Royal Commission
into Aged Care Quality and Safety

REVIEW OF INNOVATIVE MODELS OF AGED CARE

RESEARCH PAPER 3

JANUARY 2020

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The Honourable Tony Pagone QC and Ms Lynelle Briggs AO have been appointed as Royal Commissioners. They are required to provide a final report by 12 November 2020.

The Royal Commission intends to release consultation, research and background papers. This research paper has been prepared by the Flinders University, Bolton Clarke Research Institute, SAHMRI and Stand Out Report for the information of Commissioners and the public. The views expressed in this paper are not necessarily the views of the Commissioners.

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REVIEW OF INNOVATIVE MODELS OF AGED CARE

Report prepared for the Royal Commission

into Aged Care Quality and Safety

November 2019

This report has been prepared by Flinders University, Bolton Clarke Research Institute, SAHMRI and Stand Out Report for the information of the Royal Commission into Aged Care Quality and Safety and the public. The views expressed in this paper are not necessarily the views of the Commissioners.

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Abbreviations

ACAT	Aged Care Assessment Teams
ACFI	Aged Care Funding Instrument
CALD	Culturally and linguistically diverse
CAPABLE	Community Aging in Place, Advancing Better Living for Elders
LGBTI	Lesbian, gay, bisexual, trans and gender diverse, and/or intersex
NSW	New South Wales
SA	South Australia
TRACS	Teaching and Research Aged Care Services
UK	United Kingdom
US	United States of America
Vic	Victoria
WA	Western Australia
YPIRAC	Younger People in Residential Aged Care

Executive summary

To assist the Royal Commission into Aged Care Quality and Safety (established in October 2018), a review of international models of aged care has been undertaken, identifying key innovative models of care from Australia and around the world.

Approach

Innovative models of care are defined in this review as those that are not widely available in Australia. The approaches that are included in this report are complex interventions that impact on a person's whole care environment or models of care, rather than single-modality therapies or therapies targeted at a single aspect of care (e.g. interventions targeted specifically at behaviour). Models of care to provide medical (health) care services including those that integrate social and health care or palliative care are not included. Supportive approaches that are not considered innovative models of care are also described for some diverse populations.

The review involved conducting rapid scoping reviews to identify categories of innovative models of care. This was supplemented with systematic reviews on key identified approaches, reviews of reviews, grey literature searching and contact with experts. This approach did not provide an exhaustive list of all innovative models of care nor list every example of a particular category. Instead, it highlighted key innovative approaches and examples.

Background

A number of philosophies and principles underpin and are interwoven throughout innovative approaches to provision of aged care services. Person-centred care emphasises the value of the individual with their own unique history, experiences, values and culture. In theory, a person-centred care approach should also enable tailored delivery of culturally appropriate care to diverse populations. 'Culture change' is a term that refers to the transformation of residential aged care. The aim is to change the nature of care provided from task-oriented to person-centred and relationship-centred and to remodel the environment from 'institutional' to 'homelike'. It often includes an approach of empowering staff to make decisions regarding the individuals they support, with higher levels of staff training. Reablement or restorative care aims to restore and/or maintain physical function. As Australian funding for residential aged care is based on dependency, there is limited incentive for Australian aged care providers to actively encourage reablement/restorative care approaches. The key to addressing the social determinants and inequities underlying diversity in health and disability in older people is consideration of their experiences across their life course, the different environments in which they reside, empowerment to control their ageing experience, and the avoidance of existing stereotypes related to population ageing.

Philosophies of care provision that are key components of good practice in models of residential aged care are relationship-centred care and reablement approaches. Culture change initiatives that implement these approaches in residential aged care facilities should be encouraged and supported.

Innovative models of aged care

This review identified a number of approaches to providing aged care for people in the community and in residential care, both in Australia and internationally. Most innovative models of care have not been rigorously evaluated, and evidence of their effectiveness at improving care recipients' outcomes is limited. These programs require further testing before scaling up more widely within the Australian context.

The following approaches were identified:

- Dyadic interventions for people living with dementia in the community and their carer, providing individualised training and support with a focus on upskilling the carer — These approaches have moderate-quality evidence to support their effectiveness in reducing depression in carers and delaying functional decline in people with dementia.
- Support workers, system navigators or care coordinators who facilitate a streamlined approach to care for people with dementia or other chronic health conditions — One example, Community Aging in Place, Advancing Better Living for Elders (CAPABLE), has been granted Medicaid funding in the US. In Scotland, the government guarantees a minimum of one year post-diagnostic support for people with dementia.
- Small-scale, domestic models of residential aged care, where there is an emphasis on providing person-centred care that maximises the independence of the residents and participation in routine, domestic activities in a homelike setting for smaller groups of residents — These models of care better meet consumer preferences and limited evidence indicates benefits for residents, including reduced restraint use. This model has been successfully implemented in Australia but has limited availability. Perceptions of higher cost may be a barrier; capital costs may be slightly higher but running costs can be no greater and may be less.
- Respite provided in settings aligned to a person's background and offering structured activities — The example of respite provided in farm settings may have relevance to Australian populations in rural/remote areas, people from agricultural backgrounds and those living with dementia.
- Innovative models of care for people who are homeless or at risk of homelessness that include relationships as a key component, with a focus on providing services beyond care and accommodation — An Australian example that is considered innovative internationally is the Wintringham model in Victoria.
- The Bidyadanga dementia support pilot program that supports remote-living Aboriginal and Torres Strait Islander people with dementia to remain living in their community on traditional country — This program provides community education and empowerment, strengthening capacity within the local aged care and health workforce.

The following approaches were identified that support younger people with disabilities to avoid admission to residential aged care:

- Groups of individual units with shared supporting services, with smart-home technology and onsite nursing care, giving a sense of community and enabling couples to remain together.
- Integrated or co-located housing for young people within housing developments for the general public, using smart-home and communications technologies with on-call support, enabling community integration and connectedness.

Approaches that require work to ensure they are universally available across Australia to support older people from diverse populations include:

- training and education of staff in provision of non-discriminatory inclusive services
- accreditation of services with an inclusive approach
- increasing awareness among members of diverse populations of existing services and supports
- improved access to culturally appropriate aged care assessments (preferably through more trained Aboriginal and Torres Strait Islander aged care assessors) to increase referrals to aged care packages and services for Aboriginal and Torres Strait Islander populations.

