

## Evidence check

10 December 2020

Rapid evidence checks are based on a simplified review method and may not be entirely exhaustive, but aim to provide a balanced assessment of what is already known about a specific problem or issue. This brief has not been peer-reviewed and should not be a substitute for individual clinical judgement, nor is it an endorsed position of NSW Health.

## Aged care facilities and COVID-19

### Evidence check question

- 1) What are different jurisdictions doing to manage COVID-19 in aged care facilities?
- 2) What evidence is there about best practice in preventing and managing COVID-19 infections?

### In brief

- More than 71,000 people live in residential aged care facilities in NSW and to date, there have been 61 COVID-19 cases in these facilities and 29 deaths. Incidence is low in comparison with most other jurisdictions.(1)
- Of the total 52 COVID-19 deaths in NSW, 56% (n=29) occurred in residential aged care facilities. Available international comparisons on this indicator range from 0% in Hong Kong to 82% in Canada.(1)
- An international review identified emerging evidence on measures to contain COVID-19 outbreaks in care homes.
  - Early detection and rapid response after detection of index case
  - Systematic testing of all residents and staff (due to the high prevalence of asymptomatic and pre-symptomatic cases that would not be detected by symptom screening or one-off testing)
  - Moving high-risk contacts of cases out of the facility
  - Isolating cases by removing them from the facility or creating separate wards within the facility.(2)
- A systematic review and expert consensus from the European Geriatric Medicine Society advocates for universal adoption of standards of medical care in nursing homes.(3)
- Digital technologies have shown some promise in aged care facilities for contact tracing (4) and early identification and remote monitoring.(5)
- Case studies report effective collaborations between a hospital and nursing homes in Canada (6) and the US (7); and a three phase system response (initial, delayed, surge) in Washington State.(8)
- A number of studies, predominantly from the US, found an association between COVID-19 incidence and staffing levels and ratios.(9-11)
- In North American studies, the odds of a COVID-19 outbreak was associated with the incidence of disease in the region surrounding a facility, the number of residents, older design standards of the home, and the proportion of African American residents, but not profit status.(12-14)

## Limitations

Structures and staffing of aged care facilities varies across contexts. In many jurisdictions there is a lack of easily accessible, aggregated and linked data on residential care homes.(15)

## Background

More than 71,000 people live in a residential aged care facility (RACF) in NSW ([Australian Government](#)).

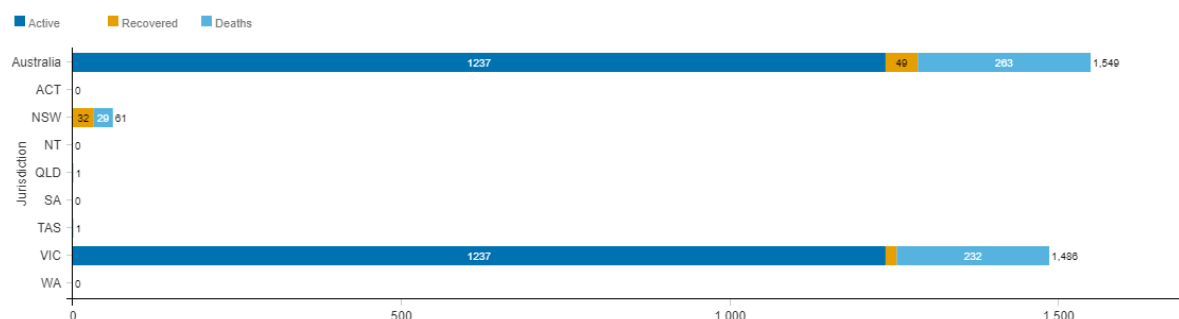
As of 18 August, there had been 61 COVID-19 cases in NSW aged care facilities and 29 deaths (Figure 1).

**Figure 1: COVID-19 cases in aged care services, Australian states and territories, 2020**

### COVID-19 cases in aged care services – residential care

This graph shows the number of confirmed active COVID-19 cases, deaths and recovered cases, in Australia and each state and territory, for people living in Australian Government-subsidised residential aged care facilities.

Source: Department of Health 18/8/2020



\* The aged care data comprises data sourced from the Victorian Public Health Events Surveillance System (PHESS) and Commonwealth sources

Source: <https://www.health.gov.au/resources/covid-19-cases-in-aged-care-services-residential-care>

Detailed jurisdictional reports describing the impact of COVID-19 on people who use and provide long-term care, and the measures adopted to contain and mitigate the pandemic are available from the [International Long Term Care Policy Network](#).

## Risk factors

Age is an important risk factor for severe COVID-19 infections. Asymptomatic or pre-symptomatic disease among residents of aged care facilities is widely noted in case reports and screening studies.(16-23)

**Table 1. Number of COVID-related or confirmed deaths in the population and in care homes (or among care home residents).**

Country	Date	Approach to measuring deaths	Total number deaths linked to COVID-19	Number of deaths of care home residents linked to COVID-19	Number of deaths in care homes	Number of care home resident deaths as % of all COVID-19 deaths	Number of deaths in care homes as % of all COVID-19 deaths
Austria	22/04/2020	Confirmed	510	220		41%	
Australia	18/05/2020	Confirmed	99	29		29%	
Belgium	18/05/2020	Confirmed + Probable	9,080		4,646		51%
Canada	08/05/2020	Confirmed + Probable	4,740	3,890		82%	
Denmark	07/05/2020	Confirmed	506	170		34%	
France	18/05/2020	Confirmed + Probable	28,239	14,363	10,650	51%	38%
Germany <sup>67</sup>	20/05/2020	Confirmed	8,090	3,029		37%	
Hong Kong	20/05/2020	Confirmed	4	0	0	0%	0%
Hungary	11/05/2020	Confirmed	421	100		24%	
Ireland	06/05/2020	Confirmed + Probable	1,375		857	62%	
Israel	29/04/2020	Confirmed	202	65		32%	
Norway	18/05/2020	Confirmed	233		135		58%
Portugal	09/05/2020		1,125	450		40%	
Singapore	03/05/2020	Confirmed	18	2	0	11%	
South Korea	30/04/2020	Confirmed	247	84	0	34%	0%
Spain	10/05/2020	Confirmed + Probable	31,889 (confirmed)		9,642 (confirmed) 16,678 (confirmed + probable)		30% (confirmed)
Sweden	14/05/2020	Confirmed	3,395	1,661		49%	
England & Wales (United Kingdom)	08/05/2020	Probable + Excess deaths	37,375 (probable) 49,470 (excess deaths)	12,526 <sup>68</sup> (probable) 25,591 (excess deaths)	9,980 (probable) 21,753 (excess deaths)	38% (probable) 52% (excess deaths)	27% (probable) 44% (excess deaths)
Scotland (United Kingdom)	17/05/2020	Probable + Excess deaths	3,546 (probable) 3,946 (excess deaths)		1,623 (probable) 2,006 (excess deaths)		46% (probable) 51% (excess deaths)
United States <sup>69</sup>	20/05/2020	Confirmed	93,163	30,130		41%	

Source: Commas-Herreras et al, 2020 (24)

## Guidance and protocols

- The Communicable Diseases Network Australia released updated [National Guidelines for the Prevention, Control and Public Health Management of COVID-19 Outbreaks in Residential Care Facilities in Australia](#) on 14 July 2020.
- The Commonwealth and NSW Ministry of Health produced a [protocol](#) outlining the roles and responsibilities, governance structures, escalation procedures and expectations around information sharing and timeframes in the management of a COVID-19 outbreak in a Commonwealth funded residential aged care facility.
- Guidance from other jurisdictions is summarised in Table 2.

## Editorials and advice from other jurisdictions

The peer reviewed literature features letters and editorials from many jurisdictions (UK, France, Spain, Taiwan, Hong Kong, Singapore, China, US, Australia) outlining elements considered important in managing the pandemic in aged care facilities.

