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Isolation facilities for covid-19: towards a person centred approach

Chuan De Foo and colleagues argue that isolation facilities have the potential to interrupt the transmission of infectious agents, particularly in the earlier stages of infectious disease outbreaks, but they must deliver person centred care

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Two years into the covid-19 pandemic, footage from isolation centres in Shanghai showing unrest have raised questions about the safety, utility, and appropriate use of such facilities.[1] Confining people infected with a pathogen in a dedicated facility is not a new idea, nor are debates about the ethical basis or how such policies should be implemented while also safeguarding human rights.[2 3] Historical examples of isolation include patients with tuberculosis, those with influenza in the 1918 pandemic, and typhoid carriers. The use of isolation to limit community spread of infectious diseases has not, however, been consigned to history. Isolation facilities were used in the 2003 severe acute respiratory syndrome (SARS) outbreak, and, on a larger scale, Ebola treatment centres were extensively used in West Africa in 2014-15 to break the chains of Ebola transmission.[4]

Governments revisited the idea of isolation facilities in response to covid-19 (box 1), especially in the early stages of the pandemic before vaccines became available, when predominant viral strains were less infectious and generally present in settings with low transmission.[6] One abiding image from early 2020 was the construction of massive health facilities in Wuhan, China, to house, treat and isolate people with covid-19 during the first wave. Other countries followed suit by refurbishing hospitals, re-purposing existing large-scale facilities or expanding capacity at pre-existing purpose-built infectious disease facilities (table 1).

Box 1: Isolation facilities for covid-19

An isolation facility is a dedicated place where people who test positive for covid-19 receive essential care and are provided with daily necessities, such as food, safe drinking water, and toiletries, as they recover.[5] "Mandatory" isolation means that everyone who meets certain criteria—typically a positive test within a defined period, even if asymptomatic or with mild clinical symptoms that do not require hospital admission—must be confined until they meet the criteria for discharge, are referred to other facilities, or die. This is different from quarantine (which isolates, temporarily, those considered at risk of spreading infection but not known to be infected), but both functions might sometimes be combined, as in New Zealand with its facilities for "managed isolation and quarantine."

Table 1 | Isolation Facilities used in the response to COVID-19

Country	Types of isolation facilities	How it was set up	Key operational characteristics/ protocols of the facility	Key policy shifts
China	Fangcang Hospitals	These makeshift field hospitals are rapidly repurposed large-scale venues such as gymnasiums or stadiums with strict Infection Prevention and Control (IPC) guided infrastructural layouts to limit contamination.	Staffed by medical teams from designated local hospitals with referral mechanism to upwards triage to higher levels of care if patient's condition deteriorates. Basic necessities, medical equipment such as ventilators and entertainment were available. About 12 000 patients were treated in these facilities by the time of their closure in March 2020.	Shifted from a COVID-zero approach to a dynamic COVID-zero approach with some change in their test, trace and isolate approach.
Hong Kong, SAR, China	Hospitals, Community Isolation Facilities (CIF), Community Treatment Facilities (CTF), and repurposed buildings.	Public venues such as convention halls, a cruise terminal, and private hotels were retrofitted to house mild and asymptomatic cases. New standalone facilities were built to add additional isolation capacity in early 2022.	During the first 2 years of the pandemic, all identified cases were isolated in public hospitals or CIFs or CTFs when the capacity of hospitals was exceeded. CIFs were designed to house patients with COVID-19 who would previously have been admitted to the hospital and were used once the patient was considered clinically stable but not yet PCR negative. CTFs housed all newly diagnosed patients until rooms were available in hospitals. In early 2022, capacity in hospitals and pre-existing CIFs was quickly exceeded, leading to the construction of new CIFs, including a step-down facility at the former Kai Tak cruise terminal.	Maintained an elimination or dynamic COVID-19 approach, which includes early identification and facility-based isolation of all positive patients.
New Zealand	Managed Isolation and Quarantine (MIQ) Facility	The New Zealand military aided in the setting up of MIQ facilities which are mainly refurbished private hotels.	MIQ facilities are staffed by police and military personnel, health professionals, seconded civil servants and hotel staff. There is a vaccination requirement for all staff. All personnel are required to undergo daily health checks and weekly testing for COVID-19. Meals are tailored to suit medical needs and cultural tastes where possible. For smokers, support for Nicotine Replacement Therapy is also offered.	Moved away from mandatory isolation when sustained community transmission resulted in a switch away from an elimination strategy to a suppression strategy, with the staged reopening of the country and the introduction of home-based isolation.
Peru	Centros de Aislamiento Temporal y Seguimiento (CATS)	A resolution from the Ministry of Health (Nº 100-days 2021/MINSA) was passed in early 2020 to transform large-scale infrastructure such as a purpose-built athlete compound into an isolation facility with support from the military.	Villa Panamericana in Lima, which between its commissioning in March 2020 and October 2021 had cared for over 47 000 people. It took in patients with mild symptoms to relieve the hospitals of increased stress. The facility also provides medical monitoring and oxygen support if needed.	Peru adopted a suppression strategy at the start of the pandemic but had found it difficult to sustain in the advent of more transmissible variants. Home isolation for many poor and rural areas, including the Amazon context, was also hardly feasible.