Some technology-based models of care that have been shown to be viable internationally but have not seen successful adoption at scale for the Australian ageing population include:

- telehealth communications and monitoring technologies for better access to health care for people living in residential aged care, at home without transport or in rural/ remote regions
- remote support ('health smart homes') for independently living people ageing in place, who are susceptible to falls or isolation.

There are many innovative approaches to supporting older people requiring long-term care both in the community and residential care. National regulations and funding can either support approaches or limit their implementation or uptake. Most of the approaches described have limited evidence for their impact on recipient outcomes, so further evaluation would provide useful cost/benefit information to support wider implementation of promising approaches.

Introduction

The Royal Commission into Aged Care Quality and Safety was established in October 2018 to inquire into the quality of aged care services provided to Australians and the delivery of aged care services in a sustainable way, including through innovative models of care and increased use of technology.

To assist the Royal Commission in its work, a review of innovative models of aged care has been undertaken to provide learnings for the aged care system in Australia. This review identifies key innovative models (emerging nationally as well as internationally), including those specific to people living with dementia, lesbian, gay, bisexual, trans and/or intersex (LGBTI) people, Aboriginal and Torres Strait Islander people, culturally and linguistically diverse (CALD) people, people living in rural and remote areas, and young people with disability living in residential aged care.

This report presents the findings from this review and summarises key innovative approaches separately for residential care, home/community care, the diverse populations mentioned above, and the use of technology.

Scope and method

Innovative approaches are defined as models of care that are novel and not widely available in Australia. The approaches that are included in this report are complex interventions that impact on a person's whole care environment or models of care, rather than single-modality therapies or therapies targeted at a single aspect of care (e.g. music, art, exercise, interventions targeted at sleep, falls, behaviour, mealtimes). Models of care to provide medical (health) care services, including those that integrate social and health care or palliative care, are also not included. Approaches not included are listed in Appendix 1 (page 73).

Innovative models of care have been identified through a number of rapid scoping reviews to identify categories of innovative models. This was supplemented with systematic reviews on key identified approaches (residential care models including physical design changes, support workers, respite models, rural/remote models), reviews of reviews (including teaching nursing homes, diverse populations) and extensive grey literature searching and contact with experts (details are provided in the supporting technical report) (see Figure 1). This approach does not provide an exhaustive list of all innovative models of care nor list every example of a particular approach; rather, it highlights key approaches and examples.

Evidence for the effectiveness of innovative models of care is often sparse. This is in part due to feasibility issues and also because of the barriers researchers confront when trying to obtain ethics approvals for research that includes people with cognitive impairment, who represent a large proportion of the aged care population, particularly in residential care. In addition, some areas of interest, such as which design of aged care homes is associated with

the best resident quality of life and cost-effectiveness, are difficult to conduct in a competitive sector with limited financial transparency [1].

Overall, very few community care models were robustly evaluated, nor was there much focus on the impact on inequity or consumer views. Existing evaluations focused on feasibility and satisfaction, with limited cost-benefit or person-specific analyses.

Where possible and appropriate, recommendations have been made as per the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach [2].

Figure 1 Approach to identifying innovative models of care in this review

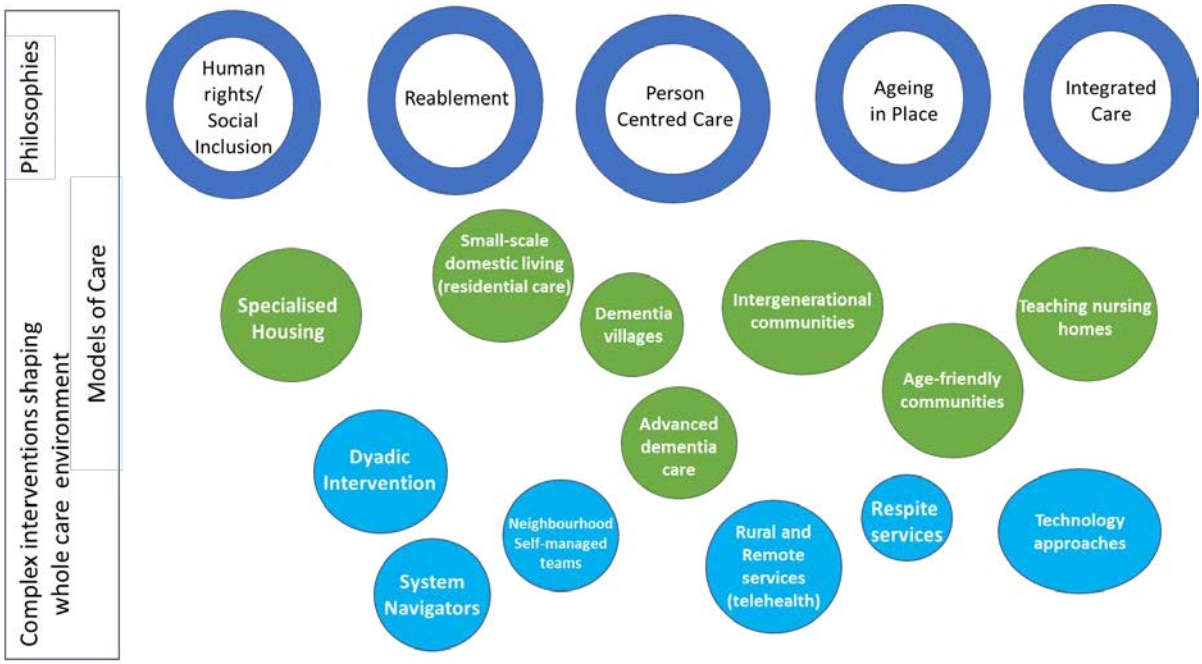
Results are presented in this report beginning with residential aged care, then the various types of home/community care, then for the diversity populations and finishing with technology. Results in each section end with a table summary of the types of models identified and highlighted examples. Further information about the characteristics of the approaches and evidence on their strengths, weaknesses, implementation, equity and consumer views are presented in the tables in Appendix 4. Other approaches considered informative, but not included as innovative models of care, are also described briefly in the text only (e.g. accreditation approaches for LGBTI services).

Background: Philosophies of aged care

Before discussing innovative models, it is important to understand that there are a number of philosophies that underpin and are interwoven throughout innovative aged care services

that should be distinguished from the services themselves. The key philosophies and their related approaches are outlined in Figure 2.