- Restricting visitors and volunteers (8, 25-32)
- PPE – including mask wearing at all times (8, 25, 27-29, 31-34)
- Surveillance, screening and rapid testing of residents (8, 29, 31, 33, 35, 36)
- Screening of staff and keeping staff healthy (25-29)
- Educational and training seminars (26-28, 33, 35)
- Cohorting and isolating patients (31, 34-37)
- Human resource policies and staffing levels (28, 29, 38)
- Communication tools for residents (29, 39-41)
- Clear direction and guidance for staff (28, 37)
- Specialist hotline for staff support needs (40, 41)
- Mobile geriatric medicine teams visiting nursing homes (40, 41)
- Accommodation for staff (28)
- Limit new patients, transfers or use quarantine for returning patients (25, 31)
- Partnerships with acute hospitals (35)
- Funding for additional cleaning and staff (42)
- Support for multidisciplinary team decision making for prioritisation and end of life support (40)
- Regional COVID-19 videoconferencing to share opinions and information (40)
- Limit visiting staff (32)

## Methods (Appendix 1)

PubMed and Google were searched on the 18 August 2020.

Targeted searches at the International Long Term Care Policy Network and National Health Service websites.

## Results (Table 1, peer reviewed articles and Table 2, grey literature)

## Results (Table 1)

Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">High impact of COVID-19 in long-term care facilities, suggestion for monitoring in the EU/EEA, May 2020</a></p> <p>Danis, et al. 2020 (43)</p>	<ul style="list-style-type: none"> <li>• Summary to provide an overview of surveillance and infection prevention and control measures outlined in the guidance documents from the European Centre for Disease Prevention and Control.</li> <li>• Proposed surveillance objectives for long-term care facilities at local, regional and national levels:                             <ul style="list-style-type: none"> <li>○ detect COVID-19 infections in residents and staff, to enable appropriate implementation of infection prevention measures, to limit the size of outbreaks (local objective)</li> <li>○ estimate and monitor the number and proportion of affected facilities to provide situational awareness</li> <li>○ monitor changes in the transmission and geographical distribution of affected facilities over time, to assess prevention and control efforts</li> <li>○ estimate and monitor the impact and severity of COVID-19 in facilities, including the impact on overall mortality in residents, to provide situational awareness of the current burden of disease and to inform mitigation measures.</li> </ul> </li> </ul>
<p><a href="#">COVID-19 highlights the need for universal adoption of standards of medical care for physicians in nursing homes in Europe</a></p> <p>O'Neill, et al. 2020 (3)</p>	<ul style="list-style-type: none"> <li>• An update of the 2015 medical standards by the European Geriatric Medicine Society.</li> <li>• This was performed by the writing group from the original 2015 guidelines and is intended as an interim measure pending a more formal review incorporating a systematic review of emerging literature and a Delphi process.</li> <li>• Updates:                             <ol style="list-style-type: none"> <li>1. All patients under consideration for admission to nursing home care should have an assessment by a specialist in geriatric medicine or old-age psychiatry or both if necessary, prior to admission.</li> <li>2. The coordination of the broad range of complexities of care, including liaison between primary, secondary care, public health, laboratory sciences and occupational health, as well as the need to incorporate resilience and reserve in the nursing home sector mandate the need for clearly specified clinical leadership for both individual nursing homes and for nursing homes within specified regions commensurate with provision of the range of services needed.</li> <li>3. Given the complexity of care associated with older people in nursing homes, physicians providing medical care to nursing home residents should have a formal competence in geriatric medicine and old age psychiatry.</li> <li>4. The medical care needs to be supported in the nursing home by nurses who have gerontological training, including training in dementia and palliative care, and care</li> </ol> </li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
	<p>attendants who have due training in the care of older people.</p> <ol style="list-style-type: none"> <li>5. The medical care needs to be supported by associated disciplines, and in particular physiotherapy, occupational therapy, speech and language therapy [including skills in dysphagia assessment and management], clinical nutrition and pharmacy, dentistry, ophthalmology and audiology as a minimum, and access to other professions—social work and psychology—as required.</li> <li>6. The medical care also needs to be supported by specialist gerontology services, including geriatricians, old age psychiatry and clinical nurse specialists as well as specialist palliative care support.</li> <li>7. The process of maintaining resident medical and nursing records should be gerontologically attuned so as to reflect the needs of this patient group and support clinical decision-making.</li> </ol> <ul style="list-style-type: none"> <li>• Appropriate schedules should be maintained for preventive interventions (such as vaccination), monitoring of chronic diseases, and regular clinical review and medication review.</li> </ul>
<p><a href="#">Real-time digital contact tracing: Development of a system to control COVID-19 outbreaks in nursing homes and long-term care facilities</a></p> <p>Wilmink, et al. 2020 (4)</p>	<ul style="list-style-type: none"> <li>• Study to describe the development and implementation of a real-time digital contact tracing system, designed specifically for long-term care facilities to mitigate the spread of COVID-19 infections.</li> <li>• ‘CarePredict PinPoint’ is a contact tracing system used to rapidly identify and categorise individuals (staff, residents and visitors) that may have been exposed to a COVID-19 infected person. The system consists of a wrist-worn wearable device (Tempo™), which beacons for real-time location tracking, and a cloud-based software application for visualisation of ego-centric contact networks.</li> <li>• A compartmental model parameterised to assess COVID-19 transmissions was used to quantify the impact of asymptomatic transmission and to assess the performance of several intervention groups to control outbreaks: no intervention, symptom mapping, PCR testing, manual and digital contact tracing.</li> <li>• Under all conditions tested, the digital contact tracing system outperformed all intervention groups, achieving reduced spread, fewer total cases, and fewer fatalities.</li> </ul>
<p><a href="#">Risk Factors Associated With Mortality Among Residents With Coronavirus Disease 2019 (COVID-19) in Long-term Care Facilities in Ontario, Canada</a></p> <p>Fisman, et al. 2020 (44)</p>	<ul style="list-style-type: none"> <li>• Cohort study of 627 long-term facilities and COVID-19 deaths in Canada.</li> <li>• The incidence rate ratio for COVID-19-related death among residents was 13 times higher than that among community-living adults older than 69 years.</li> <li>• Early identification of risk requires a focus on testing, providing personal protective equipment to staff, and restructuring the facility’s workforce to prevent the movement of COVID-19 between facilities.</li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">COVIDApp as an Innovative Strategy for the Management and Follow-Up of COVID-19 Cases in Long-Term Care Facilities in Catalonia: Implementation Study</a></p> <p>Echeverría, et al. 2020 (5)</p>	<ul style="list-style-type: none"> <li>• Implementation of a mobile app (COVIDApp) in 196 care centres in Barcelona, Spain (between 1 and 30 April, 2020).</li> <li>• To report the implementation of COVIDApp for the management of long-term care facility residents, specifically for early identification and self-isolation of suspected cases, remote monitoring of mild cases, and real-time monitoring of the progression of the infection.</li> <li>• Data were recorded from 10,347 individuals and up to 4,000 healthcare workers.</li> <li>• Prevalence             <ul style="list-style-type: none"> <li>○ A rapid increase in suspected cases was seen until day 6 but decreased during the last two weeks (from 1,084 to 282 cases).</li> <li>○ The number of confirmed cases increased from 419 (day 6) to 1,293 (day 22) and remained stable during the last week.</li> <li>○ 5,090 institutionalised individuals (49.2%) remained asymptomatic for ≥14 days.</li> </ul> </li> <li>• Deaths             <ul style="list-style-type: none"> <li>○ A total of 854/10,347 deaths (8.3%) were reported; 383 of these deaths (44.8%) were suspected or confirmed cases.</li> </ul> </li> <li>• Healthcare workers             <ul style="list-style-type: none"> <li>○ The number of isolated healthcare workers remained high over the 30 days, while the number of suspected cases decreased during the last two weeks.</li> </ul> </li> <li>• COVIDApp was found to rapidly detect and remotely monitor suspected and confirmed cases of COVID-19 among institutionalised individuals. The platform shows the progression of infection in real time and can aid in designing new monitoring strategies.</li> </ul>
<p><a href="#">A Hospital Partnership with a Nursing Home Experiencing a COVID-19 Outbreak: Description of a Multiphase Emergency Response in Toronto, Canada</a></p> <p>Stall, et al. 2020 (6)</p>	<ul style="list-style-type: none"> <li>• Case report of a hospital-nursing home partnership during an outbreak in Toronto, Canada.</li> <li>• To report on a multiphase emergency response by a 371-bed acute-care hospital and a 126-bed nursing home experiencing an outbreak.</li> <li>• Four phase response:             <ol style="list-style-type: none"> <li>1. engagement, relationship, and trust building</li> <li>2. environmental scan, team building, and immediate response (first 72 hours)</li> <li>3. early-phase response (next seven days)</li> <li>4. stabilisation and transition period (day 10 to present).</li> </ol> </li> <li>• The key principles of this intervention included a phased response that emphasised relationship and trust building; a robust clinical and operations team with central input from geriatric medicine, palliative care, IPAC, psychiatry, nursing, as well as senior hospital leadership and administration; and a non-hierarchical and collaborative approach to working with the nursing home staff and most responsible family physicians.</li> </ul>



