Responding to COVID-19 in Residential Care: The Singapore Experience

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1. Key points

- Nursing home residents make up 0.04% of all COVID-19 cases in Singapore.
- As the total number of COVID-19 related deaths (n=27) is remarkably low, nursing home residents make up 11% of this figure even though there have only been 3 deaths to date.
- Key objectives of pandemic management in residential care are:

    1. To reduce the likelihood of COVID-19 entering nursing homes by restricting visits, increasing staff health surveillance, restricting movements of health care workers between facilities, and adhering to strict protocols for inter-facility transfers of residents.

    2. To reduce the impact of an infection if and when COVID-19 does enter a residential care facility. This is achieved through the creation of self-contained operational bubbles or split zones in care facilities and staff quarters; and through the close monitoring and early testing of residents with acute respiratory infections.

    3. To support the recovery of nursing homes after one or more residents have been found to be COVID-19 positive. This begins with swift testing of residents and staff in the affected zones within 24 hours to establish the extent of spread. Suspect and positive cases are transferred out for isolation and care in acute hospitals. Infection Prevention and Control principles are reinforced and the supply and use of personal protective equipment (PPE) is stepped up. Where necessary, manpower support drawn from other institutions is provided to ensure service continuity. Throughout all this, acute hospital partners are available to support the testing and medical management of residents and staff of affected nursing homes.

2. Impact of COVID19 in Singapore

2.1. Number of positive cases in the general population and deaths

As of July 26, 2020 (Sunday), Singapore has reported 50,369 confirmed cases and 27 deaths (0.05%).[1] At the time of writing, 173 cases required hospitalisation, 4,648 cases were clinically well and cared for in isolation facilities in the community, and 45,521 individuals have completely recovered.[1]

The current prevalence of COVID-19 in Singapore is 0.88%, out of a total population of 5.7 million people with the resident population of 4.0 million and non-resident population of 1.7 million people.[1,2]

A large proportion (94%, n = 47,533) of the cases are migrant workers residing in congregated dormitories.[1] There are 323,000 such migrant workers in Singapore.[3] Extensive testing of asymptomatic migrant workers have contributed significantly to the increase in new cases since early April. The number of new COVID-19 cases reported in the community outside the dormitories have been under 25 per day since April 25, 2020.[1,4–10]

2.2. Population level measures to contain spread of COVID-19

At the population level, Singapore's strategy is one of multi-pronged surveillance, case finding, testing, mandatory reporting, contact tracing and containment.[11] All individuals who present with acute respiratory infection (ARI) and who fit the case definition set out by the Ministry of Health (MOH) are swabbed. The collected samples are analysed using Real-Time Polymerase Chain Reaction (RT-PCR) tests. Those who test positive and are clinically unwell according to a set clinical protocol are hospitalised while those individuals who are clinically well are housed and cared for in designated community isolation facilities. These community facilities include hotels, army barracks, stadiums, and exhibition halls which have been repurposed. Clinically well individuals are closely monitored by designated healthcare professionals stationed at these facilities.

Extensive contact tracing is done for all positive cases. Asymptomatic close contacts of confirmed cases are placed on mandatory quarantine at their own homes or at designated quarantine facilities for 14 days. They are instructed to self-monitor and report their temperature and respiratory symptoms thrice daily. Distal contacts of the confirmed cases do this once a day for 14 days from the last known exposure to the cases. Both close and distal contacts who report symptoms may call a designated hotline to be conveyed to hospitals for follow-up.[11] In early April, there more than 1,300 Singapore Armed Forces personnel and civilians were deployed as contact tracers. They are responsible for identifying and notifying close contacts of confirmed cases as well as checking to make sure that those serving quarantine or stay-home notices are in compliance.[12]

