RAPID REPORTS AND PERSPECTIVES FROM THE FIELD

Omicron exposes critical infrastructure dependencies in Australia

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Abstract

Covid 19 / Omicron has caused high levels of absenteeism among the workforce. While the impact on the supply chain is being acknowledged, risks to the stability of critical infrastructure systems are not. The mutual inter-dependencies of complex systems such as power, transport and internet need to be better understood.

Key words: Pandemic, critical infrastructure, dependencies, absenteeism of work force

Supplies

COVID-19 had barely arrived in Australia, in early 2020, when shoppers cleaned out supermarket shelves of toilet paper. As despair grew, a tabloid sprang to help, offering eight pages of their daily left empty. News outlets around the world were amazed to see similar reactions in many cities in the USA and Europe. (1) As COVID-19 encroached society and the need for infection control called for distancing and later for lockdowns, people stayed away from inner city venues and the daily commute. As a result, public transport and international and domestic flights almost came to a standstill. Time tables were reduced, and hundreds of aircrafts were decommissioned and parked in deserts. (2) More than 400,000 airline workers lost their jobs, and 100,000 infected staff were stuck on cruise ships around the world. While people stopped moving, freight transport increased, pushing the cost of shipping containers up tenfold. Housebound consumers shopped on the internet where trade exploded. (3)

With numbers of COVID-19 rising exponentially, no longer only the health system's hospital -ICUs were overwhelmed. When in March 2021 a container ship got stuck in the Suez Canal, the global transport systems showed their fragility as hundreds of vessels got stuck around the world. (4) Almost at the same time, a drought in Taiwan affected the largest producer of microchips, a component essential in the automobile industry and for all types of computers. (5) Car manufacturers had initially scaled back their production when COVID-19 broke out and people stayed at home. As the factories attempted to return to normal, microprocessor chips were no longer available and they had to shut down entire car production sites in the USA and Europe, sending hundreds of thousands of workers home. (6) The 'just-in-time' delivery of parts, a proven supply system element for decades, had crashed.

Thus, a little understood and even less conceded risk for society had been exposed and COVID-19 was its tipping point. Where are we heading now?

Preparedness Planning

Plans outlining in detail the requirements for the event of an outbreak of a pandemic have been available in Australia and for practically all states and many Government entities since at least 2006. (7–15) These followed, or were informed by, guidelines made available in much detail by the World Health Organisation since 2005. (16,17) Effectively all major organisations, such as the military and globally operating companies, issued guidelines for preparation of their respective organisations and businesses. (18) These plans mandated not only stockpiling of equipment and consumables which could be affected by shortages. They addressed, in often much detail, topics such as potential staff shortages due to absenteeism and even work from home. (19)

Moreover, exercises with a wide range of relevant parties had been held in a number of countries several years prior, (20,21) with one of these immediately before COVID-19 first appeared. (22) If this was not enough, a quick look into history books provides detailed experience on which to build any responsible organisation would have been readily available. (23-25)

In other words, neither the arrival of COVID-19 nor the question as to which steps to take, should have come as a surprise for any organisation taking their professional obligation for *continuity management* seriously.

Such responsibilities are prescribed in Multifold Standards documents. These Standards, which most developed and industrialised countries have, are continually updated. They form the base for any accountable management of commercial and government departments. (26–29) Every airline in the world greets their passengers with fundamental disaster preparedness instructions ["life vest under your seat..."] before the plane even moves. How could any country have been taken by surprise and not have any stockpiles of anything? It is, admittedly, difficult to scale the extent of actions required for public health preparedness. (30) However, doing (almost) nothing, not holding even the most rudimentary stockpiles, despite available information and fact-based obligations, and thus

exposing millions of people to substantial health risks, borders on negligence. (31) The inability or unwillingness to provide protection to its citizens is considered as one of the characteristics of fragile states. (32)