Figure 2 Examples of philosophies and innovative approaches in aged care



Person-centred care

Many newer models of aged care include a person-centred care approach, which is based on the work of Kitwood [3] and the idea that 'personhood' applies regardless of the level of disability or dementia. Person-centred care is increasingly seen as synonymous with good quality in residential care.

Person-centredness is an approach to providing care established through the relationships between all care providers, older people and the important people in their lives [4, 5]. It involves qualities of compassion, concern, kindness and respect [6], which can be difficult to measure [7]. Being person-centred underscores the value of the individual with their own unique history, experiences, values and culture that have shaped who they are.

Person-centredness requires that the relationship between the care provider and the recipient be built on mutual trust and respect, an acceptance of the individual's right to self-determination, a shared understanding of needs, preferences, decisions and aspirations, and a shared collective knowledge of available choices [8, 9]. Implementation of a person-centred care approach by care staff requires leadership and management to implement the framework for this [10, 11]. Australian randomised controlled trials have demonstrated improved quality of life and less agitation in people with dementia when a person-centred care approach is encouraged in residential aged care [11, 12]. Person-centred care may also contribute to reduced staff burnout [10].

A person-centred care approach should also enable tailored delivery of care in an appropriate manner to diverse populations. However, for some populations, barriers to true expression of individual preferences and needs exist due to language (e.g. CALD and Aboriginal and Torres Strait Islander populations), or other barriers to expressing personal preferences (e.g. LGBTI population).

Building on the concept of person-centred care is the idea of relationship-centred care, developed by Nolan [13] who describes how individuals experience relationships that promote a sense of belonging and security. Providing care in this way is promoted as a move from a model of resident 'care' to resident 'engagement' with more reciprocal relationships [14]. This shift has been associated with calls for a 'social revolution' in residential care [15]. Selected examples of innovative models of care that include a person- and relationship centred approach to care are provided in Box 1.

Box 1. Examples of new and innovative models of care which include person-centred care and relationship-centred approaches are:

- Butterfly Homes [16]
- Hammond Care dementia-specific small-scale domestic living homes [17]
- De Hogeweyk [18]
- Caring for Older Adults and Caregivers at Home Program [19]

'Culture change' is another related term that has been used in the US to refer to programs focused on the transformation of long-term (residential) care, including the implementation of person-centred and relationship-centred care [20]. This change aims to transform the nature of care provided from task-oriented to person-centred, to remodel the environment from 'institutional' to 'homelike' [21] and to change the nature of the relationships between staff and residents [21].

The main tenets of culture change are to promote choice, dignity, respect, self-determination and purposeful living [22-24]. Staff are empowered to make decisions regarding the individuals they support, in a manner that suits the individual, and the service includes high levels of staff training [21, 25, 26]. De-institutionalisation may involve removing staff uniforms, medicine trolleys, and rigid routines, with more control over daily activities given to residents [27, 28]. Examples of the culture change movement are outlined in Box 2.

Box 2. Examples of the culture change movement include the:

- Pioneer Network in the US [29, 30]
- Wellspring Model, where 8–10 facilities work together as 'learning collaboratives' to share ideas and build partnerships between managers and residents [31, 32]
- Dementia-specific Montessori model
- Australian MyLife Model of Care [33, 34] — Whiddon aged care received an award from the Australian Aged Care Quality Agency for the design and implementation of this approach [34]
- My Home Life program which operationalises culture change through leadership support [35] — This program has been implemented widely in the UK, with academic involvement and support of national consumer and provider organisations [36, 37] as well as being implemented through the South Australian Innovation Hub [38].

Reablement

Rehabilitation, reablement and restorative principles are not particularly innovative, but implementation in Australia has been variable. Reablement or restorative care aims to restore and/or maintain physical function [39-41]. A reablement plan includes an assessment (often by people from multiple disciplines), goal setting and a combination of interventions, including exercises targeting physical impairments, activities of daily living retraining, behavioural interventions, adjustments to the environment and accessing adaptive equipment [40]. Approaches that help people regain function are widely supported by evidence and clinical practice guidelines [42]. Key characteristics of restorative care in aged care include [43]:

- individual, family and staff education and training
- reorientation of focus from ‘treating’ and ‘taking care’ of individuals towards working together to maximise function and comfort
- the establishment and monitoring of goals with the individual, family and care staff
- the use of a coordinated inter-disciplinary care team who share these common goals.

Successful implementation of effective reablement/restorative care requires consideration of an individual’s motivation, self-efficacy, social supports, cognition, environment and physical capabilities.

Embedding a reablement approach in aged care is more widely practiced in other nations, including Japan [44]. As the Australian Aged Care Funding Instrument (ACFI) for residential care homes is based on dependency, there is limited incentive for Australian aged care providers to actively encourage reablement/restorative approaches. No additional funding is available to providers for increased therapy to achieve recovery when residents return from

hospital (e.g. following a hip fracture) or when a functional decline occurs (e.g. following influenza). An Australian trial demonstrated that rehabilitation following hip fracture can improve mobility for people living in residential aged care but providing such a service using a specialist hospital outreach program was not cost-effective [45]. This suggests that the approach should be embedded in aged care rather than delivered using 'flying squads' or hospital outreach teams.

Related to reablement/restorative approaches is the comparatively new concept of frailty, which is used to describe older people who have decreased reserve and resistance to stressors that put them at risk of adverse events (falls, hospital admissions, admission to care and death) [46]. Community studies, including an Australian study, have found that frailty can be reversed by a combination of nutritional, exercise and psychosocial interventions [47-49]. In Sydney, a consortium of geriatricians, GPs, allied health and nursing staff at the North Primary Health Care Network is now attempting to systematically intervene for older people with frailty using a care pathway approach. Referral forms and coordination supports are provided to GPs and allied health staff via a website[i] [50]. To date, less work is available on the effectiveness of formally addressing frailty within residential care settings, so a restorative approach remains the evidence-based recommendation.

Human rights and social inclusion

All older Australians in care have the basic human right to dignity in care, as outlined in the first recommendation of the Australian clinical practice guidelines for dementia [42, 51] (Box 3).

Box 3. Australian Clinical Practice Guidelines and Principles of Care for People with Dementia

RECOMMENDATION 1: Health and aged care professionals should provide person-centred care, by identifying and responding to the individual needs and preferences of the person with dementia, their carer(s) and family. The 10 Principles of Dignity in Care (http://www.dignityincare.org.uk) should be used as the standard by which care is delivered and evaluated.