Efforts in manual contact tracing are complemented by the use of technology. To this end, the Government Technology Agency (GovTech) created two contact tracing aids — TraceTogether and SafeEntry.[13] TraceTogether, launched in March 20, 2020, is a mobile phone application that uses Bluetooth Relative Signal Strength Indicator (RSSI) readings between mobile phones across time to estimate the proximity and duration of an encounter between two users. Approximately 2.1 million people have downloaded this application.[14] While this take up rate is less than ideal, the government has not made it mandatory as the performance of this application is inconsistent across mobile phone operating systems.[15] In late June, the government distributed 10,000 Bluetooth-enabled TraceTogether dongles to vulnerable older adults as an alternative to the smartphone application.[15,16] SafeEntry, a cloud-based visitor registration system, was introduced in late April. Visitors to businesses such as malls, supermarkets, hair salons, offices, and factories are now required to check-in using SafeEntry.[17] Approximately 45,000 premises are registered to provide check-in logs to a dedicated government server.[18]

2.2.1. Policy changes introduced in the community in early 2020

Singapore imposed travel restrictions progressively to prevent the further importation of the COVID-19 virus. In late January, the government announced that all Singapore residents and long-term pass holders who had travelled to China must be put on a 14-day leave of absence upon their return.[19] On February 18, this measure was escalated to stricter Stay Home Notice orders.[20] The authorities began swabbing symptomatic travellers at points of air, sea, and land entry on March 4, 2020.[21] Port calls of all cruise vessels were banned on March 13.[22] Singaporeans were advised to defer travel and entry of all short-term visitors from all countries of origin were banned on March 23, 2020.[22,23] From April 9, 2020, all returning Singapore citizens, permanent residents, and long-term pass holders have to be quarantined at dedicated community isolation facilities for 14 days before they can return to their own residences in Singapore.[24]

Social distancing measures were introduced gradually with the suspension of Group activities involving older adults in community and senior activity centres, and religious activities in mid-March.[25,26] By late-

March, entertainment venues such as movie theatres, pubs, and night clubs were closed. Gatherings of more than 10 people were also disallowed outside of school and work settings. Businesses were strongly encouraged to facilitate telecommuting and work from home to reduce close physical interactions.[27-29]

2.2.2. Policy changes in the community introduced in April 2020

In response to a rapid increase in the number of coronavirus cases, on April 7, 2020, Singapore entered the "circuit breaker" phase where schools were shut and replaced with home-based learning. Further restrictions were imposed on activities involving beaches, playgrounds, and outdoor exercise. Only essential services such as public transport, hospitals, medical and dental clinics, banks, supermarkets, and select food establishments were allowed to operate.[30] People were asked to stay at home and refrain from interacting with people from different households. Visits to the homes of people aged 60 years and older was generally discouraged except if it is necessary to meet the older adults' daily needs.[31] By mid-April, the wearing of surgical or cloth face masks when outside of one's home was made mandatory.[32] Only people engaging in outdoor exercise are exempt from this requirement. On April 21, 2020, the government announced the extension of the circuit breaker by another month to end on June 1 instead of May 4.[33] Stricter restrictions were introduced during this period. Less essential food and beverage businesses such as those standalone outlets that retail only beverages, packaged snacks, confectioneries (e.g. sweets, toffees) or desserts had to close. Pet shops, hair salons, barber shops and retail laundry services were also shut.[34]

These strict measures resulted in a decrease in the number of community cases which were unrelated to the cases in the dormitories. As the count of new cases reported per day started to stabilise at lower numbers, the government began to ease some restrictions. Hairdressers and some food establishments were allowed to resume partial operations in mid-May.[35]

2.2.3. Re-opening in phases

On May 28, the government announced a 3-phase approach to ending the semi-lockdown measures that have been in place since early April. Phase 1, which started on June 2, saw the reopening of schools on a modified schedule and the resumption of some services such as vehicle servicing.[36] At the time of writing (end of July), Singapore is in Phase 2 of its reopening. Schools, retail, and dine-in food outlets are now open. Members of families who live apart in different households may now visit each other on a limited basis. Requirements to practice safe distancing and to don masks when outdoors remain in place.[37]

3. Rates of infection and mortality among long-term care users and staff

There are currently 80 nursing homes with 9000 employed staff in Singapore.[38]Approximately 40% are private facilities. While operated by commercial entities, a portion of the beds in these facilities are contracted by the Ministry of Health for residents who are eligible for public subsidies.