Flattening the Curves to protect health systems

Past strategies of lockdown, testing, tracing, vaccination and restricting travel and gatherings, were initially motivated by the possibility of an overwhelmed *health system*. The fear was that too many infected people would exceed the capacities of hospitals to care for patients. At the centre of this thinking was the concern that there would not be enough beds in Intensive Care Units, which are considered the most scarce and expensive resource. (33) This approach allowed a convenient way of continuing "business as usual", protecting and maintaining the status quo of production and consumption. It was also hoped that vulnerable populations could be shielded from the virus at least until the advent of vaccines. (34) *Continuation of society* was reflected in ongoing sports, weddings and other events, in a tiered setting of vulnerability defined by risk of death.

Beyond the Health Care System

The outbreak of the pandemic of COVID-19 virus infection was seen as just that: a virus and therefore a health problem, assigned to public health. Anything associated with this public health issue was perceived as manageable under 'health', defined by the virus' impact on ICUs.

Only when these came under pressure, a new break point evolved: workers providing the services in the system. Initially the hospital's "frontline workers", as they were now called, became the prototype of the *essential employee*, without whom, and without whose specialised skills, the health system would not continue to be operational. (35–38)

The Omicron pandemic has caused infection on a massive scale not previously seen, reflected in the impacts of workplace absenteeism and the sheer number of workers unable to work in production and services. At first, Chinese ports were locked down even if the authorities detected only a few ill among the workers handling the containers, of which up to 20,000 would normally be loaded onto ships. As a result, more than hundreds of vessels were soon idling off the coast of Shanghai and across the Pacific at the largest US-port, Los Angeles. All over the world, similar pictures developed as the movement of the flotilla of nearly 5,000 container vessels, normally shipping 17 million boxes per year, slowed down. The industry was already plagued by rising numbers of crew members unable to work due to positive testing or falling ill with COVID-19. (39) As it spread, the pandemic began to hit drivers of trucks, of which you would require about 6,000 to cart away the load of one container ship in port. However, as demonstrated in a study from 2006, "The Impact of a Temporary Disruption of Road Freight Transport", this too, could have been anticipated instead of a “let it rip” policy, and addressed, earlier. (40)

In Australia, an extreme swing from good control to unmitigated transmission has illustrated critical infrastructure dependencies well. By January 2022, absenteeism in several industries in Australia reached substantial proportions (20-30% in major supermarket chains), forcing supermarket-CEOs to take out full-page adverts in an attempt to calm consumers facing empty shelves. (41) Governments did not anticipate that “living with COVID-19” included empty supermarket shelves, meat processing plants struck down by mass absenteeism, and restaurants shuttered because of lack of supply and lack of staff.

Why it helps to look at "Systems"

The public had thus far noticed two "systems" which had been affected by the outbreak: the hospitals ["health system"] and transport in the form of moving people and produce. However, absenteeism, either caused by illness, fear of illness, or the need to care for sick relatives, is of course not limited to transport or health industries. When a mass infection event like Omicron occurs, without mitigation, all workforce is affected and all industries unable to function at full capacity.

What is the Critical Infrastructure and why does it matter in a Pandemic?

The continuation of society is based on an intricate network of mutually dependent structures or systems, the most important of which come under the header of "essential infrastructure": electricity, water, and internet being the most prominent and obvious. (42)

A domain of engineers, "..understanding, analysing, and sustaining the robustness and resilience of these infrastructures require multiple viewpoints and a broad set of interdisciplinary skills", (43) which may well be the reason why they and their intricate workings have been given little public attention and even less comprehension.

These systems do not stand alone. They are connected as in electricity feeding the internet [including your telephone] and water pumps; the internet controlling the power grid.

As interconnected systems depend on the workings of all of their components, any failure of one of them is bound to drag down the others. (44) "Interdependent effects occur when an infrastructure disruption spreads beyond itself to cause appreciable impact on other infrastructures, which in turn cause more effects on still other infrastructures".

