

Should Australian states and territories have designated COVID hospitals in low community transmission? Case study for Western Australia

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Abstract. This case study describes the process of selecting the most appropriate state-wide hospital system to manage COVID-19 cases in a setting of low community transmission of COVID-19 infection. A rapid review of the literature was conducted of the advantages and disadvantages of having designated COVID hospitals. This led to three different options being presented for discussion. Following consultation, the option chosen was for all hospital facilities to remain prepared to care for COVID-19 patients where they present rather than having specified designated hospitals because this was considered the most practical option currently.

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Introduction

Internationally there has been a significant increase in hospital capacity to manage the predicted increase in demand due to COVID-19. This has included the rapid building or converting of non-health buildings into temporary health facilities dedicated to managing COVID-19 patients.^{1–3} This increase was primarily in health systems expecting, approaching or already exhausting existing health care capacity, such as in China, South Korea and Italy.^{2,4,5}

In April 2020, the World Health Organization recommended that health systems prepare and activate designated COVID-19 hospitals in response to various stages of community transmission.⁶ Many health systems adopted a model of having a designated COVID-19 hospital, with contingency plans in place to redeploy medical staff from other areas⁴ and stream non-COVID-19 patients to other hospitals to manage increases in COVID-19 activity.⁷

Where community transmission has been high (e.g. England, Italy and South Korea) all healthcare facilities were strongly advised to prepare to care for COVID-19 patients by April 2020.^{4,8,9} The transfer of infectious patients presents many

logistical challenges around patient care and infection control, making it inadvisable to transfer patients between hospitals unless there is a medical need.¹⁰ In contrast, in settings with low community transmission, health systems have described the use of designated hospitals to care for COVID-19 patients,^{11,12} with other hospitals to remain functioning as usual until the designated hospital reaches capacity.

Since the introduction of lockdown measures and strict quarantine for international and interstate travellers, the state of Western Australia (WA) has been successful in sustaining low numbers of COVID-19 cases (<https://experience.arcgis.com/experience/359bca83a1264e3fb8d3b6f0a028d768>, accessed 13 July 2020) (Fig. 1). Data collected up to 30 June 2020 show that most COVID-19 cases in WA were from international travellers (45%) and cruise ship passengers or shipping crew (41%) and detected while people were quarantined in hotels.

Discussions therefore emerged as to whether WA should establish a designated COVID-19 hospital while leaving other hospitals available to deliver their usual services. This paper describes the process undertaken to evaluate options and determine

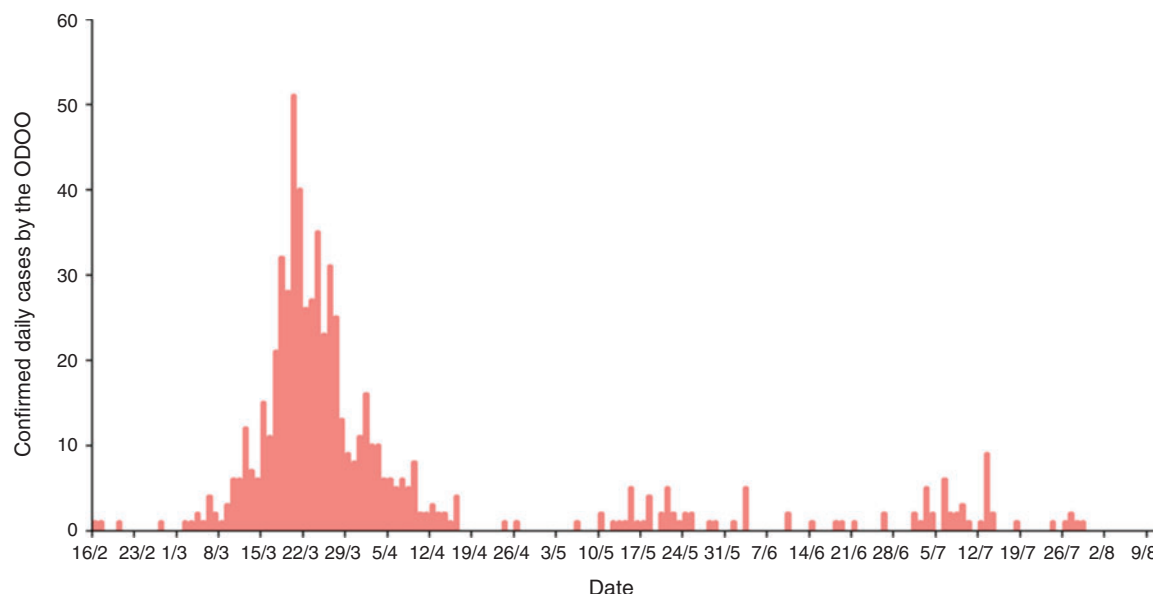


Fig. 1. Graph of confirmed COVID-19 cases in Western Australia (graph data from <https://experience.arcgis.com/experience/359bca83a1264e3fb8d3b6f0a028d768>, accessed 13 July 2020). There were a total of 611 cases by 30 June.¹³ Spikes seen on the graph in March were from passengers from international cruise liners. Spikes in May were from the crew on an international export ship. ODOO, optimal date of onset.

the preferred approach to managing COVID-19 cases requiring hospitalisation for the state of WA, a large geographical area with multiple hospitals and low sustained community transmission.