Among confirmed COVID-19 cases, 0.04% (n=20) were nursing home residents and 0.01% (n=5) were nursing home staff. Nursing home residents account for 3 (11%) out of a total of 27 deaths from COVID-19. They were aged 86, 86 and 97 and had pre-existing medical conditions. Based on a total of 16,059 public and private residential care beds[39], the infection and mortality rates per care bed are 0.12% and 0.02% respectively.

4. Brief background to the long-term care system

Singapore has a rapidly ageing population. Older adults aged 65 years and above currently constitute 583,000 out of 4.0 million (14.5%) of its resident population.[40] This figure is expected to rise to 900,000 in 2030.[41]

4.1. Philosophy of Long-Term Care

To meet the health and social care demands of an ageing population, Singapore has increased both acute and long-term care (LTC) services in recent years. The government is the main provider of acute health care through its public hospitals. Private hospitals supply only 14% of all inpatient acute care beds in Singapore.[39]

In social and long-term care, Singapore adopts a "many helping hands" approach.[42] Family and surrogate caregivers are the primary providers of long-term care needs of older adults in the community. The main providers of formal long-term care in Singapore are Voluntary Welfare Organisations (VWOs) or Social Service Agencies (SSAs). The SSAs provide a wide range of residential and community-based care to support older adults with different levels of care needs.[42] In 2019, there were 7,600 day care places, 10,300 home care places, 1,986 community hospital beds, and 16,059 nursing home beds in Singapore. Three-quarters of these nursing home beds are supplied by SSAs and the government. The remainder are supplied by private operators.[39]

4.2. Long-Term Care Typology in Singapore

Day care services are centre-based full-day programmes are for older adults to socialise and enjoy organised leisure activities. The different types of day care centres for older adults in Singapore include: senior care centres (SCCs), day rehabilitation centres (DRCs), general and enhanced dementia day care (DDCs), and day hospices.[43]

Home care services include medical, nursing, therapy, personal care, and hospice. These services are appropriate for bed-bound older adults in their own homes. Meals-on-Wheels (MoW) and Medical Escort and Transport (MET) are additional services available to those who are in need of these supports.[44]

Community hospitals provide short-term (2 to 4 weeks) inpatient rehabilitation after acute medical episodes. They are located close to acute hospitals to facilitate transitions of care from acute hospitals back into patients' homes in the community.[45,46]

Nursing homes provide long-term residential care in the community. Some facilities provide specialised care for people with dementia and other mental health conditions.[47]

4.3. Organization of Long-Term Care

Singapore's long-term care policies are designed to promote greater integration of health and social services, and active care management and coordination to help people make informed decisions about their care.[48,49]

The Agency for Integrated Care (AIC) has been playing the role of National Care Integrator since 2009.[50] As the designated referral coordinator for long-term care services, AIC helps match older adults and their families with care services. Being a central body, AIC is also responsible for supporting community care service partners in manpower development, quality improvement, programme development, and crisis management.

The Ministry of Health (MOH) introduced the Regional Health System (RHS) model in 2012 to provide seamless integrated care based on geographic location.[51,52] Under this model, providers of primary, chronic health, and social care collaborate with designated anchor public acute hospitals in each geographical region to smoothen transitions between care settings.[53] This strategy of integrating health and social provider systems has helped strengthen care management capabilities and ensure care continuity. In the current COVID-19 health system response, the presence of these pre-existing collaborative relationships has facilitated the allocation and sharing of infection control resources and training, and the safe transfer and management of patients between acute and community care settings.