Table 1 | Isolation Facilities used in the response to COVID-19 *(Continued)*

Country	Types of isolation facilities	How it was set up	Key operational characteristics/ protocols of the facility	Key policy shifts
Singapore	National Centre for Infectious Disease (NCID) and Community Isolation Facilities (CIF)	The SARS experience prompted the construction of NCID to prepare for impending infectious disease outbreaks while CIFs were expeditiously repurposed using large scale venues such as exhibition halls.	NCID is a purpose-built facility housing with both general and ICU beds, as well as public health, laboratory, and clinical services. Staff at NCID are trained on the appropriate use of personal protective equipment (PPE) and other medical equipment to care for patients with greater clinical needs. For CIFs, there were patient experience teams that oversaw the wellbeing of patients and organised non-health services such as hairdressing, financial advice, and movie screenings. These services were provided at no cost to patients. Newer CIFs relied heavily on technology for teleconsultation and food delivery purposes.	Singapore shifted from a near elimination strategy towards living with the virus endemically, thus prioritising home-based isolation in the face of more transmissible variants but also high vaccination rates.
South Korea	Community Treatment Centres (CTCs)	CTCs are repurposed using existing buildings that include X-ray amenities and infrastructural components that make donning and doffing of personal protective equipment worn by trained staff more efficiently.	CTCs are used to isolate asymptomatic overseas patients and it is family-oriented with rooms to allow infants and parents to stay together. Morning and afternoon rounds by doctors are performed through video calls. Patients self-monitor throughout the day with a mobile application. Patients who deteriorate will be transferred to hospitals.	South Korea moved from its elimination strategy towards living with the virus endemically and have since promoted the use of home-based isolation.
Sri Lanka	National Institute of Infectious Disease Hospital, Provincial and District Hospitals and COVID-19 Specialised Treatment Centres	Infection Prevention and Control (IPC) protocols were in place for designated hospitals to receive COVID-19 patients while the Sri Lankan Army and developmental partners aided in the conversion of large buildings such as previously closed hospital buildings and an unused radio station into Treatment Centres.	Guidelines on risk assessment and management of healthcare workers who have been exposed to a suspected or diagnosed case of COVID-19 were disseminated to all health workers. Triage system and algorithms to identify priority cases and surge plans were implemented throughout the facilities. Clinical practice guidelines were developed and shared with healthcare providers, including management of corpses of the deceased that were infected.	Sri Lanka's suppression strategy required the admission and isolation of all (symptomatic and asymptomatic) COVID-19 patients. As numbers swelled, home-based isolation was authorised for mild and asymptomatic cases.

