (and ready for the future) should be seen as a national strategic priority, and is shown to be both a good return on investment and to have a positive benefit:cost ratio.[37] The COVID-19 pandemic has exposed gaps in health system readiness across multiple jurisdictions. We have a unique opportunity to learn from this pandemic and recognise how easily essential healthcare can be disrupted without high levels of preparedness, across all levels of healthcare provision.

## Authors' contributions

SH developed the concept, researched the background, authored the paper, and approved the final version.
AD researched the background, authored the paper and aproved the final version.

## Declarations of interest

SH is a Lieutenant Colonel in the Australian Army (reserve), and AA is a Flight Lieutenant in the Royal Australian Air Force (reserve). This editorial represents the authors' views only and does not represent official Australian Defence Force policy or opinion.

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