Source	Summary
<b>Peer reviewed sources</b>	
	<ul style="list-style-type: none"> <li>This report highlights how hospital and nursing home administrators and clinicians can effectively collaborate to manage a large COVID-19 outbreak and ideally prevent the risk of future outbreaks.</li> </ul>
<p><a href="#">American Geriatrics Society Policy Brief: COVID-19</a></p> <p>American Geriatrics Society, 2020 (45)</p>	<ul style="list-style-type: none"> <li>Outlines recommendations on:                             <ul style="list-style-type: none"> <li>defence production act and supply chain (for things such as PPE and testing kits)</li> <li>safe transfer of COVID-19 patients</li> <li>public health planning for coordinating important stakeholders</li> <li>workforce considerations including training screening and staff availability</li> <li>payment and tax relief.</li> </ul> </li> </ul>
<p><a href="#">COVID-19 in a Long-Term Care Facility — King County, Washington, February 27–March 9, 2020</a></p> <p>McMichael et al. 2020 (46)</p>	<ul style="list-style-type: none"> <li>Once COVID-19 has been introduced into a long-term care facility, it has the potential to result in high attack rates among residents, staff members, and visitors.</li> <li>Thus, prevention is the preferred approach.</li> <li>Long-term care facilities should take proactive steps to protect the health of residents and preserve the healthcare workforce by identifying and excluding potentially infected staff members, restricting visitation except in compassionate care situations, ensuring early recognition of potentially infected patients, and implementing appropriate infection control measures.</li> </ul>
<p><a href="#">A Health System Response to COVID-19 in Long-Term Care and Post-Acute Care: A Three-Phase Approach</a></p> <p>Kim, et al. 2020 (8)</p>	<ul style="list-style-type: none"> <li>Descriptive review of health systems response.</li> <li>The University of Washington Medicine's Post-Acute Care Network developed and implemented a three-phase approach within its pre-existing network of skilled nursing facilities.</li> <li>Initial phase – this phase was designed to optimise communication, review infection control practices, and create a centralised process to track and test the target population.</li> <li>Delayed phase – the goals were to slow the spread of the disease once it is present in the SNF by providing consistent education and reinforcing infection prevention and control practices to all staff.</li> <li>Surge phase – aimed to prepare facilities in response to an outbreak by deploying a ‘drop team’ within 24 hours to the facility to expeditiously test patients and exposed employees, triage symptomatic patients, and coordinate care and supplies with local public health authorities.</li> </ul>
<p><a href="#">For-profit long-term care homes and the risk of COVID-19 outbreaks and resident deaths</a></p>	<ul style="list-style-type: none"> <li>Retrospective cohort study.</li> <li>Whether for-profit homes have had worse COVID-19 outcomes than non-profit homes.</li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
Stall, et al. 2020 (12)	<ul style="list-style-type: none"> <li>• The analysis included all 623 Ontario long-term care homes, comprising 75,676 residents; 360 long-term care homes (57.7%) were for profit, 162 (26.0%) were non-profit, and 101 (16.2%) were municipal homes.</li> <li>• There were 190 (30.5%) outbreaks of COVID-19 in long-term care homes, involving 5,218 residents and resulting in 1,452 deaths, with an overall case fatality rate of 27.8%.</li> <li>• The odds of a COVID-19 outbreak were associated with the incidence of COVID-19 in the public health unit region surrounding a long-term care home, the number of residents, and older design standards of the home, but not profit status.</li> <li>• For-profit status was associated with both the extent of an outbreak in a long-term care home and the number of resident deaths, compared with non-profit homes.</li> </ul>
<a href="#">Variation in SARS-CoV-2 Prevalence in US Skilled Nursing Facilities</a>  White, et al. 2020 (47)	<ul style="list-style-type: none"> <li>• Cross sectional study.</li> <li>• Linking county SARS-CoV-2 prevalence data, administrative data, state reports of skilled nursing facilities outbreaks, and data from Genesis HealthCare, a large multistate provider of post-acute and long-term care.</li> <li>• 118 (34.6%) Genesis skilled nursing facilities and 640 (21.2%) non-Genesis skilled nursing facilities had outbreaks.</li> <li>• Larger skilled nursing facilities and skilled nursing facilities in areas of high SARS-CoV-2 prevalence are at high risk for outbreaks.</li> </ul>
<a href="#">Effectiveness of an On-Site Medicalisation Program for Nursing Homes with COVID-19 Outbreaks</a>  Bernabeu-Wittel, et al. 2020 (48)	<ul style="list-style-type: none"> <li>• Retrospective review of four nursing homes.</li> <li>• A coordinated on-site medicalisation program in response to a sizeable COVID-19 outbreak in four nursing homes was organised.</li> <li>• Ten key processes and interventions were established (provision of informatics infrastructure, medical equipment, and human resources, universal testing, separation of 'clean' and 'contaminated' areas, epidemiological surveys, and unified protocols stratifying for active or palliative care approach, among others).</li> <li>• 272 out of 457 (59.5%) residents and 85 out of 320 (26.5%) staff members were affected.</li> <li>• The survival or optimal palliative care, survival, and referrals to hospital, occurred in 77%, 72.5%, and 29% of patients diagnosed before the program started, with respect to 97%, 83.7% and 17% of those diagnosed during the program, respectively.</li> <li>• A coordinated on-site medicalisation program in nursing homes with COVID-19 outbreaks achieved a higher survival or optimal palliative care rate, and a reduction in referrals to hospital.</li> </ul>
<a href="#">Staffing Levels and COVID-19 Cases and</a>	<ul style="list-style-type: none"> <li>• Retrospective review analysing facility-level data on COVID-19 cases and deaths merged with nursing home and county characteristics.</li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">Outbreaks in US Nursing Homes</a></p> <p>Gorges, et al. 2020 (9)</p>	<ul style="list-style-type: none"> <li>• Study seeks to understand whether baseline nurse staffing is associated with the presence of COVID-19 in nursing homes and whether staffing impacts outbreak severity.</li> <li>• 71% of the 13,167 nursing homes that reported COVID-19 data as of 14 June 2020 had at least one case among residents and/or staff. Of those, 27% experienced an outbreak.</li> <li>• Higher RN hours are associated with a higher probability of experiencing any cases. However, among facilities with at least one case, higher nurse aide and total nursing hours are associated with a lower probability of experiencing an outbreak and with fewer deaths.</li> <li>• The strongest predictor of cases and outbreaks in nursing homes is per capita cases in the county.</li> </ul>
<p><a href="#">COVID-19 Infections and Deaths among Connecticut Nursing Home Residents: Facility Correlates</a></p> <p>Li, et al. 2020 (10)</p>	<ul style="list-style-type: none"> <li>• Retrospective review of all Connecticut nursing homes (n = 215).</li> <li>• To determine the associations of nursing home registered nurse staffing, overall quality of care, and concentration of Medicaid or racial and ethnic minority residents with confirmed COVID-19 cases and deaths.</li> <li>• The average number of confirmed cases was eight per nursing home (zero in 107 facilities), and the average number of confirmed deaths was 1.7 per nursing home (zero in 131 facilities).</li> <li>• Among facilities with at least one confirmed case, every 20-minute increase in RN staffing (per resident day) was associated with 22% fewer confirmed cases; compared with one- to three-star facilities, four- or five-star facilities had 13% fewer confirmed cases, and facilities with high concentration of Medicaid residents or racial/ethnic minority residents had 16% and 15% more confirmed cases, respectively, than their counterparts.</li> <li>• Among facilities with at least one death, every 20-minute increase in registered nurse staffing significantly predicted 26% fewer COVID-19 deaths.</li> </ul>
<p><a href="#">Characteristics of U.S. Nursing Homes with COVID-19 Cases</a></p> <p>Abrams, et al. 2020 (13)</p>	<ul style="list-style-type: none"> <li>• Retrospective review of all nursing homes from 30 states that reported COVID-19 cases at the facility level.</li> <li>• Study aim was to examine the characteristics of nursing homes with documented COVID-19 cases in the 30 states reporting the individual facilities affected.</li> <li>• Of 9,395 nursing homes in our sample, 2,949 (31.4%) had a documented COVID-19 case.</li> <li>• Larger facility size, urban location, greater percentage of African American residents, non-chain status, and state were significantly (P &lt; .05) related to the increased probability of having a COVID-19 case.</li> <li>• Five-star rating, prior infection violation, Medicaid dependency, and ownership were not significantly related.</li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">Nurse Staffing and Coronavirus Infections in California Nursing Homes</a></p> <p>Harrington, et al. 2020 (11)</p>	<ul style="list-style-type: none"> <li>• Retrospective study.</li> <li>• In the US, 1.4 million nursing home residents have been severely impacted by COVID-19; by 1 June 2020, there was at least 25,923 resident and 449 staff deaths as a result of the virus.</li> <li>• Nursing homes with low registered nurse staffing levels appears to leave residents vulnerable to COVID-19 infections.</li> <li>• Establishing minimum staffing standards at the federal and state levels could prevent this in the future.</li> </ul>
<p><a href="#">Efficacy of a Test-Retest Strategy in Residents and Health Care Personnel of a Nursing Home Facing a COVID-19 Outbreak</a></p> <p>Blain, et al. 2020 (49)</p>	<ul style="list-style-type: none"> <li>• Case investigation with 79 residents and 34 healthcare personnel.</li> <li>• This study shows the validity of the updated American Testing Guidance for Nursing Homes:                             <ul style="list-style-type: none"> <li>- It suggests implementing COVID-19 infection prevention and control measures in both residents and healthcare personnel with positive testing or COVID-19 symptoms.</li> </ul> </li> <li>• It warns that asymptomatic healthcare personnel with repeated negative real-time reverse-transcriptase polymerase chain reaction (rRT-PCR) testing can develop antibodies against COVID-19.</li> </ul>
<p><a href="#">Is There a Link between Nursing Home Reported Quality and COVID-19 Cases? Evidence from California Skilled Nursing Facilities</a></p> <p>He, et al. 2020 (14)</p>	<ul style="list-style-type: none"> <li>• Cross-sectional study with data from 1,223 nursing facilities with reported quality and longitudinal data of COVID-19 cases in the US.</li> <li>• Overall quality rating, white resident percentage, ownership, and bed occupancy had a significant impact on COVID-19 cases and deaths.</li> </ul>