The argument for establishing isolation facilities was to curb onward transmission, especially within households[7] and in large gatherings that could become "superspreader" events.[8] For isolation facilities to be effectively used, the public must have trust in those running the facilities, trust in those asking people to be isolated, and trust that complying with isolation will ultimately serve a beneficial purpose.[9] However, reports of inequitable and unfair requirements associated with mandatory centralised isolation have surfaced—isolation facilities can impose unnecessarily severe restrictions or criminalise people who are unable to make use of such facilities because of the high financial burden or family obligations. In Northern Argentina, for example, people in isolation centres were reportedly under constant police surveillance and were not allowed to leave. The centres also lacked proper ventilation and were overcrowded and unsanitary, making physical distancing difficult. Moreover, people who tested positive for covid-19 were confined together with others awaiting test results.[10] In Hong Kong, some people refused to be admitted to isolation facilities citing reasons such as chaotic protocols within facilities and the inability to reach authorities handling admissions. Refusal was met with hefty fines and up to two months' imprisonment in some cases, which might have led many people to either not test or hide their test status from authorities.[11] Reports have also exposed the suboptimal conditions under which some migrant workers in Singapore were isolated in their own dormitories, where they lacked prompt access to medical care and basic necessities.[12]

In our view, isolation facilities can have an important role in preventing and interrupting community transmission and safeguarding health systems, particularly before vaccines are available. But they should only be used if they do not infringe human rights and deliver person centred care and support.[13]

Extensive costs for potential benefits

In countries that advised people who tested positive for covid-19 to self-isolate, dedicated facilities provided a feasible alternative for people living in crowded, often multigenerational homes, slums, or other situations (such as refugee camps or prisons) where self-isolation would have been impossible. In New York City and Baltimore, for example, hotel quarantine and isolation programmes for people who were positive or suspected positive for covid-19,

offered at no cost, were used as an alternative for those who could not otherwise isolate owing to housing instability or crowding.[14] In some settings, spaces in isolation facilities were made available or even mandated in recognition that complete home isolation was difficult to achieve, especially in the face of competing demands for food and other necessities, childcare, or income crucial for survival.[15] There was also recognition that home isolation could be extremely dangerous or even deadly for people experiencing domestic violence.[14]

These potential benefits notwithstanding, creating, repurposing, and maintaining isolation facilities can incur substantial costs and requires rapid resource mobilisation to ensure adequate space, ventilation, power supply, and sanitation.[16] We need a large multidisciplinary workforce with expertise ranging from architecture and construction to logistics and supply chain and sanitation and health.[5 17] Typically, assembling that workforce requires recruiting staff from the private sector, redeploying public sector workers, including those in the armed forces. In New Zealand, for example, managed isolation and quarantine facilities were staffed by police and military personnel, health professionals, seconded civil servants, and hotel staff.

The actual costs of operating isolation facilities are not yet publicly available, but, given the range of resources required, the estimated cost of running an isolation facility is high. New Zealand's managed isolation and quarantine centres are estimated to have cost NZ$800m (€490 million) over 18 months in payments to hotels.[18] A 2020 modelling study in Massachusetts estimated the cost of quarantine facilities at US$640 000 a month to rent and operate. It also modelled the costs of providing financial incentives and social support services for infected people and their contacts between March and December 2020. Those estimated costs would be in the range of US$300-570 million depending on the trajectory of infections. But the costs of maintaining such facilities with wraparound and economic support services were estimated to be outweighed by the costs that the health system might incur if cases were to surge uncontrollably.[19] To meet the costs of its facilities, the Ministry of Health and Indigenous Medical Services in Sri Lanka drew upon international support to create isolation and treatment units at specialty hospitals and called on the Sri Lankan navy to provide the construction expertise and labour.[20] It seems almost certain that other low resource countries will have struggled to maintain isolation facilities in the face of exponentially rising infections.[21]