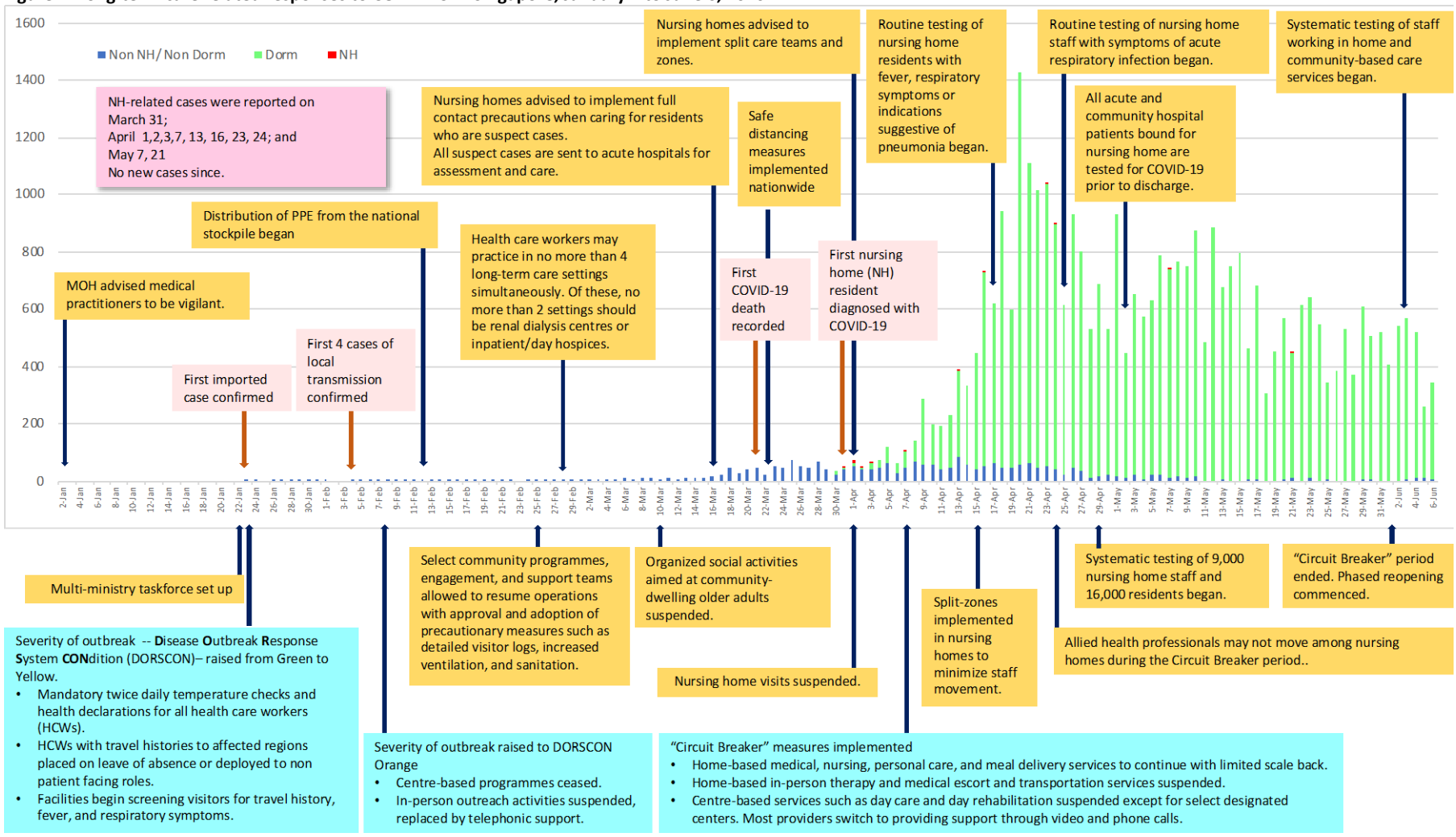
5. Long-term care policy and practice measures to prevent and mitigate the impact of COVID-19

5.1. Whole sector measures

Singapore's response to outbreaks of infectious diseases is guided by the Disease Outbreak Response System Condition (DORSCON) framework. This colour-coded system describes different levels of severity of an outbreak and specifies actions that should be taken to prevent and reduce the impact of new pathogens at each level.[54] MOH put medical practitioners in Singapore on heightened alert on January 2, 2020.[55] As the situation in Wuhan worsened, a Multi-Ministry Task Force was set up here on January 22, 2020 to orchestrate a coordinated and integrated whole-of-government response to this outbreak.[56] The first advisory to the long-term care sector advising against travel to Wuhan was issued on January 23, 2020.