<p><a href="#">Coronavirus Disease 2019 Outcomes in French Nursing Homes That Implemented Staff Confinement With Residents</a></p> <p>Belmin, et al. 2020 (50)</p>	<ul style="list-style-type: none"> <li>• Retrospective cohort study to investigate COVID-19-related outcomes in 17 French nursing homes that implemented voluntary staff confinement with residents.</li> <li>• Mortality rates related to COVID-19 were lower among nursing homes that implemented staff confinement with residents compared with those in a national survey.</li> </ul>
<p><a href="#">Rapid Telehealth-Centred Response to COVID-19 Outbreaks in Postacute and Long-Term Care Facilities</a></p> <p>Harris, et al. 2020 (51)</p>	<ul style="list-style-type: none"> <li>• Case study describing the rapid implementation of a multidisciplinary telehealth-centred COVID-19 facility outbreak strategy.</li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
	<div data-bbox="603 376 1465 869"> <p>PUI = Person under investigation; UVA = University of Virginia; LIP = Licensed independent practitioner</p> </div> <ul style="list-style-type: none"> <li>• This strategy focused on supporting the facility team remotely using rapidly deployed technologic solutions. Goals included:             <ul style="list-style-type: none"> <li>○ early identification of patients who need their care escalated</li> <li>○ monitoring and treating patients deemed safe to remain in the facility</li> <li>○ care coordination to facilitate bi-directional transfers between the skilled nursing facility and the hospital</li> <li>○ daily facility needs assessment related to technology, infection control and staff wellbeing.</li> </ul> </li> <li>• 18 out of 48 (38%) facility residents required hospitalisation and 6 (12.5%) died.</li> </ul>
<p><a href="#">Hospital affiliated long term care facility COVID-19 containment strategy by using prevalence testing and infection control best practices</a></p> <p>Eckardt, et al. 2020 (52)</p>	<ul style="list-style-type: none"> <li>• A case report of an outbreak investigation and containment strategy in a 120-bed long-term care facility in the United States.</li> <li>• Strict infection control measures were implemented as well as periodic prevalence testing of residents and staff for COVID-19 by collection of a Nasopharyngeal swab specimen for RT-PCR for SARS-CoV-2 at 14-day intervals.</li> <li>• The facility also worked closely with the local emergency medical service agencies to track daily transports of long-term care patients and emergency department encounters to identify potential outbreaks early. Hospital leadership communicated directly with facility administration when COVID-19 positive patients were encountered.</li> <li>• Over six weeks, the spread of the disease was contained, shown by the prevalence decreasing from 5.4% to 3.6% to 0.41%.</li> <li>• This model has proven to slow the spread of COVID-19 in a facility to less than local community conversion percentages.</li> <li>• Lessons learned             <ul style="list-style-type: none"> <li>○ Point prevalence testing and infection control best practices are paramount to the containment of an outbreak.</li> <li>○ Direct and open communication with staff, close relationships with area hospitals, dynamic infection</li> </ul> </li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">Mitigation of a COVID-19 Outbreak in a Nursing Home Through Serial Testing of Residents and Staff</a></p> <p>Escobar, et al .2020 (53)</p>	<p>prevention and control measures are needed to quickly contain an outbreak.</p> <ul style="list-style-type: none"> <li>• A case report of an outbreak and containment strategy in a 135-bed nursing home in Pennsylvania, United States.</li> <li>• The outbreak was rapidly contained by using a universal testing strategy of all residents and nursing home staff.</li> <li>• This strategy took place in several steps                             <ol style="list-style-type: none"> <li>1. The implementation of serial SARS-CoV-2 testing with rapid turnaround.</li> <li>2. The nursing home leadership developed a comprehensive plan for a SARS-CoV-2 isolation ward in advance of the outbreak.</li> <li>3. A multidisciplinary team of physicians, nurses, and administrators with expertise in infection prevention, quality improvement, and geriatrics met daily to round in the nursing home.</li> <li>4. Employee occupational health services quickly implemented universal testing of employees, identifying and isolating several asymptomatic staff members, including staff with simultaneous duties at both the nursing home and the affiliated acute care hospital.</li> <li>5. Quality management staff were engaged during the outbreak as dedicated observers to prevent lapses in infection control practices, with education reinforcement and maintenance of appropriate personal protective equipment.</li> </ol> </li> <li>• These interventions resulted in a reduction in transmission of SARS-CoV-2 in the nursing home residents, with the last case in a resident detected less than two weeks after the first case.</li> </ul>
<p><a href="#">Characteristics and Quality of US Nursing Homes Reporting Cases of Coronavirus Disease 2019 (COVID-19)</a></p> <p>Chatterjee, et al. 2020 (54)</p>	<ul style="list-style-type: none"> <li>• A comparative study between 8,943 nursing homes that did or did not report cases of COVID-19 in 23 states and the District of Columbia, United States.</li> <li>• To describe the characteristics and quality of nursing homes with COVID-19 cases in states where public health departments have begun to publicly report their statuses.</li> <li>• 3,021 (33.8%) nursing homes reported COVID-19 cases by 29 April 2020.</li> <li>• Rates of deficiencies and complaints, defined as failures to meet or allegations of non-compliance with federal requirements, were higher in nursing homes that reported COVID-19 cases, including: higher mean (SD) health deficiencies (56.2 [68.7] vs 67.0 [67.6]); emergency preparedness deficiencies (3.2 [3.4] vs 3.9 [3.6]); reported incidents (1.1 [3.1] vs 2.4 [4.7]), and substantiated complaints (4.0 [7.4] vs 5.7 [9.5]).</li> <li>• There were more for-profit facilities in the group that reported cases than in the group that did not (2,383 [78.9%] vs 4,090 [69.1%]).</li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
	<ul style="list-style-type: none"> <li>The largest difference between nursing homes with and without COVID-19 cases was observed in county-level rates of COVID-19, suggesting that when the surrounding population case rate is high, area nursing homes are at a high risk of infections.</li> </ul>
<p><a href="#">Clinical Outcomes of Early Treatment With Doxycycline for 89 High-Risk COVID-19 Patients in Long-Term Care Facilities in New York</a></p> <p>Alam, et al. 2020 (55)</p>	<ul style="list-style-type: none"> <li>Retrospective study is to describe the clinical outcomes of high-risk COVID-19 patients with moderate to severe symptoms in long-term care facilities after early intervention with doxycycline in the USA.</li> <li>Eighty-nine (89) high-risk patients who developed a sudden onset of fever, cough, shortness of breath, and hypoxia and were diagnosed with COVID-19, were treated with doxycycline (100mg PO or intravenous (IV) for seven days) and regular standard of care.</li> <li>Early treatment with doxycycline for high-risk patients with moderate to severe COVID-19 infections in non-hospital settings, such as long-term care facilities, is associated with early clinical recovery, decreased hospitalisation and decreased mortality.</li> </ul>
<p><a href="#">COVID-19 Collaborative Model for an Academic Hospital and Long-Term Care Facilities</a></p> <p>Archbald-Pannone, et al. 2020 (7)</p>	<ul style="list-style-type: none"> <li>The ‘Geriatric Engagement and Resource Integration in Post-Acute and Long-Term Care Facilities (GERI-PaL) program’ includes five components.                         <ol style="list-style-type: none"> <li>Project ECHO (daily community collaborative rounds)</li> <li>Nursing liaisons</li> <li>Infection advisory consultation</li> <li>Telemedicine consultation</li> <li>Resident social contact remote connections.</li> </ol> </li> </ul>
<p><a href="#">Improving the care of older patients during the COVID-19 pandemic</a></p> <p>Bianchetti, et al. 2020 (56)</p>	<ul style="list-style-type: none"> <li>Principles are primarily directed to physicians and nurses working in the geriatric field but could also be useful for other specialists.</li> <li>Specific to older people with COVID-19 living in long-term care facilities. If typical or atypical symptoms of COVID-19:                         <ul style="list-style-type: none"> <li>perform confirmatory tests</li> <li>isolate positive cases</li> <li>provide specific and supportive treatment</li> <li>evaluate the need for hospitalisation (by assessing the life-expectancy, the general health status, the cognitive and functional status, and the severity of symptoms) as well as the facilities ability to accomplish the goals of the care</li> <li>involve patient family in therapeutic choices</li> <li>provide PPE and monitor the COVID-19 presence among care professionals.</li> </ul> </li> <li>Asymptomatic residents of the facility who had contact with confirmed cases should be tested and, if positive, isolated and periodically checked for specific and nonspecific symptoms.</li> <li>Hospitalisation should be limited to cases that cannot be managed in the facility.</li> </ul>
<p><a href="#">Recommendations for protecting against and mitigating the COVID-19</a></p>	<ul style="list-style-type: none"> <li>Narrative review</li> <li>In this article authors addressed the relative lack of attention, arguing that enhanced traffic control bundling can and should be adopted and</li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">pandemic in long-term care facilities</a></p> <p>Yen, et al. 2020 (57)</p>	<p>implemented as a means of protecting long-term care facility residents and staff.</p>
<p><a href="#">“We are Alone in This Battle”: A Framework for a Coordinated Response to COVID-19 in Nursing Homes</a></p> <p>Behrens, et al. 2020 (58)</p>	<ul style="list-style-type: none"> <li>• This perspective offers a framework, designed with the input of nursing home leaders, to facilitate internal and external decision-making and collective action to address these threats.</li> <li>• Policy options focus on assuring a shared understanding among nursing home leaders and government agencies of changes in the operational status of nursing homes throughout the crisis, improving access to additional essential resources needed to mitigate the crisis’ impact, and promoting shared accountability for consistently achieving accepted standards in core quality domains.</li> </ul>