These principles indicate that each person should be treated as an individual by offering a personalised service. Social inclusion and addressing the needs of diverse older populations requires considering the varied experience of individuals throughout their life, the different environments in which older people live, the empowerment of older people in taking control of their ageing experience, and the avoidance of existing stereotypes related to ageing [52].

In December 2017, the Australian Government launched The Aged Care Diversity Framework, which aims to ensure that all consumers of aged care can access information on, and receive,

[i] https://sydneynorthhealthnetwork.org.au/programs/frailty/

aged care services appropriate for their individual characteristics and life experiences [53]. The new Aged Care Quality Standards state that all aged care organisations are expected to provide non-discriminatory, inclusive care and services [54]. Specialised aged care services for diverse populations attempt to address inequities more fully than mainstream services, even when there are such policies for all services to be inclusive.

Ageing in place

Increasingly, there is an emphasis on 'ageing in place', that is, older people living safely and independently in their own home and/or community as they age [52, 55]. This may provide benefits in terms of maintaining a sense of connection, security and familiarity, as well as a sense of identity and autonomy [56]. Ageing in place is enabled by approaches that support people to remain living at home and that support informal caregivers as well as retirement communities that allow transition to higher levels of care within the same location.

Although the concept of ageing in place is not particularly innovative, some new models of care include an ageing-in-place element in their approach. Examples include the US Rural Caregiver Network Project [57] and the Bidyadanga dementia support pilot program [58, 59]. Another example is RandAid, a not-for-profit organisation in Johannesburg, South Africa, that provides retirement accommodation and long-term care to older people within a village-type setting, which has adopted the person-centred Eden Alternative philosophy [60].

Ageing in place can be driven by government policy, for example by promoting the development of dementia-friendly communities such as through the New Orange Plan in Japan [61].

Integrated care

Integrated care means health and social care being delivered together and sufficiently well-coordinated to ensure people are able to access the care and treatment they need, regardless of their situation.

In Australia, the health and aged care (social care) systems have limited integration, which can lead to problems for older people with chronic health conditions. For example, frail older people with mobility disabilities who live in residential aged care homes may find it difficult to access medical specialists. Similarly, transitions between settings funded by state and territory governments (hospital) to those funded by the Australian Government (residential aged care and general practice) carry the risk of miscommunication for older people with complex conditions.

A review of integrated care models for people with dementia distinguished between problems with integration of social and health sectors resulting from funding and policy and problems resulting from poor integration of the various sectors of health (acute and long-term, primary and secondary, general and specialist) [62]. For example, in Australia, many aspects of dementia care are integrated into the aged care service provision. This can mean that there may be less access to dementia assessment and health services in rural and remote

areas where there is limited access to Aged Care Assessment Teams (ACAT) for assessments and services [62, 63].

Fragmentation between the health and social systems is common across the world; thus, there are a number of integrated care models internationally [64]. A recent review of systematic reviews found that the most common key elements of integrated care approaches are multidisciplinary teams, comprehensive assessment and case management [65]. Some models for older people have been evaluated in controlled trials [66-68]; however, none of these trials have focused specifically on people with dementia.

Innovative models of residential aged care

Residential aged care or nursing homes typically provide 24-hour nursing care to people with physical and/or cognitive impairment, including a large proportion of people living with dementia [1, 69-71]. The World Health Organization advocates for the improvement of residential care conditions through developing care models that give residents a sense of autonomy within a more homelike environment [52].

People living with dementia themselves have reported that the features they would like in residential aged care are reablement and rehabilitation support and facilities, supports for independence, exercise and sport opportunities including areas for walking, lifestyle and diet (including palatable food), and flexible routines including for meal times [72]. Independent access to outdoor areas as well as to the community outside the home and natural environments are considered important. In terms of design people with dementia would like plenty of space both indoors and outdoors and personalised furnishings. They would also like connections to the general community, family and friends within the home including the opportunity for people to be able to stay overnight. Involvement in the processes in the home including having their input on provision of services taken seriously is also wanted.

To date, the evidence for the impact of alternative models of residential aged care on resident outcomes such as quality of life has been limited, but studies underway are starting to include such outcomes. For example, a large study of alternative models of residential aged care, examining the impact on quality of care, resident quality of life and care staff wellbeing, is currently ongoing in the Netherlands [73].

Small-scale domestic living models

A number of small-scale living models of residential aged care exist, where residents live in homes of, for example, up to 16 people [1, 17, 31, 69, 74, 75]. These models of care are provided as both dementia-specific and general aged care homes. Small-scale living models of care have many features in common, including a focus on a domestic, homelike, familiar or normalised environment, where medical equipment is hidden, staff do not wear uniforms, the residents have the opportunity to engage in domestic or regular duties, staff members are allocated to work in specific living units and there is a focus on maximising resident independence and quality of life. There is often emphasis on increased access to the outdoors

and engagement with nature. In Nova Scotia, Canada, provision of care in a 'household' small-scale model of care is a requirement for new and replacement government-funded homes [76].

A systematic review was conducted to compare the impact of small-scale living designs with that of traditional residential aged care on resident-centred outcomes. All studies were non-randomised and were generally of limited methodological quality, so confidence in the evidence is very low. However, there is some evidence for increased social engagement [77-79], inconsistent effects on function [78, 79], reduced physical restraint and psychotropic drug use [27, 77, 78], improvements in quality-of-care indicators [27] and reduced decline in caregiver relations [80].

Other potential benefits of these models of care (not systematically reviewed) include increased activity levels of residents with dementia, similar running costs and consumer preferences for these models of care [69, 70, 81, 82]. However, building costs are likely to be higher for this style of facility, due to larger requirements for space per resident [83, 84].

Larger, more traditional facilities can be retrofitted to some degree, to break the living units into smaller groups with small kitchens or kitchenettes and smaller shared living and dining areas [85]. A culture change approach can also be applied to embed a more person- and relationship-centred approach, if supported and driven by management [10]. There is limited evidence for whether this retrofitting produces the promising preliminary findings observed for small-scale domestic living units, and overall the evidence is uncertain. However, an Australian randomised controlled trial found that changes to facilities with environmental dementia-friendly design or incorporating a person-centred care approach had benefits on quality of life and agitation for people living with dementia [11, 12]. Improvements in quality-of-care interaction were seen when both person-centred care and design changes were incorporated. This finding is supported by small US and Spanish controlled before-after studies showing positive effects on behaviour and quality of life, respectively [86, 87].