Singapore reported its first COVID-19 case on January 23, 2020.[57] Since then, MOH has kept the public up-to-date by releasing the number new cases and other pertinent statistics daily. In addition, MOH regularly communicates the government's anti-COVID-19 measures to the public and to health and social care providers through various channels. Figure 1 illustrates a timeline of long-term care related policy responses superimposed on published national COVID-19 numbers.

Figure 1. Long-term care related responses to COVID-19 in Singapore, January 2 to June 6, 2020



5.2. Care coordination

5.2.1. Hospital discharges

Upon entering DORSCON level Orange in early February, elective surgical procedures and non-essential health and dental care services were put on hold.[58] In some instances, semi-urgent procedures that were unlikely to require prolonged ICU stays were allowed to proceed.[59]

Throughout the Circuit Breaker period, hospitals continued to discharge patients back into the community and to nursing homes via regular referrals coordinated by AIC. Initially, an additional administrative requirement of a memo declaring that the patient is free of ARI and symptoms suggestive of COVID-19 was imposed. Patients with ARI or pneumonia must test negative for the novel virus before discharge. By early May, when it became clear that it is possible for COVID-19 positive individuals to be asymptomatic, testing of all acute and community hospital patients who are bound for nursing homes became mandatory. Home-based care was maintained with increased availability of medical, nursing, and hospice services for discharged patients throughout this period.[58]

5.2.2. Centre-based care

A small number of designated centres remained opened for older adults without alternative caregiving arrangements who have intensive care needs.[60] This was only possible because the imposition of Circuit Breaker measures requiring people to stay at home meant there was greater caregiver availability. As Singapore began to ease its circuit breaker measures in June, more designated centres were gradually opened to meet service demands as more people have to return to work outside their homes.[61]

5.3. Nursing Homes

5.3.1. Prevention of COVID-19 infections

Preventing exposure

The first step in preventing COVID-19 infections among nursing home residents is to minimise their exposure to COVID-positive individuals. Nursing homes commenced strict screening for elevated temperature, travel history, and respiratory symptoms of all visitors and staff beginning in January, as soon as the first imported case was reported. By late February, movement of health care workers across institutions was also substantially curtailed.[59] Health care workers may not practice at more than four long-term care facilities simultaneously. Initially, people with recent travel histories to a handful of known hotspots were prevented from entering care facilities. As the pandemic progressed, in-person visits were suspended altogether for a little over two months during the Circuit Breaker period from April 7 to June 17, 2020.

At the time of this writing, nursing home residents may receive one of two designated visitors for 30 minutes each day. Visitors are encouraged to make appointments ahead of time so that care facilities are able to keep the number of visitors manageably low at any point in time.[62–65]

Personal Protective Equipment

The next line of defence is through practicing good infection prevention and control. While each nursing home has its own policies, operators are encouraged to refer to current advisories issued by MOH as well as to the National Infection Prevention and Control Guidelines for Long Term Care Facilities,

published in 2018.[66] This document contains best practice guidelines for appropriate levels of contact precautions that are applicable to all care facilities. AIC organised webinars to review these practices with care providers and helped disseminate up-to-date guidelines as they arise. To ensure that nursing homes, both public and private, have sufficient personal protective equipment (PPE) to adhere to standard and enhanced precautions, AIC started drawing on the national stockpile and organising distribution in early February. It facilitated the rationing of supplies based on the facilities' staff size and level of precaution required of specific care services.

Implementation of Split Zones

The implementation of split zones to minimise the mingling of staff and residents in nursing homes was made mandatory on April 15, 2020. A zone is defined as a physical space with dedicated entry and exit points. A nursing home can be split into multiple zones. Each zone of no more than 100 residents is meant to be a self-sufficient care "bubble" with a fixed set of staff and residents. About half of the care facilities have reorganised themselves such that there are 26-50 residents in each zone. Once set up, staff and residents from one zone may not cross into another. All communication between staff is conducted over text messages, by phone, or via video conference as far as possible. This form of segregation extends to living quarters, both on- and off-site. The use of common spaces such as pantries and lifts may also be staggered such that there is enough time for cleaning between use by personnel from different zones. Medical personnel who have to move between zones, such as physicians or therapists, have to adhere to stepped-up infection prevention and control measures. Their movements are recorded to facilitate contact tracing later on.