## Results (Table 2)

Source	Summary
<b>Pre-peer reviewed and grey literature</b>	
<p><a href="#">COVID-19 related mortality and spread of disease in long-term care: a living systematic review of emerging evidence</a></p> <p>Salcher-Konrad, et al. 2020 (1 August)</p>	<ul style="list-style-type: none"> <li>• Included 54 reports for 49 unique primary studies.</li> <li>• Outbreak investigations in long-term care facilities reported incidence rates of between 0.0% and 71.7% among residents and between 0.4% and 64.0% among staff at affected facilities.</li> <li>• Mortality rates varied from 0.0% to 17.1% of all residents at outbreak facilities, with case fatality rates between 0.0% and 33.7%.</li> <li>• Across studies of outbreaks, no long-term care staff members died.</li> <li>• There was limited information on the impact of COVID-19 on long-term care in the community.</li> </ul>
<p><a href="#">International evidence on care home COVID-19 outbreak responses: summary of key findings</a></p> <p>Salcher-Konrad and Comas-Herrera, 2020 (12 June)</p>	<ul style="list-style-type: none"> <li>• Emerging evidence suggests the following measures were effective in containing COVID-19 outbreaks:                             <ul style="list-style-type: none"> <li>○ early detection and rapid response after detection of index case</li> <li>○ systematic testing of all residents and staff (due to the high prevalence of asymptomatic and presymptomatic cases that would not be detected by                                     <ul style="list-style-type: none"> <li>a) symptoms screening, or</li> <li>b) one-off testing (if infection has already spread beyond index case)</li> </ul> </li> <li>○ moving high-risk contacts of cases out of the facility</li> <li>○ isolating cases by removing them from the facility or creating separate wards within the facility.</li> </ul> </li> </ul>
<p><a href="#">Guidance for preventing and controlling COVID-19 outbreaks in New Zealand aged residential care</a></p> <p>Health Quality and Safety Commission New Zealand</p>	<ul style="list-style-type: none"> <li>• This guidance provides practical assistance to aged residential care facilities in response to the global COVID-19 pandemic including checklists, signs and templates.                             <ul style="list-style-type: none"> <li>○ If one or more confirmed COVID-19 cases have occurred within a residential care facility, an outbreak management team should be convened.</li> <li>○ Education for staff, residents and their families/whānau is vital to inform behaviour and help manage the potential occurrence for ongoing transmission in an outbreak setting.</li> <li>○ Using PPE when necessary, but not over-using or misusing. Strategies to preserve and optimise PPE include cleaning reusable eye protection between use, surgical mask to remain on until it feels damp or for up to four hours, don't touch face or eyes whilst wearing a mask, remove and dispose of PPE safely and wash hands after removal and between each interaction with a resident.</li> <li>○ Facilities should have a staff contingency plan in the event of a community or facility outbreak where staff are isolated or unwell for a prolonged period until cleared to return to work.</li> </ul> </li> </ul>