The effect is a failure cascade: the troubled system drags all those with it, that depend on it. (45) Most systems rely on specially trained and qualified staff to steer, run and monitor them. If a crucial number of such staff becomes unavailable, systems, or the service they provide, can quickly become unavailable, with consequences for other services along the line of dependency. Not having enough truck drivers to haul medical supplies, petrol or food would cause supply

disruptions, e.g. for hospitals or other transport modes (cars, planes, busses), or the public. Users at the end of a systems-cascade may not see the cause of failure or the affected system; they will mere notice that an expected good or service is not available. Of particular concern are systems which form the base for many others, such as electricity supply. Power stations in NSW would have as few as 300 staff, and local faults may be the remit of private companies like Ausgrid. It can be safely assumed that no-one is employed beyond the number absolutely necessary to run and maintain the plant. Should absenteeism rise beyond a threshold the safe operation could be in jeopardy. (46) So, a major storm or heatwave that results in power failures may not have the same response time by electricity companies during the pandemic due to mass absenteeism.

It may initially appear that power supply and road transport are not linked or even independent. However, refuelling at a petrol station requires electricity for the pump, and for Australia's power plants coal is being trucked. Likewise, any means of telecommunication stops without power. Telecommunication, including the Internet, is required to manage and monitor effectively all aspects of electricity generation and distribution across their network. Any failure of the internet has the potential to lead to power disruptions. (47,48) As a "side effect", payment systems [ATM, EFTPOS], stock control in warehouses and all of transport would be affected. Numerous types of equipment in use in a hospital could shut down, endangering the lives of patients: from monitoring devices to refrigerators that cool medicines.

Thousands have left big cities as the new mode allows work from anywhere with a good internet connection. With large numbers of employees now using the internet to "work from home" all of society face an incalculable risk which currently remains completely unmitigated. (49) It is not without irony to consider the threat of a computer virus attack on the cyber network. To illustrate the severity and impact, one only needs to revisit the attack on one of the largest shipping companies, Mearsk, in 2017. Computer malware attacked all their offices and vessels worldwide, rendering 49,000 computers useless. (50) Whatever continuity plans and instruments they did have in place were insufficient to deal with the enormity of destruction. The shipping line were not the only one. Pharmaceutical companies, food producers, railways and logistics firms were taken out of busines, some for several weeks.

Australia has made itself dependent on the internet in an unprecedented way. In addition to the existing infrastructure components, COVID-19 testing, tracing and reporting are all now also based on apps and require a functioning uncompromised and secure internet connectivity. While water, transport and electricity supply are on Australian grounds, the internet is a global installation. It exposes Australia not only via links to the world but also due to most of the data storage being located on overseas servers. Moreover, our lives are obviously now depending on the "fifth' combat war zone, along with air, land, sea and space", as the Australian army calls cyberspace. (51)

COVID-19 as a threat to critical Infrastructure

The Omicron wave of COVID-19 has brought into sharp focus the multi-dimensional dependencies of Australian everyday life and in particular the vulnerability of the health system: break points for its functioning are not only the lack of staff in the hospital itself. The hospitals dependency on external services and supplies extends such break points to outside systems and within those to a long, interconnected chain: will power work? Will the internet hold? Can spare parts and equipment be flown-in from overseas? Are these goods even available overseas? It is clear from these very few aspects listed here that the just-in-time globalised economy has not only removed many goods out of immediate reach. It has also taken away control and decision power from those who would appear to be tasked with managing measures necessary for the wellbeing of the people of Australia.

As an extension and with regards to looming threats, the pressure on society from the outbreak of the Coronavirus shows that we are not prepared for the supply, public health and a longer term security threat: climate change. (52) As far as “living with COVID-19”, the Omicron wave has shown that the economy cannot function when there is mass illness, and that a vaccine-only strategy is inadequate. Mitigation in the forms of vaccination, masks, testing, tracing and safe indoors are needed to control the mass effects on workforce.

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