Comprehensive Testing of Staff and Residents

Routine testing of nursing home residents with fever, respiratory symptoms or indications suggestive of pneumonia began in mid-April. Comprehensive testing of all 9,000 nursing home staff and 16,000 residents commenced on April 29, 2020.[67] This coincided with the emergence of scientific evidence of the possibility of pre-symptomatic and asymptomatic transmission of COVID-19.[68]

To support nursing homes in this exercise, MOH and AIC worked with the regional hospitals to train nurses in care facilities on the procedure of taking nasopharyngeal swabs and to support the setting up of mass swabbing workflows. Nurses from three home care providers were also trained in parallel to maximise swabbing capacity. Once the necessary swabs have been completed, AIC coordinated the transport of the samples to the National Public Health Laboratory (NPHL) where they are tested.

The first round of testing identified 1 new case who is a staff nurse at a facility69, and 4 new cases who are residents at another.70 In addition to performing the tests for free, the government ensured free follow-up treatment to all who test positive in this active surveillance exercise.[71]

5.3.2. Controlling spread once infection is suspected or has entered a facility

Of the 20 cases of COVID-19 positive nursing home residents identified across 6 nursing homes between March 31, 2020 and June 4, 2020, 13 were in one single facility.[72] The facility with the second highest number of cases had four COVID-19 positive residents.[70] The remaining four nursing homes had only one COVID-19 positive resident each.[73–76] In all cases, the residents were transferred to acute hospitals for their care.

When a person in a nursing home tests positive for COVID-19, AIC immediately convenes a COVID-19 Incident Response Team (CIRT) comprising representatives from the nursing home, the supporting

regional hospital, MOH, AIC, NPHL, and the National Centre for Infectious Diseases (NCID) to help the facility manage the necessary next steps:

1. Contain

The confirmed case is transferred to an acute hospital for care. The nursing home provides a dossier of information about the confirmed case, the facility's floor plan, and the existing split zone arrangements to determine the appropriate public health actions. The nursing home stops admitting new or returning residents. Staff and residents who have been in close contact with the confirmed case are identified and isolated or monitored. If the facility has been divided into zones, the affected zones are thoroughly disinfected and PPE stepped to protect staff and to prevent any further transmission. The facility is able to accept returning residents only for unaffected zones, as determined jointly by its management and Public Health experts.

2. Step up Infection Control

AIC conducts an infection prevention and control walk-through to help the nursing home identify isolation areas, plan infection control workflows, and review PPE guidelines with the staff. Prominent signages are put up throughout the facility to demarcate clean and contaminated zones. The nursing home reviews its PPE stock. AIC triggers deliveries of additional PPE as needed.

3. Swab and Surveillance

AIC helps the nursing home link up with its supporting acute hospital and the NPHL to carry out swabbing and testing operations. The supporting hospital advises on hospital admission decisions and care plans for residents who are now under quarantine, especially for those with dialysis and other medical appointments.

4. Contact Tracing

The nursing home generates a 30-day travel and contact history for all staff and residents to facilitate contact tracing.

5. Heightened Vigilance

The nursing home closely monitors the health of its residents and staff for changes in health status for 28 days.

6. Communicate

The nursing home informs the residents' next-of-kin and works with AIC to craft a media statement. MOH disseminates news of the confirmed case via a press release that is timed to occur on the same evening or the day after case confirmation.

7. Service Continuity

The nursing home activates its business continuity plan. Depending on the number of staff who are placed under quarantined due to exposure to the confirmed case, the nursing home may activate step-in workforce from its other branches or parent organisation. It may turn to AIC for help if needed.