Objective

The aim of this study was to determine whether designated COVID-19 hospitals are a suitable approach to manage confirmed COVID-19 cases requiring hospital-level care (for COVID-19 symptoms or other medical need) in the setting of sustained low community transmission of COVID-19, such as in WA. Suspect cases, contacts and COVID-19 cases not requiring hospital-level care remain in their usual home residence.

Methods

Since February 2020, all hospitals in WA have been preparing to admit COVID-19 patients that require hospital-level care. These hospitals are existing hospital facilities with medical and surgical wards and staff available to provide 24-h care, and range from large tertiary and general hospitals, which also have emergency and intensive care unit (ICU) facilities, to speciality hospitals that cater for specialised groups of patients, such as aged care, mental health and paediatrics, to smaller private and regional hospitals.¹⁴ Transfer of patients occurs if hospitals are unable to provide higher levels of care, particularly in remote and regional communities. The health system has an established network to provide patient transfer from all areas of WA into the metropolitan area where tertiary hospitals, equipped to provide critical care, are located. Specialised groups of COVID-19 patients, such as maternity, paediatric and mental health, can also be directed to hospitals that cater to these speciality groups.

For the present study, 'designated COVID-19' hospital refers to an existing hospital that has a specified physical area designed

to provide health care to confirmed COVID-19 patients who require hospital-level care, whether COVID-19 related or not, while the rest of the hospital continues to deliver existing hospital services. 'Low community transmission' in this paper refers to an environment where asymptomatic testing in the community has not detected any COVID-19 cases and where confirmed cases of COVID-19 are identified, traceable and contained.¹⁵ During the winter season, all hospitals will have seasonal influenza-like illness presentations that fulfil the COVID-19 suspect case definition and currently have a low probability of being COVID-19 positive.

A rapid literature review was conducted to examine learnings of health care delivery models that various countries adopted during the COVID-19 pandemic. The review included media releases, international and national guidelines, peer-reviewed journals and professional webinars (see File S1 available as Supplementary Material to this paper). The evidence was compiled into an internal report and the most feasible options were presented as follows:

- Option 1: all hospitals are to manage COVID-19 positive cases that also require hospital-level care, with the transfer of patients to hospitals providing critical care when required
- Option 2: one tertiary hospital designated to manage all confirmed COVID-19 cases that also require hospital-level care
- Option 3: four tertiary hospitals (to ensure appropriate management of adult, paediatric, maternity and mental health specialities) designated to manage all COVID-19 cases requiring hospital admission.

Research evidence, along with a list of advantages and disadvantages for each of the options, was discussed with service providers who oversee public hospitals. The research

evidence and the outcome of the consultations were presented to the peak governing body of health services to consider the most suitable approach for WA.

Results

Consultations

There was a variety of responses as to the most suitable approach from health service providers. There was a mix of support for each of the options. Evidence from the review and results of the consultation relating to the advantages and disadvantages of each of the options are presented below.

Option 1: no designated hospital

The advantage of having all hospitals receiving COVID-19 patients meant that all hospitals are prepared to care for COVID-19 patients and constantly practice infection control protocols. This would reduce the need to transfer a patient needing critical care. Medical-related transfers are associated with the risk of a patient deteriorating from the stress imposed by the journey and exposing accompanying staff to infection.¹⁰ The decontamination process after a transfer has taken place is also a time-consuming process, because WA uses planes to transfer patients over long distances.

The disadvantage of Option 1 is that COVID-19 patients are likely to be scattered across the state, making allocation of valuable resources, such as staffing and specialised equipment, challenging. Differences in clinical settings and levels of clinical expertise could result in different patient outcomes. In addition, managing patients with COVID-19 alongside usual non-COVID care is challenging for staff and patients because of the increased risk of exposure, and may increase the community's risk perception of hospitals transmitting COVID-19, leading to unwell community members avoiding seeking urgent hospital care.^{16,17}

Option 2: one designated hospital

An advantage of a designated hospital can lead to the allocation and concentration of medical expertise¹⁸ in the care of COVID-19 patients, which may optimise patient outcomes. Since the declaration of the pandemic, COVID-19 has received a lot of attention and has become a rapidly developing area of research. The latest information about the disease and patient management is released in high volumes regularly, making it challenging for medical staff to keep up to date. Dissemination of information and upskilling of medical staff can be logistically less challenging when staff are concentrated in a single hospital.