Box 4 ***Green House project: example of small-scale, culture change model of residential care*** [21, 27, 31, 75, 79, 88-92]
The US Green House model is a small-scale living, culture change model. It strives to create an environment that is a true home and is respectful of the right of individual residents to exercise their autonomy with respect to the things that are important to them. This means that the residents themselves are actively consulted regarding their interests and preferences to help residents fulfil their choices. The environment includes free-standing homes for 7–10 residents, with private bedrooms and bathrooms, shared living areas and hidden medical infrastructure. The care staff, known as Shahbazim[ii], are empowered to prioritise tasks, while nurses oversee clinical care and 'guides' run the household operation. There is a different relationship between nurses and care workers, and the model requires complex human resources management and specific staff training.

Dementia villages

Dementia villages similarly offer small-scale living, but the houses are included in a village environment, with retail services that are staffed by carers to support people with dementia to engage in 'village life'. Examples include De Hogeweyk in the Netherlands [18, 93-95] and Bryghuset in Denmark [96, 97]. In the Netherlands, the large capital cost of De Hogeweyk was financed in the majority by the state. Care costs to residents are similar to standard models and additional funding is raised by charging fees for facility use and tours to external people or groups [95]. In Australia, an example of this model of care is currently under development in Tasmania [98, 99].

Community-based shared housing arrangements

Shared housing arrangements are similar to small-scale living, but homes are located in the community in refurbished apartment blocks [100] or in neighbourhood houses [101]. They emphasise connection to the neighbourhood, with care provided by care workers and family members, predominantly for people with dementia [100]. Shared housing arrangements are completely disconnected from traditional nursing homes and are served by at least one community care service. Typically, 6–10 people live together in apartments or houses with a communal kitchen, a living room and private bedrooms [100, 102]. They can be successfully established in both rural and urban areas, and this concept of care is well suited to the strong family ties of ethnic groups or people living with dementia. In Germany, shared housing arrangements are now included in laws enacted by states replacing the federal nursing home act and special grants to support their implementation are available [103].

Advanced dementia care models

Innovative approaches to providing care for people with advanced dementia include Namaste Care, which has a focus on providing a calm environment and loving touch, pain management and hydration [104-111], a national program of support and dementia specialist teams with

[ii] The Shahbazim provide personal care for residents but also housekeeping activities including cleaning, laundry and meal preparation as well as scheduling activities and staff

a care coordinator in Scotland [112] and Dementia Palliare, an international community of practice with online experiential learning to promote best practice [113, 114].

Intergenerational communities

In intergenerational communities, elderly residents live alongside members of the general public, with an emphasis on resident interaction with children, students and other members of the community. Prominent examples exist in the Netherlands [115, 116], Japan [117] and the US [118].

One version of intergenerational models involves university students living in aged care homes at reduced costs in return for volunteering their time to interact with the residents – this type has been implemented in Australia [119], the Netherlands [120, 121] and the US [122]. Another recently implemented Australian example is Kalyra Woodcroft Aged Care, co-located with a Montessori middle school from which students regularly engage in music, art, history and cooking classes with residents [123]. Similar examples of intergenerational retirement communities are outlined below under 'Innovative models of home/community care' (page 15).

Teaching nursing homes

The teaching nursing home (TNH) model is designed to establish partnerships between the aged care and education sectors to:

- provide education and training to the aged care workforce (students and existing staff)
- promote aged care research and development
- promote best-practice clinical care.

Much like teaching hospitals, some aged care providers operate as learning centres, providing placements for students across a range of professions. In this way, they prepare both the aged care and health workforces to provide care for our increasing numbers of old and very old people [124]. The TNH model is based on the rationale that aged care providers are more likely than hospitals to have highly developed knowledge of the needs of older people, particularly in relation to managing complex and chronic health conditions. In contrast, the hospital environment confines student experience to acute health conditions and limits the capacity for students to work with the same care recipients throughout the duration of a clinical placement.

The TNH model has been trialled in Australia, the Netherlands, Norway, Canada and the US, although it has only been implemented with ongoing government funding in Norway, in a 'hub and spokes' strategy.[iii] Thus, while it is not a new model (being evident from the 1960s in the US), it is not a core feature of aged care systems, mainly because governments are unlikely to fund it, other than by providing short-term funding. Those providers who do

[iii] Two TNH centres are funded in each province, one focused on home care and the other on residential aged care. An additional centre is funded with a specific focus on the Indigenous Sami people. These act as central hubs of learning and education supporting aged care providers within each province.

allocate resources for appropriately supported[iv] student and/or workforce education regard this as an investment rather than a cost because of the multiple benefits they have seen it generate and their belief in the model as a stimulant for best practice [125]. The model was developed to address poor quality of (residential aged) care through current and future workforce education and by building a research evidence base for care provision [124], citing multiple researchers in different countries.

A systematic review of nursing homes as nursing student learning environments found they promote workforce training and competencies and can generate positive attitudes to working in aged care among nursing students. Adequate staffing support was identified as a challenge [126]. However, there is limited evidence of the impact of the approach on resident outcomes.

As is occurring in Norway, there is the possibility of expanding the role of TNH hubs that partner with education providers and specialise in providing clinical and workforce education and research designed to inform care. These specialist centres have the ability to support local, regional or state networks of aged care providers, in the process sharing their knowledge and expertise and encouraging communities of practice dedicated to best-practice aged care [127, 128]. However, further evaluation of the impact of this approach on resident outcomes, particularly when implemented locally, is required.

Box 5 ***Teaching nursing homes in Australia: Teaching and Research Aged Care Services*** [125, 127]
The Teaching and Research Aged Care Services program is the first teaching nursing home model established in Australia and was funded by the Australian Government from 2012 until 2015. The program sites were defined as 'aged care services that combine teaching, research, clinical care and service delivery in one location to operate as a learning environment to support clinical placements and professional development activities in various disciplines'. Funding was allocated across 16 different TRACS partnerships between aged care organisations and teaching institutions around Australia. Vocational education and training sector providers, which in Australia educate the majority of the direct care workforce in aged care, were included in 2 of the 16 partnerships. The national evaluation found that key factors contributing to the success of the model include established partnerships, effective leadership and coordination, establishment of learning infrastructure (i.e. technology and learning spaces) within aged care services, training aged care staff to be designated mentors, and providing a structured program of learning across the spectrum of aged care services. The program demonstrated the value of providing ongoing education to the existing aged care workforce to further build their skills and understanding of care for older people, as well as prepare the future aged care workforce (students on placement) for working effectively with older people.