8. Maintain Adherence

The nursing home works to ensure that the staff adhere to infection prevention and control measures. These measures must remain in place until two or more rounds of testing have yielded consistently negative findings as ascertained by MOH.

9. Workforce Recovery

Healthy staff may return to active duty after the mandatory 2-week quarantine period. They must be oriented to the new measures that have been put in place to ensure sustained adherence to the infection prevention protocols.

10. Resolution

The 28-day surveillance period is reset each time more cases are discovered. If no new cases arise, the episode is concluded. The affected resident is transferred back to the nursing home when s/he is fully recovered and tests negative for COVID-19.

5.3.3. Managing staff availability and wellbeing

Like many other countries, the residential care sector in Singapore operates with a lean workforce. This can pose staffing challenges in affected facilities. In the worst hit nursing home with 13 COVID-19 positive residents, the entire staff of the facility had to be quarantined.[77] Nurses and other health care workers were deployed from other institutions to ensure continuity of care at the affected nursing home. Fortunately, this particular facility was the exception rather than the rule. With the implementation of split zones and full contact precautions, subsequent affected facilities avoided such acute staff shortages.

To ensure that the bubbles created by split zones remain intact, alternative housing had to be arranged for some nursing home staff who were staying with colleagues assigned to different zones, or staying with health care workers from other organisations, or staying in dormitories where safe distancing is impracticable. During Singapore's Circuit Breaker period from April 7 to June 1, 2020, many nursing home staff were housed in hotels and serviced apartments. Government-funded delivered meals and dedicated transportation between the accommodation and their work places were provided.[11] Alternative housing also includes living on-site in the nursing homes with split zone arrangements extending into the staff's living quarters.

All health care staff working on the frontlines of this pandemic are publicly recognised for their sacrifices. Those who were asked to move into temporary accommodation were each given a $500 allowance to facilitate the transition. In addition, AIC and senior management of care facilities delivered care packages and messages of support to buoy the spirits of those working in nursing homes. Professional counselling and emotional support services have also been made available during this challenging period.

6. Lessons learnt so far

The COVID-19 pandemic has highlighted the importance of having agility in a country's policy response as the base of evidence and best practices on the monitoring, prevention, and treatment of diseases caused by novel pathogens is constantly evolving. Singapore took the threat of the COVID-19 outbreak seriously early on and pre-emptively put in place a Multi-Ministry Task Force for COVID-19 to coordinate strategies and facilitate regular communication within the health and social care systems, and between government agencies and the public. Even so, the rapid unfolding of this pandemic posed a communications challenge as policy responses and public messaging had to be revised often.

Having an existing Disease Outbreak Response System framework that indicates the appropriate levels of response to meet the challenges posed by the COVID-19 pandemic has helped. Singapore has had opportunities to refine this framework based on its experiences with the Severe Acute Respiratory

Syndrome (SARS) outbreak of 2003 and the H1N1 influenza pandemic of 2009. There remains, however, room for improvement. The experience of other countries has shown that the residential care sector can be a particularly susceptible part of health and social care systems during a pandemic. The workforce capability and capacity challenges that Singapore faces are similar to those in other countries. While intensive central support and resourcing is helping residential care providers manage this particular outbreak, this episode has reinforced the need to upskill and resource the residential care sector.

Older adults with multiple chronic conditions form the most vulnerable population in this COVID-19 pandemic. Currently, stringent infection prevention and control measures, the creation of self-sufficient care bubbles in nursing homes, the transfer of confirmed cases out of nursing homes, active surveillance, integration of health and social care within regional health systems, and resourcing by the government are measures that have been effective in protecting nursing home residents in Singapore. Infections that were presumably acquired in residential care facilities account for 11% of all COVID-19 deaths here. This figure is lower than that of South Korea, where 36.7% of COVID-19 deaths were of people who presumably contracted the infection while residing in nursing homes or long-term care hospitals.[78] If the new behaviours learned and process built today can be sustained, then the sector would emerge better equipped to manage other more common communicable diseases. It is also hoped that the lessons learned from this experience will be used to catalyse positive changes to Singapore's health and social care systems even after the pandemic ends.

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