Source	Summary
<b>Pre-peer reviewed and grey literature</b>	
	<ul style="list-style-type: none"> <li>○ Staff or residents exhibiting signs and symptoms fitting the case definition for COVID-19 should isolate and be tested as soon as possible. Isolation and nursing with PPE should continue until tests are back. Residents should continue to be managed as a probable case even if swabs are negative but clinical suspicion is high.</li> <li>● Outlines guidance on managing staff and residents with potential COVID-19 infection in aged residential care facilities. District health boards are expected to work closely with the facilities to ensure there are adequate supplies of PPE to meet requirements.             <ul style="list-style-type: none"> <li>○ All residents with suspected, probable or confirmed COVID-19 infection should be isolated immediately. This will reduce risk of further transmission to other residents.</li> <li>○ When a facility is notified of a probable or confirmed case, the facility should work with their local public health unit, follow the Ministry of Health’s online advice for health professionals.</li> <li>○ Residents in isolation should have symptom checks daily, reside in a single room with own dedicated bathroom.</li> </ul> </li> </ul>
<a href="#">Coronavirus Disease 2019 (COVID-19) Outbreaks in Residential Care Facilities CDNA National Guidelines for the Prevention, Control and Public Health Management of COVID-19 Outbreaks in Residential Care Facilities in Australia</a>	<ul style="list-style-type: none"> <li>● Special considerations in the management of residents with suspected or confirmed COVID-19 in a residential care facility include isolation, medical review and testing, and transfer if warranted.</li> <li>● Residential care facilities should seek advice from an infection control consultant.</li> <li>● An internal outbreak management team (OMT) should be established to direct, monitor and oversee the outbreak.</li> <li>● Residential care facilities should adhere to the infection prevention and control guidance.</li> <li>● Once resident isolation or cohorting measures are in place, to further reduce the risk of transmission, it is preferable to allocate specific residential care facility staff to the care of residents in isolation</li> <li>● Identify and implement enhanced infection control measures including:             <ul style="list-style-type: none"> <li>○ standard and transmission-based precautions</li> <li>○ environmental cleaning and disinfection</li> <li>○ signage for all (staff, residents, visitors</li> <li>○ during a COVID-19 outbreak, where possible, the movement of visitors into and within the facility should be restricted</li> <li>○ the Infection Control Expert Group infection prevention control guideline provides detailed information on the management of admissions and transfers during an outbreak.</li> </ul> </li> </ul>
<a href="#">Infection Prevention and Control for COVID-19: Interim Guidance for Long Term Care Homes</a>	<ul style="list-style-type: none"> <li>● Important measures to prevent introduction and spread of COVID-19 in long term care homes.</li> </ul>

Source	Summary
<b>Pre-peer reviewed and grey literature</b>	
<p><a href="#">Public Health Agency of Canada 2020</a></p>	<ul style="list-style-type: none"> <li>○ Essential volunteers and visitors should be restricted to those deemed essential, meaning necessary to basic personal care (e.g. feeding), medical (e.g. phlebotomy) or compassionate (e.g. end of life) resident care, and in some cases, visitors may be prohibited.</li> <li>○ All staff and essential volunteers and visitors must be trained and monitored for compliance with putting on and wearing a mask for the duration of their shift or visit, and discarding it afterward, and also to ensure vigilance in properly assessing the need for additional personal protective equipment (PPE), putting it on, wearing and removing it to minimize contamination of themselves and the immediate environment</li> <li>○ Staff must support essential volunteers and visitors in appropriate use of PPE</li> <li>○ All staff will use Droplet and Contact precautions, in addition to Routine Practices, for all care of residents with suspected or confirmed COVID- 19</li> <li>○ All staff and essential volunteers or visitors must be trained on other IPC measures such as proper hand hygiene and the importance of maintaining a 2m spatial distance between residents.</li> <li>● All staff must work proactively to identify suspect or confirmed cases of COVID-19 in staff, residents and any essential visitors, with a low threshold for testing (i.e. even mild symptoms)</li> </ul>
<p><a href="#">Clinical Decision Pathway: COVID-19 in LTC Residents</a></p> <p>BC Centre for Disease Control 2020</p>	<ul style="list-style-type: none"> <li>● Guidance to clinicians on the care management of long-term care residents with COVID-19.</li> </ul>
<p><a href="#">Protecting residents at congregate care facilities</a></p> <p>Government of Alberta 2020</p>	<ul style="list-style-type: none"> <li>● Alberta has developed or updated the following documents:             <ul style="list-style-type: none"> <li>○ guidelines for COVID-19 outbreak prevention, control and management in congregate living sites</li> <li>○ updated operational and outbreak standards for licensed supportive living and long-term care (Order 12-2020).</li> </ul> </li> </ul>
<p><a href="#">COVID-19 Mesures pour la gestion des cas et des contacts dans les centres d'hébergement et de soins de longue durée pour aînés : recommandations intérimaires</a></p> <p>(document in French)</p> <p>INSPQ 2020</p>	<ul style="list-style-type: none"> <li>● Quebec has developed a set of interim recommendations for the management of COVID-19 patients in long-term care facilities.</li> </ul>

Source	Summary
<b>Pre-peer reviewed and grey literature</b>	
<p><a href="#">Coronavirus (COVID-19): getting tested</a></p> <p>Dept of Health and Social Care (UK)</p>	<ul style="list-style-type: none"> <li>• The UK government is testing all workers in care homes.</li> <li>• The UK Government released <a href="#">guidance for care homes</a>, local health protection teams, local authorities, clinical commissioning groups and registered providers of accommodation for people who need personal or nursing care. It sets out how to admit and care for residents safely and protect care home staff.</li> </ul>
<p><a href="#">COVID-19: our action plan for adult social care.</a></p> <p>Dept of Health and Social Care (UK)</p>	<ul style="list-style-type: none"> <li>• PPE is being supplied to care homes.</li> <li>• Guidelines for managing a suspected outbreak of COVID-19 in a care home include:                             <ul style="list-style-type: none"> <li>○ reference to the local Health Protection Team</li> <li>○ isolate cases, determine the best approach to isolating residents</li> <li>○ reinforce infection control practices (PPE, staffing and controlling visitors)</li> <li>○ consider isolating vulnerable individuals who might be at risk of becoming infected and move people to different locations</li> <li>○ test all new residents prior to admission. For people discharged asymptomatic into a care home, isolation for 14 days is recommended</li> <li>○ test all symptomatic residents in care homes.</li> <li>○ Enable remote (telehealth) care. Regular care home rounds by GPs and/or their multidisciplinary teams should be delivered virtually unless a physical presence is required for clinical reasons.</li> </ul> </li> <li>• While it is recommended that care homes limit unnecessary visits, visits at the end of life are important both for the individual and their loved ones and should continue.</li> <li>• All care providers can and should look to their local authority and local health services for support. Local authorities need to have a clear picture of all alternative local provision that could be used in the case of an outbreak.</li> <li>• Local authority public health colleagues are providing telephone support on PPE guidance, infection control and other issues, but where more support is needed, North West London Health have launched a team to go into homes and provide face-to-face support.</li> </ul>
<p><a href="#">Interim Additional Guidance for Infection Prevention and Control for Patients with Suspected or Confirmed COVID-19 in Nursing Homes</a></p> <p>Center for Disease Control 2020</p>	<ul style="list-style-type: none"> <li>• Evaluate and manage residents with symptoms of COVID-19:                             <ul style="list-style-type: none"> <li>○ ask residents to report if they feel feverish or have symptoms consistent with COVID-19</li> <li>○ actively monitor all residents upon admission and at least daily for fever (T≥100.0°F) and symptoms of COVID-19 (shortness of breath, new or change in cough, sore throat, muscle aches). If positive for fever or symptoms, implement <a href="#">Transmission-Based Precautions</a></li> <li>○ if COVID-19 is suspected, based on evaluation of the resident or prevalence of COVID-19 in the community, follow the <a href="#">Interim Infection Prevention and Control Recommendations for Patients</a></li> </ul> </li> </ul>

Source	Summary
<b>Pre-peer reviewed and grey literature</b>	
	<p><a href="#">with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings</a></p> <ul style="list-style-type: none"> <li>○ information about the clinical presentation and course of patients with COVID-19 is described in the <a href="#">Interim Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease 2019 (COVID-19)</a></li> <li>○ The health department should be notified about residents or healthcare personnel with suspected or confirmed COVID-19. Perform a <a href="#">respiratory infection surveillance</a> during an outbreak.</li> </ul>
<p><a href="#">Coronavirus Disease 2019 (COVID-19) Preparedness Checklist for Nursing Homes and other Long-Term Care Settings</a> Centers for Disease Control 2020</p>	<ul style="list-style-type: none"> <li>● A COVID-19 response preparation checklist.</li> </ul>