[iv] This will include supporting supervision and mentoring (and therefore backfill for staff providing this) and dedicated education infrastructure that includes computers, access to internet, spaces for tutorials etc.

Table 1 Innovative models of residential care

Residential aged care models	Key features	Examples
Small-scale living	Relationship- and person-centred approach to care. Emphasis on creating homelike living spaces, typically with 6–16 residents per house, where resident autonomy and independence is promoted and fostered. Can be dementia-specific or general aged care. Often involves 'culture change' and empowerment of care workers, with increased responsibilities for providing holistic care.	Eden Alternative (US) [28, 31, 32, 69, 75] Green House (US) [21, 27, 31, 75, 79, 88-92] Clustered domestic (Australia) [1, 70, 83, 129] The Butterfly Household (UK, Canada, Ireland, Australia, US)[v] [130-133] Green Care Farms (the Netherlands) [134-139] Evermore (UK) [74, 140] Martha Flora (the Netherlands, UK) [141-143]
Community-based shared housing arrangements	Apartment-style or single-family home, small-scale living, with 6–8 residents per home, often in an urban setting. Emphasis on connection to neighbourhood and resident autonomy. Care provided by care workers and family members. Can be dementia-specific or general aged care.	Group Homes Australia (Australia) [85, 144] Shared Housing Arrangements (Germany) [100, 102] Charles House Eldercare Homes (US) [101, 145] Group Living (Malmo) (Sweden, the Netherlands) [146-148]
Dementia villages	Community living for people with dementia, where 24-hour nursing care is provided, with 6–7 residents per house, plus communal shops and gardens. Safe environment where residents can participate in everyday activities within a village setting, with services operated by trained staff.	De Hogeweyk (the Netherlands) [18, 93-95] Bryghuset (Denmark) [96, 97] Korongee (Australia) [98, 99]
Additional complex supports for advanced dementia care	**Multisensory program:** Care for people with advanced dementia and end-of-life care. Creating a calm environment and unhurried loving approach to activity and interaction, pain management and hydration.	Namaste Care [104-111]
	Care coordination: Model of support, case coordinator and advanced dementia specialist team to help people with dementia live in comfort and with choice.	Scottish Advanced dementia practice model [149, 150]
	Community of practice: International sharing of experiential learning and education of practitioners using virtual platform to allow a reiterative approach to best practice for advanced dementia care.	Palliare [113, 114]

[v] The Butterfly Household Model is a culture change model which is often applied in small-scale living but can also be applied in traditional nursing homes.

Residential aged care models	Key features	Examples
Intergenerational communities	Elderly residents needing care reside alongside members of the general public. Emphasis on resident interaction with children, students and/or other members of the community. Can be dementia-specific or general aged care.	Humanitas (the Netherlands) [115, 116] Gojikara Village (Japan) [117] The Mount neighborhood (US) [118] Cooinda Aged Care Centre (Australia) [119] Humanitas Deventer's (the Netherlands) [120, 121] Judson Manor (US) [122] Kalyra Woodcroft Aged Care (Australia) [123]
Teaching nursing homes	Residential aged care homes designed to establish partnerships between the aged care and education sectors, provide education and training to the aged care workforce, promote aged care research and development and best-practice clinical care.	Teaching and Research Aged Care Services (Australia) [125, 127] Robert Wood Johnson Foundation (1980s) [124] The Ontario Centers for Learning Research and Evaluation (Canada) [124] Norwegian Program [128] Physician focused approach (the Netherlands) [151]

Innovative models of home/community care

Home/community care refers to care of people within their own home, in their own community, to assist with their activities of daily living. In these models, the amount and type of care people receive varies according to how much support they need to carry on with their activities of daily living. Low-level supports might include occasional help with shopping, attending appointments, cleaning and home maintenance while high-level supports might include nursing and daily help with things like getting into/out of bed, washing, dressing, walking and eating — the types of needs that may lead to a person being in residential aged care. That help may be delivered by informal caregivers (usually family members and friends), paid personal carers, nurses or a combination of these.

Novel respite approaches

Respite is defined as a short interval of rest from the routine of caregiving, predominantly to support the health and wellbeing of the carer, but ultimately also the person receiving care. Respite can be provided in-home or out-of-home, varying in duration, timing and activities. Innovative models of respite care were found in a range of settings, including universities, farms and in the community. An analysis of Australian observational data has shown that respite use is associated with fewer days in residential aged care [152].

University-based respite services provide educational opportunities and experiences in gerontology and aged care for students, as well as respite for caregivers and recipients. These programs can be either on campus or in-home and are found in the US and Canada. Individual programs have shown improved outcomes for caregivers and positive reports from students; however, there is a paucity of robust evidence on outcomes.

Farm-based respite models, found in Europe and the US, provide access to outdoor environments and meaningful activity (see Box 6).

Community-based respite includes programs that use existing community services, centres and resources in innovative ways (e.g. hotels, unused public housing, civic centres and nursing homes). These have been identified in Chile, North America, Australia, New Zealand, Japan and various countries in Europe. Other models include providing respite care in dedicated homelike or cottage facilities (Australia) and by placement in other people's homes (Europe).

Box 6 ***Green Care Farms: an example of innovative respite care*** [153]
An innovative respite care model is Green Care Farms, originating in the Netherlands and further tested in the US, Italy, UK, Norway and Belgium. Farm-based day care services, of which Green Care Farms is an example, combine agricultural activities with care services, using farm resources to promote health and give a sense of purpose by involving older people in meaningful activities. Critically, this model matches the preferences and capacities of people requiring day care services (including people living with dementia) with activities to enhance social participation (i.e. social and/or civic engagement and community involvement). This model of care requires dedicated houses that are designed in a homelike manner but with the advantage of providing access to outdoor environments and greater exposure to sensory and meaningful experiences. It is of particular value to people who have resided or worked in a farm environment, which is of potential relevance in the Australian rural/regional context.