There are other costs to consider, including human resources. Ideally, centralising resources to manage patients with mild to moderate symptoms at these facilities preserves tertiary care facilities for more severe covid-19 cases and non-covid-19 related services, protecting overall health system capacity.[22] Singapore, for example, redeployed nurses from public sector ophthalmology centres to isolation facilities, and the shortfall of personnel was alleviated through the use of teleophthalmology services and other digital tools.[23] Despite efforts to redistribute medical personnel across the health system, taking staff away from other services is likely to compromise them, especially where there is a pre-existing shortage of healthcare workers.[24 25]

Isolation facilities are a logical intervention and have been used widely, but the benefits are largely theoretical and depend heavily on the way in which they are implemented, as most studies report outcomes using simulation models that might not accurately reflect their real world abilities to interrupt transmission, let alone the number of cases and deaths averted through the use of isolation facilities.[26-29] Public acceptance of public health efforts to slow or stop transmission has been high in almost every jurisdiction, but, to realise potential benefits, public trust must be earned through person centred care. Otherwise, as was seen in Hong Kong and more recently in China, people with covid-19 will be deterred from coming forward.[30 31]

Providing person centred care in isolation facilities

Fundamentally, isolation facilities should not be simply viewed as buildings in which to segregate infected people—resources must be directed to the provision of person centred care. This means that people are isolated in a humane and respectful way, receive high quality physical and mental healthcare, and have their individual needs for food, shelter, and personal hygiene (soap, running water, menstrual products, and so on) recognised, and have a means to communicate with friends, family, or healthcare providers (wi-fi, electronic device charging capabilities, or tablets for patient use). In managed isolation and quarantine facilities in New Zealand, for example, mental health support was offered to people throughout their isolation period, provided by on-site health teams, and after discharge through telephone helplines.[32] People in mandatory isolation facilities must have confidence in the quality of care they will receive and a clear understanding of protocols for entering the facility, what life inside the facility is like (including continuity of care when needed and the maintenance of connection with the outside world), and the requirements for discharge.

Person centred care in isolation facilities would also include leisure space for people to gather safely in the facility. In Singapore, the newly converted facility at the Expo Convention Hall opened in February 2022. The facility was family oriented, enabling young children to be isolated together with their care givers in designated family rooms.[33] Given the risks of gender based violence in confined settings, providing safe spaces for all genders is critical. This can be achieved by establishing protective mechanisms such as trained female staff and gender segregated sanitation amenities in all shared spaces that ensure privacy and access to gender specific health services.[34 35] Person centred care is also culturally appropriate, accessible, and inclusive. In practice, this means anticipating, preparing for, and accommodating a diverse range of needs and levels of support. Examples include efforts to support caretaking responsibilities (so that people are not unduly separated from close family members including children), as well as assurances that people without immigration documents will not be penalised or punitively detained, as was the communication in South Korea[36] and Saudi Arabia.[37] For vulnerable populations, including those working in the gig and informal economy, access to these facilities must come without catastrophic losses of income or livelihoods, which can be mitigated through income replacement or short term allowances.

In most cases, people in mandatory isolation facilities (except incoming travellers that departed after travel regulations started) were not charged for their stay,[38 39] but arrangements varied in terms of the economic and social support provided to them. New Zealand and Singapore offered income protection such as allowances or short term income replacement to people in isolation facilities,[40 41] but elsewhere economic support was not provided for those isolating. In Peru, for example, economically vulnerable people such as informal sector workers did not benefit from income support and consequently were less able and willing to stay in isolation facilities.[42]

Finally, person centred care allows people in isolation to trust that their medical needs will be met. Clear protocols are needed for patient transfer and deciding when to discharge, with well

functioning mechanisms for referral to other parts of the health system, both to more advanced facilities in case of acute illness and to primary care for continuity after discharge. Isolation facilities must be staffed by a trained and protected multi-professional health workforce, adequately compensated and equipped with supplies, including personal protective equipment and medicines to ensure that essential care can be delivered even during surges. The creation of isolation facilities need not draw extensive resources from the health system, but existing infrastructure can be re-purposed and human resource gaps filled by training and deploying retired medical workers, medical and nursing students, and personnel beyond the health system to reduce the effects felt in other areas of the health system. Isolation facilities will also challenge newly formed teams operating in unfamiliar conditions to provide high quality care, which can be alleviated by rigorous simulation exercises and contingency planning.[43 44]

A time and a place for isolation facilities?