## Appendix

### PubMed search terms

((2019-nCoV[title/abstract] or nCoV\*[title/abstract] or covid-19[title/abstract] or covid19[title/abstract] OR "covid 19"[title/abstract] OR "coronavirus"[MeSH Terms] OR "coronavirus"[title/abstract] OR sars-cov-2[title/abstract] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept]) AND (2019:2021[pdat])) AND ("nursing homes"[MeSH Terms] OR "aged care"[title/abstract] OR "nursing home\*" [title/abstract] OR "nursing facilit\*" [title/abstract] OR "long term care\*" [title/abstract] OR "long term facilit\*" [title/abstract] OR "residential aged care"[title/abstract] OR "residential home\*" [title/abstract] OR "residential care\*" [title/abstract] OR "RACF"[title/abstract])

### Google search terms

COVID-19 AND aged care, long term care, residential aged care facilities, skilled nursing facilities

## References

1. Adelina Comas-Herrera JZ, Charles Litwin, Amy T. Hsu, Elizabeth Lemmon, David Henderson and Jose-Luis Fernández. Mortality associated with COVID-19 outbreaks in care homes: early international evidence. International Long Term Care Policy Network Accessed on 19 August 2020, available at: <https://ltccovidorg/wp-content/uploads/2020/06/Mortality-associated-with-COVID-among-people-who-use-long-term-care-26-June-1pdf>. 2020.
2. Maximilian Salcher-Konrad AJ, Huseyin Naci, Marselia Tan, Yousef El-Tawil, Adelina Comas-Herrera. Updated findings: Living systematic review of emerging evidence on COVID-19 related mortality and spread of disease in Long-Term Care (31 July 2020). Accessed on 19 August 2020 Available from: <https://ltccovidorg/2020/08/02/updated-findings-living-systematic-review-of-emerging-evidence-on-covid-19-related-mortality-and-spread-of-disease-in-long-term-care-31-july-2020/>. 2020.
3. O'Neill D, Briggs R, Holmerová I, Samuelsson O, Gordon AL, Martin FC. COVID-19 highlights the need for universal adoption of standards of medical care for physicians in nursing homes in Europe. *European Geriatric Medicine*. 2020;1-6.
4. Wilmink G, Summer I, Marsyla D, Sukhu S, Grote J, Zobel G, et al. Real-time digital contact tracing: Development of a system to control COVID-19 outbreaks in nursing homes and long-term care facilities. *JMIR Public Health and Surveillance*. 2020.
5. Echeverría P, Mas Bergas MA, Puig J, Isnard M, Massot M, Vedia C, et al. COVIDApp as an Innovative Strategy for the Management and Follow-Up of COVID-19 Cases in Long-Term Care Facilities in Catalonia: Implementation Study. *JMIR Public Health and Surveillance*. 2020;6(3):e21163.
6. Stall NM, Farquharson C, Fan-Lun C, Wiesenfeld L, Loftus CA, Kain D, et al. A Hospital Partnership with a Nursing Home Experiencing a COVID-19 Outbreak: Description of a Multiphase Emergency Response in Toronto, Canada. *Journal of the American Geriatrics Society*. 2020;68(7):1376-81.
7. Archbald-Pannone LR, Harris DA, Alberio K, Steele RL, Pannone AF, Mutter JB. COVID-19 Collaborative Model for an Academic Hospital and Long-Term Care Facilities. *Journal of the American Medical Directors Association*. 2020;21(7):939-42.
8. Kim G, Wang M, Pan H, G HD, Roxby AC, Neukirch J, et al. A Health System Response to COVID-19 in Long-Term Care and Post-Acute Care: A Three-Phase Approach. *Journal of the American Geriatrics Society*. 2020;68(6):1155-61.
9. Gorges RJ, Konetzka RT. Staffing Levels and COVID-19 Cases and Outbreaks in US Nursing Homes. *J Am Geriatr Soc*. 2020.
10. Li Y, Temkin-Greener H, Shan G, Cai X. COVID-19 Infections and Deaths among Connecticut Nursing Home Residents: Facility Correlates. *Journal of the American Geriatrics Society*. 2020.
11. Harrington C, Ross L, Chapman S, Halifax E, Spurlock B, Bakerjian D. Nurse Staffing and Coronavirus Infections in California Nursing Homes. *Policy, Politics & Nursing Practice*. 2020;21(3):174-86.
12. Stall NM, Jones A, Brown KA, Rochon PA, Costa AP. For-profit long-term care homes and the risk of COVID-19 outbreaks and resident deaths. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne*. 2020.
13. Abrams HR, Loomer L, Gandhi A, Grabowski DC. Characteristics of U.S. Nursing Homes with COVID-19 Cases. *Journal of the American Geriatrics Society*. 2020;68(8):1653-6.
14. He M, Li Y, Fang F. Is There a Link between Nursing Home Reported Quality and COVID-19 Cases? Evidence from California Skilled Nursing Facilities. *Journal of the American Medical Directors Association*. 2020;21(7):905-8.
15. Hanratty B, Burton JK, Goodman C, Gordon AL, Spilsbury K. Covid-19 and lack of linked datasets for care homes. *BMJ (Clinical Research ed)*. 2020;369:m2463.
16. Kimball A, Hatfield KM, Arons M, James A, Taylor J, Spicer K, et al. Asymptomatic and Presymptomatic SARS-CoV-2 Infections in Residents of a Long-Term Care Skilled Nursing Facility - King County, Washington, March 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(13):377-81.
17. Birgand G, Blanckaert K, Deschanvres C, Vaudron A, Loury P, King L. Testing strategies for the control of COVID-19 in nursing homes: Universal or targeted screening? *The Journal of infection*. 2020.