Innovative support worker models

The role of the support worker is far-reaching, but generally encompasses some form of care coordination, case management and system navigation components. The aged care system is renowned for being fragmented and difficult to navigate, with the support worker role designed to facilitate a streamlined, integrated approach to care. Targeted interventions should be at the macro (system), meso (organisation) and micro (individual) level. Innovative support worker models were identified in Europe, New Zealand, the US and Australia.

A key example is CAPABLE, which has been recently granted Medicaid funding in parts of the US. In Scotland, the National Dementia Strategy includes support workers as a key component of a three-pronged approach that includes a minimum of one year post-diagnostic support for people with dementia (5-pillars model), support for those with moderate to severe dementia (8-pillars model) and an advanced dementia practice model (see Table 1). While there is no current explicit funding for support worker roles in the Australian aged care sector, there is potential within the consumer-directed care environment of Commonwealth Home Support Programme and Home Care Packages to access funds to this end.

Box 7 ***CAPABLE: innovative collaborative care*** [154, 155]
Community Aging in Place, Advancing Better Living for Elders (CAPABLE) is an example from the US of collaborative, multi-sectoral care. CAPABLE uses occupational therapists, registered nurses and handymen to achieve the functional goals of older people requiring assistance at home. The model of care is underpinned by a theoretical framework of resilience and person-environment fit. It posits that intervening on various domains of resilience, such as the physical capacity of an individual and their built environment, will have more lasting effects on individual resilience to stress, and be a better fit between a person and their environment, which should result in improved functioning. By addressing both internal and external environmental factors, stress should decrease, and strength should increase, to better support individuals to age well at home. Evaluation has shown improved function in activities of daily living, reduced falls rates, fewer hospitalisations and higher satisfaction with care. Medicaid funding has recently been granted in the US to implement the program in 27 sites across 14 states.

Dyadic caregiver interventions for people with dementia

Carers have been described as one of the key therapeutic agents in dementia care. They are able to provide hands on care and supervision and influence the person's environment (home environment, communication environment, activity engagement and routine). There is good evidence supporting general carer education and support programs [156, 157], and these are already available via the National Dementia Helpline and Dementia Australia fact sheets, resources and education groups.

Systematic reviews have found that dyadic interventions (i.e. interventions targeted at both the person living with dementia and their carer and their interaction) may be more advantageous than programs that focus purely on educating and supporting the carer (without optimising the capabilities of the person with dementia and problem solving specific care challenges) [157, 158]. An overview has shown that dyadic interventions are likely to be at least as effective at delaying functional decline as acetylcholinesterase inhibitors, which are listed on the Pharmaceutical Benefit Scheme [158]. A recent Australian Productivity Commission report stated that different carer support interventions were too diverse to allow pooling of results with meta-analysis and no identified systematic review examined the outcome of admission to institutional care for these programs specifically. This review therefore summarises evidence available for this outcome for each example of this model individually in Appendix 3.

Dyadic interventions differ from caregiver-focused interventions in that they consider care challenges and the strengths and abilities of both the person with dementia and their carer, working together on tailored, individualised solutions. Many dyadic interventions use adult learning principles and involve role play and modelling to build carer skills. Such programs are highly regarded by carers as they are personalised, usually delivered in the home environment and aim to build on the strengths of the person with dementia to remain independent (a reablement approach). However, the service delivery model is also the key challenge in implementation; home-based, individualised programs are more resource intensive and involve additional training of the workforce. Nevertheless, economic analyses of these programs suggest that investment in such programs can reduce health and aged care costs and may delay institutionalisation [159-162]. These programs can only be provided when an informal carer is involved so lack applicability for people who live alone.

A number of dyadic intervention approaches exist, and most were designed for use with people with mild to moderate symptoms of dementia. Most interventions have been tested in randomised controlled trials and some of the intervention programs have been trialled in the Australian population with success (i.e. Care of Persons with Dementia in their Environments, Going Away to Stay at Home) [163, 164]. The REACH program has also been implemented in US indigenous populations [165, 166]. In Australia, implementation is hindered by the constraints of reimbursement. These programs often require multiple allied

health consultations, but current reimbursement options through Medicare (via a GP Chronic Disease Management Plan) limit reimbursement at six items.

There is now a solid body of evidence (multiple high-quality randomised trials) established for dyadic interventions. This level of evidence does not exist yet for many other emerging and innovative models of care. The evidence statements below are formed based on existing published systematic review and meta-analyses:

- Dyadic interventions can reduce depressive symptoms in carers of people with dementia (moderate evidence).
- Dyadic interventions can delay functional decline in people with dementia (moderate evidence) [vi].

Delaying functional decline (through maximising independence in activities of daily living) is likely to delay admission to residential care.

Other recent community models of care

A number of other innovative community models of care were identified, including age-friendly communities and neighbourhood-based teams. World Health Organization initiatives encourage whole-of-community guidance, with numerous other models moving away from a deficits model to harness individual and community assets to improve lives. These models have a focus on community collaborations to provide support and promote ageing in place. For example, senior-friendly communities coordinate volunteer and formal supports, with older people active contributors. Villages models are community cooperatives funded through members' annual subscriptions, which use paid coordinators and community volunteers to provide supports. Other senior-friendly communities include intergenerational models that actively house or co-locate older people amongst younger generations.

[vi] Additional trials have been published since the 2016 Laver et al overview 158. Laver K, Dyer S, Whitehead C, Clemson L and Crotty M, *Interventions to delay functional decline in people with dementia: a systematic review of systematic reviews.* BMJ Open, 2016. **6**(4): p. e010767.

Box 8 ***Compassionate communities: an innovative, holistic, community care model*** [167] Compassionate communities provide an excellent example of a holistic, alternative, community care model. Compassionate communities leverage community assets to improve health outcomes for older people at high risk of unplanned admission to hospital. Given that wellbeing is more than just physical health, the model is premised on linking people to their communities, rather than solely relying on care planning within primary health care practices. The model uses person-centred care planning principles, with referral to social prescribing schemes (i.e. local, non-clinical services that build/maintain connections through activities and networks) and leverage existing services. Older people may seek out these services in the community (if they so desire and are able), but accessibility is also enhanced by bringing the networks to people at home who are physically or financially more limited. Fundamentally, the model uses volunteers as community connectors (training required), with trusting relationships being critical to success. Evaluation conducted in the Frome region in the UK showed a significant decrease in unplanned hospital admission across a 4-year period.