Isolation facilities are not a panacea but are one component of a comprehensive pandemic response to emerging infectious hazards. As public authorities begin to shift their attention to future pandemic preparedness planning or perhaps more virulent emerging strains of covid-19 alongside waning immunities, the range of experiences gained in creating and operating isolation facilities for covid-19 offer some lessons for their use. Isolation facilities provide a crucial opportunity to limit community transmission at the beginning of any new highly contagious infectious disease threat and when community transmission is low. If transmission rises, then isolation facilities might remain useful on a non-mandatory basis for those unable to safely self-isolate at home.[45] Recent experience has shown that isolation facility policies can pivot to meet evolving needs during an infectious outbreak, adjusting to fluctuating case numbers, hospital capacity, and vaccine coverage. Community isolation facilities in Singapore, for example, transitioned from a facility that housed all symptomatic cases to being used as step-down facilities for those discharged from hospitals or requiring closer monitoring to preserve tertiary hospitals for more severe cases.[46]

Although there have been successful examples of policies using isolation facilities, concerns about public trust and acceptability warrant greater reflection. High profile reports have exposed less than ideal conditions, highly restricted movement, and at times lack of prompt access to medical support and basic necessities.[47 48] But the New Zealand example indicates that isolation facilities can function in ways that ensure a safe patient journey through the provision of adequate pastoral care and clear communication channels, which in turn do not deter sick people from being tested.[49] Trust in the mandatory isolation process is likely to be especially low among marginalised groups, such as undocumented migrants, and of course trust also depends on previous experiences with public health authorities and political leaders.[50]

Throughout the pandemic, some have argued, although with little evidence, that measures such as mandatory isolation are more acceptable in East Asian countries than in western ones.[51] Although this is a generalisation, the public's view of this approach might reflect the role of the state in recent decades and the track record of responding to past health emergencies in East Asia. Singapore's successful management of the 2003 SARS outbreak, for example, fostered trust in the government that mobilised collective action and compliance with public health measures during the covid-19 pandemic.[52 53] Other factors, such as high levels of social support including commensurate and accessible financial packages for those in isolation, might also influence the acceptability of isolation facilities.[48]

Community engagement and clear communication on policies and services related to isolation must be central to the use of isolation facilities to ensure that they are person centred and to build and sustain public support.[50 54] The importance of this kind of approach was evidenced during the 2014 Ebola outbreak. In eastern Sierra Leone, for example, health authorities undertook communication campaigns, such as airing positive experiences from survivors over the radio, to build trust and confidence in the use of Ebola treatment centres in response to widespread scepticism and public resistance.[55]

Isolation facilities are, at best, only one component of a comprehensive public health strategy, particularly in the early stages of outbreaks guided by an understanding of the often changing epidemiological situation. Other complementary measures to reduce transmission include the use of face masks in public enclosed spaces, robust testing and tracing systems linked to supported isolation at home where possible, restrictions on large gatherings, and ensuring the availability of vaccines.[56 57] Isolation facilities have the potential to interrupt transmission, yet the extent to which they do so in practice is less clear. In future we must prepare to quickly and robustly evaluate and report on care and outcomes in these facilities.

Key messages

- Isolation facilities have historically been used to limit community spread of infectious diseases
- Governments revisited the idea to curb covid-19 transmission and safeguard health systems
- Isolation facilities were a feasible alternative when self-isolation was not possible, but reports of inequitable and unfair requirements regarding mandatory isolation have surfaced
- They must be staffed by a trained, protected, and well equipped interdisciplinary workforce and oriented to person centred care
- Isolation facilities are but one component of a comprehensive public health strategy

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