18. Dosa D, Jump RLP, LaPlante K, Gravenstein S. Long-Term Care Facilities and the Coronavirus Epidemic: Practical Guidelines for a Population at Highest Risk. *Journal of the American Medical Directors Association*. 2020;21(5):569-71.
19. Hoxha A, Wyndham-Thomas C, Klamer S, Dubourg D, Vermeulen M, Hammami N, et al. Asymptomatic SARS-CoV-2 infection in Belgian long-term care facilities. *The Lancet Infectious diseases*. 2020.
20. Graham NSN, Junghans C, Downes R, Sendall C, Lai H, McKirdy A, et al. SARS-CoV-2 infection, clinical features and outcome of COVID-19 in United Kingdom nursing homes. *The Journal of Infection*. 2020;81(3):411-9.
21. Feaster M, Goh YY. High Proportion of Asymptomatic SARS-CoV-2 Infections in 9 Long-Term Care Facilities, Pasadena, California, USA, April 2020. *Emerging Infectious Diseases*. 2020;26(10).
22. Louie JK, Scott HM, DuBois A, Sturtz N, Lu W, Stoltey J, et al. Lessons from Mass-Testing for COVID-19 in Long Term Care Facilities for the Elderly in San Francisco. *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America*. 2020.
23. Arons MM, Hatfield KM, Reddy SC, Kimball A, James A, Jacobs JR, et al. Presymptomatic SARS-CoV-2 Infections and Transmission in a Skilled Nursing Facility. *The New England Journal of Medicine*. 2020;382(22):2081-90.
24. Comas-Herrera A ZJ, Litwin C, Hsu A, Lemmon E, Henderson D, Fernandez J-L. . Mortality associated with COVID-19 outbreaks in care homes: early international evidence *International Long Term Care Policy Network*; 2020 26 June 2020.
25. Crotty F, Watson R, Lim WK. Nursing homes: the titanic of cruise ships - will residential aged care facilities survive the coronavirus disease 2019 pandemic? *Internal Medicine Journal*. 2020.
26. Chen CR, Huang HC, Huang HC, Chen W. Preparing for COVID-19: The experiences of a long-term care facility in Taiwan. *Geriatrics & Gerontology International*. 2020;20(7):734-5.
27. Shea YF, Lam HY, Yuen JKY, Adrian Cheng KC, Chan TC, Mok WYW, et al. Maintaining Zero Coronavirus Disease 2019 Infection Among Long-Term Care Facility Residents in Hong Kong. *Journal of the American Medical Directors Association*. 2020;21(7):981-2.
28. McGilton KS, Escrig-Pinol A, Gordon A, Chu CH, Zúñiga F, Sanchez MG, et al. Uncovering the Devaluation of Nursing Home Staff During COVID-19: Are We Fuelling the Next Health Care Crisis? *Journal of the American Medical Directors Association*. 2020;21(7):962-5.
29. Martinez-Peromingo J, Serra-Rexach JA. Long-Term Care Facilities and the COVID-19 Pandemic: Lessons Learned in Madrid. *Journal of the American Geriatrics Society*. 2020.
30. Wang L, Qi N, Zhou Y, Zhang H. Prevention and infection control of COVID-19 in Nursing Homes: experience from China. *Age and Ageing*. 2020.
31. Gaur S, Dumyati G, Nace DA, Jump RLP. Unprecedented solutions for extraordinary times: Helping long-term care settings deal with the COVID-19 pandemic. *Infect Control Hosp Epidemiol*. 2020:1-2.
32. Lum T, Shi C, Wong G, Wong K. COVID-19 and Long-Term Care Policy for Older People in Hong Kong. *Journal of Aging & Social Policy*. 2020;32(4-5):373-9.
33. Szczerbińska K. Could we have done better with COVID-19 in nursing homes? *European Geriatric Medicine*. 2020:1-5.
34. Ouslander JG. Coronavirus Disease19 in Geriatrics and Long-Term Care: An Update. *Journal of the American Geriatrics Society*. 2020;68(5):918-21.
35. Bakaev I, Retalic T, Chen H. Universal Testing-Based Response to COVID-19 Outbreak by a Long-Term Care and Post-Acute Care Facility. *Journal of the American Geriatrics Society*. 2020;68(7):E38-e9.
36. Winnett A, Jatt LP, Sohn L, Lysaght M, Yoshikawa T, Simon SR, et al. Coordinated outreach for veterans in long-term care facilities by an integrated Veterans Affairs healthcare system during the COVID-19 pandemic. *Infection Control and Hospital Epidemiology*. 2020:1-2.
37. Wang J, Yang W, Pan L, Ji JS, Shen J, Zhao K, et al. Prevention and control of COVID-19 in Nursing Homes, Orphanages, and Prisons. *Environmental Pollution (Barking, Essex : 1987)*. 2020;266(Pt 1):115161.

38. Figueroa JF, Wadhera RK, Papanicolas I, Riley K, Zheng J, Orav EJ, et al. Association of Nursing Home Ratings on Health Inspections, Quality of Care, and Nurse Staffing With COVID-19 Cases. *JAMA*. 2020.
39. Siette J, Wuthrich V, Low LF. Social Preparedness in Response to Spatial Distancing Measures for Aged Care During COVID-19. *Journal of the American Medical Directors Association*. 2020;21(7):985-6.
40. Aïdoud A, Poupin P, Gana W, Nkodo JA, Debacq C, Dubnitskiy-Robin S, et al. Helping nursing homes to manage the COVID-19 crisis: an illustrative example from France. *Journal of the American Geriatrics Society*. 2020.
41. Cofais C, Veillard D, Farges C, Baldeyrou M, Jarno P, Somme D, et al. COVID-19 Epidemic: Regional Organization Centered on Nursing Homes. *Journal of the American Geriatrics Society*. 2020.
42. McGregor MJ, Harrington C. COVID-19 and long-term care facilities: Does ownership matter? *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne*. 2020.
43. Danis K, Fonteneau L, Georges S, Daniau C, Bernard-Stoecklin S, Domegan L, et al. High impact of COVID-19 in long-term care facilities, suggestion for monitoring in the EU/EEA, May 2020. *Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable Disease Bulletin*. 2020;25(22).
44. Fisman DN, Bogoch I, Lapointe-Shaw L, McCreedy J, Tuite AR. Risk Factors Associated With Mortality Among Residents With Coronavirus Disease 2019 (COVID-19) in Long-term Care Facilities in Ontario, Canada. *JAMA Network Open*. 2020;3(7):e2015957.
45. Society AG. American Geriatrics Society (AGS) Policy Brief: COVID-19 and Assisted Living Facilities. *J Am Geriatr Soc*. 2020.
46. McMichael TM, Clark S, Pogojans S, Kay M, Lewis J, Baer A, et al. COVID-19 in a Long-Term Care Facility - King County, Washington, February 27-March 9, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(12):339-42.
47. White EM, Kosar CM, Feifer RA, Blackman C, Gravenstein S, Ouslander J, et al. Variation in SARS-CoV-2 Prevalence in US Skilled Nursing Facilities. *Journal of the American Geriatrics Society*. 2020.
48. Bernabeu-Wittel M, Ternero-Vega JE, Nieto-Martín MD, Moreno-Gaviño L, Conde-Guzmán C, Delgado-Cuesta J, et al. Effectiveness of a On-Site Medicalization Program for Nursing Homes with COVID-19 Outbreaks. *The Journals of Gerontology Series A, Biological Sciences and Medical Sciences*. 2020.
49. Blain H, Rolland Y, Tuailon E, Giacosa N, Albrand M, Jaussent A, et al. Efficacy of a Test-Retest Strategy in Residents and Health Care Personnel of a Nursing Home Facing a COVID-19 Outbreak. *Journal of the American Medical Directors Association*. 2020;21(7):933-6.
50. Belmin J, Um-Din N, Donadio C, Magri M, Nghiem QD, Oquendo B, et al. Coronavirus Disease 2019 Outcomes in French Nursing Homes That Implemented Staff Confinement With Residents. *JAMA Netw Open*. 2020;3(8):e2017533.
51. Harris DA, Archbald-Pannone L, Kaur J, Cattell-Gordon D, Rheuban KS, Ombres RL, et al. Rapid Telehealth-Centered Response to COVID-19 Outbreaks in Postacute and Long-Term Care Facilities. *Telemedicine journal and e-health : The Official Journal of the American Telemedicine Association*. 2020.
52. Eckardt P, Guran R, Hennemyre J, Arikupurathu R, Poveda J, Miller N, et al. Hospital affiliated long term care facility COVID-19 containment strategy by using prevalence testing and infection control best practices. *American Journal of Infection Control*. 2020.
53. Escobar DJ, Lanzi M, Saberi P, Love R, Linkin DR, Kelly JJ, et al. Mitigation of a COVID-19 Outbreak in a Nursing Home Through Serial Testing of Residents and Staff. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*. 2020.
54. Chatterjee P, Kelly S, Qi M, Werner RM. Characteristics and Quality of US Nursing Homes Reporting Cases of Coronavirus Disease 2019 (COVID-19). *JAMA Network Open*. 2020;3(7):e2016930.



55. Alam MM, Mahmud S, Rahman MM, Simpson J, Aggarwal S, Ahmed Z. Clinical Outcomes of Early Treatment With Doxycycline for 89 High-Risk COVID-19 Patients in Long-Term Care Facilities in New York. *Cureus*. 2020;12(8):e9658.
56. Bianchetti A, Bellelli G, Guerini F, Marengoni A, Padovani A, Rozzini R, et al. Improving the care of older patients during the COVID-19 pandemic. *Aging clinical and Experimental Research*. 2020:1-6.
57. Yen MY, Schwartz J, King CC, Lee CM, Hsueh PR. Recommendations for Protecting Against and Mitigating the COVID-19 Pandemic in Long-term Care Facilities. *J Microbiol Immunol Infect*. 2020.
58. Behrens LL, Naylor MD. "We are Alone in This Battle": A Framework for a Coordinated Response to COVID-19 in Nursing Homes. *Journal of Aging & Social Policy*. 2020;32(4-5):316-22.