Disadvantages of Option 2 include an elevated risk of infections to staff with the high concentration of COVID-19 patients.¹⁹ However, the availability of multiple staff to support each other with infection control measures has also been observed as beneficial, and it has been noted that staff may become more confident with infection control measures when they are performed regularly rather than sporadically.²⁰ Contingency plans to upskill a group of staff outside the designated hospital will be important should there be a large outbreak in designated hospital staff members.

In an area with low community transmission, a disadvantage of a designated hospital could be that hospital facilities are at risk of being underused²¹ or may rapidly reach capacity in the event

of a surge. However, the allocation of one designated hospital would provide a clear direction to the community as to where to seek medical support related to COVID-19 infections. In this way, the community can be more assured that COVID-19 patients are being cared for at an allocated facility²⁰ while other health facilities are available to provide other medical services.

Option 3: four designated hospitals

In WA, regional and remote areas are affiliated to specific tertiary hospitals located in the metropolitan area. Infrastructure to cater to various patient groups, such as paediatric, maternity, mental health and prison inmates, is also located at different tertiary hospitals. It would be advantageous to collectively prepare these hospitals to care for all patient groups. Four hospitals would also create more capacity to cater for a surge in cases or a hospital staff outbreak while still enabling the containment of personal protective equipment (PPE) supplies, and the development and sharing of expertise.

The disadvantage of this option is that all four tertiary hospitals are in Perth, capital city of WA, and would require the transportation of all rural and remote COVID-19 patients requiring hospitalisation, not just severe cases.

Decision

After consultations were held, Option 1 was considered the most suitable response for WA. The challenges associated with patient transfer across a large geographical area in WA overrode the advantages of designated hospitals. In addition, having all hospitals prepared was felt to be an important component to be able to respond to the unknown time and location of future presentations of COVID-19 cases.

Discussion

Maintaining all hospitals to be prepared to care for COVID-19 patients was considered the most suitable approach in an environment of low community transmission. Although public health service providers acknowledged the advantage of having one or more designated hospitals to leave other hospitals available to provide non-COVID services, the risk associated with patient transfer was significant. Furthermore, many highlighted that COVID-19 is still a relatively new disease with a wide variability in clinical presentations, which makes it challenging to decide on clinical thresholds that would inform the need to admit patients and transfer to a higher-level setting. Many have seen rapid deterioration in patient health²² and preferred that, should there be designated hospitals, patients were transferred there as soon as possible.

WA covers a large geographical area where the northern most region of the Kimberly is ~2000 km from the metropolitan area. Tertiary hospitals are concentrated in the metropolitan area around Perth where more than 90% of the population live. A major consideration to the health system is ensuring equity of access to all WA inhabitants. Designated hospitals would likely be in the Perth metropolitan area. Should a COVID-19 patient from a remote or regional area require critical care that the local hospital could provide, the preference would be to transfer the patient to, or deploy staff and facilities from, the closest general hospital, which could be

located outside the metropolitan area, thus making the concept of designated hospitals less favourable.

Although the preservation of PPE was encouraging with designated hospitals, some respondents commented that it is inevitable that all hospitals would need to observe infection control measures, because patients presenting with influenza-like illness would still have to be screened and isolated until a diagnosis was confirmed. Treating patients with COVID-19 is risky and causes multiple disruptions to standard operations. Members from treating hospitals advised of challenges to rostering, upskilling of staff and cost to redesigning of treatment areas. Even though WA has seen low cases of COVID-19 patients, it is wise for all hospitals to prepare for a surge in activity as increase in cases can happen very rapidly, as seen in the state of Victoria, Australia, where over 3000 cases were reported in less than a month (<https://www.dhhs.vic.gov.au/coronavirus-covid-19-daily-update>, accessed 16 July 2020), 10% of which required hospitalisation. Maintaining the decision for all hospitals to be prepared for COVID-19 cases could also escalate modifications to various hospitals to ensure that all hospitals are able to provide quality care or transfers to higher-level care for COVID-19 patients.

Study limitations

COVID-19 has been in existence for less than 1 year and is an exponentially growing pandemic with serious consequences, so there is limited information available on designated COVID-19 hospitals in settings of sustained low or no community transmission. Most publications describe experiences with increased COVID-19 transmission. As some countries now move into low community transmission, it could be beneficial for their health systems to consider the options highlighted in this paper.

Conclusion

Overall, from the available evidence and discussions, there appears to be no clear or significant benefit of having (or not) one or more designated hospitals. Health systems should consider the most appropriate approach according to resources and demands based on the level of community transmission. The readiness of resources should also be available to cope with the financial and geographical pressures placed on the health system. Although many countries are witnessing a reduction in cases, many still have very high infection rates. It is recommended that health systems continue to share their approaches and learnings in environments of low community transmission.

Competing interests

None of the authors has any competing interests to declare.

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