In low- to middle-income countries, informal care (that provided by relatives, partners and neighbours) is the dominant form of long-term care available [168, 169]. Many of these countries report innovative practices to support caregivers, although evaluations of implementation are scarce. For example, the World Health Organization's iSupport platform has been established to deliver training for caregivers for people living with dementia in any country and rural or remote populations and attempts to use technology to provide access to support for families [170].

Box 9 ***Elderly helping the elderly: Volunteer programs in Vietnam*** [171] Three community-based social innovations operate across various Vietnamese provinces. The first comprises elderly public health volunteers who are trained to visit households to check on the health of older people and provide advice about health promotion. A second program, using volunteer retired health workers, draws on the skills of retired doctors and nurses predominantly to provide primary health care services in their local area. These programs draw on the energy and skills of the volunteers to contribute information and education at a grassroots level and link with other workers and volunteers. Finally, elderly home care volunteers provide home care and assistance with daily living, aiming to improve equity and inclusiveness in care. In addition to improving the lives of older people in Vietnam, these programs seek to benefit the people volunteering, through them remaining active and improving their own health, wellbeing and knowledge. Further, volunteers receive benefits such as regular health check-ups, reduced treatment costs and health insurance. Challenges with this model are the various funding structures, with funding currently provided through international donors and the Vietnamese government. Coordinated volunteer programs of this type also address loneliness and connection.

Table 2 Innovative models of community care

Model type	Key features	Examples
Innovative models of respite	**Community engaged scholarship:** University students participate in structured sessions with older people as part of placement.	Community-college partnership [172] Houseguest Program [173] TimeOut@UCLA [174]
	Social and/or community integration: Collaborations developed with existing community services and centres, drawing on existing resources to supplement programs.	Meeting Centers Support Program [175, 176] Kintun [177, 178] Respitality [179, 180] Montessori [181, 182] DAYS BLG! [183-185] CASCADE [186]
	Social and care farming: Services that have been adapted from a farm setting, using farm resources to promote health. Use of commercial farms and agriculture to promote physical and mental health, by partaking in normal farming activities. Supervised, structured program of farming-related activities.	Green Care Farms [153] (see Box 6) Farm-based day care [187]
	Cottage & home like respite: Provision of overnight (or day) respite care in a dedicated cottage home (purpose built or family home conversion).	Enabling Household/Eden Alternative [188-190] HammondCare [191, 192]
	Adult placement: An adult who needs support/accommodation is supported in the home of others.	Shared Lives [193-195] Foster Care [196] Foster Families [171]
	Day centre: respite programs for day placement co-located in a residential care home.	ElderServe at Night [197, 198]
Innovative support worker models	**Integrated care:** Management and delivery of services to ensure a continuum of care, according to needs over time and across different levels of the system.	Te Whiringa Ora Programme [199, 200] The Norrtalje Model [200, 201] The Salford Integrated Care Programme [202] My Care, My Way [203, 204]
	Care coordination: Using care coordinators or care managers to facilitate a streamlined approach to care.	Caring for Older Adults and Caregivers at Home (COACH) [19] Support and Services at Home (SASH) [205, 206] Gerontology Nurse Specialist [207, 208] Scottish 8-pillars model [149, 150]
	Case management: A collaborative process of assessment, planning, facilitation and advocacy for care and service options to meet holistic individual needs.	Admiral Nurses [209, 210] Home Independence Program Coordinator [211]
	Collaborative care: Working in collaboration with disciplines/other services outside of usual scope of practice.	CAPABLE [154, 155](see Box 7)

Model type	Key features	Examples
	Coordinator and navigator: Relationship-centred care with enablement approach. Holistic and accessible. The role involves referral, linkage to, and navigation of, services; education and information provision; emotional and practical support; and advocacy.	Aged Care Navigator [212] Dementia-Person Aligned Care Team (D-PACT) [213] Scottish 5-pillars model [214]
	Workforce optimisation: Utilising and upskilling non-clinical or less qualified staff for roles that extend their usual scope of practice.	Maximizing Independence at Home (MIND/MIND-S) [215, 216] Patient Care Connect [217] Comprehensive Care Coordinators [218] Enhancing support workers [218, 219]
Dyadic caregiver interventions for people with dementia	**Personalised interventions for people with dementia and their caregiver.** Tailored intervention based on capabilities of the person with dementia (reablement focus; strengths-based approach) while also addressing concerns of carers via problem solving and skill building.	Care of Persons with Dementia in their Environments [163, 220] "Going Away to Stay at Home" [164, 221, 222] Resources for Enhancing Alzheimer's Caregivers Health [162, 165, 166, 223, 224] COACH [19] Community occupational therapy for older patients with dementia and their care givers (COTiD) [160, 225] DAISY [226]
Other community-based approaches	**Age-friendly cities and communities:** Communities that enable people of all ages to actively participate in community activities. Everyone is treated with respect, regardless of their age. Communities that make it easy for older people to stay connected to people that are important to them, help them stay healthy and active, and provide appropriate support to those who can no longer look after themselves.	Age-Friendly Communities [227]
	Senior-friendly community living: Arrangements allowing individuals to age in place whilst remaining integrated within the community, supported by appropriate services or individuals.	Intergenerational and Senior co-housing [228-231] Integrated Community Living [232, 233] Naturally Occurring Retirement Community [234] Villages [235] Care-Cooperative Village Hoogeloon [236] City Village South [237]

Model type	Key features	Examples
	Asset-based community development: Emphasises people's and communities' assets, together with their needs. Taps into the wealth of resources, capabilities and networks that are inherent in communities. Connects people with supports that are more appropriately provided by the voluntary, community and social enterprise sectors.	Community circles [238] Community enterprise development [239-244] Social prescribing [245, 246] Frome compassionate communities [167] (see Box 8) Cares Family [247, 248] Community catalysts [249] Volunteer driven programs [171, 250, 251] (See Box 9)
	Autonomous team working: Geographically or 'neighbourhood' based working; small, autonomous or self-managed teams.	Buurtzoog [252, 253] Wellbeing teams [253-255]

Innovative models for diverse populations

In Australia, as in many countries, there is an understanding that supports may be required for a diverse range of groups within the community who have particular cultural or other needs that are difficult for mainstream care services to adequately meet. Supports for these diverse groups typically aim to better tailor or coordinate mainstream services, increase awareness/understanding of these groups' requirements or provide a targeted increase to the services available to a particular group of people.

Rural and remote living

Many challenges associated with the resourcing and delivery of aged care services arise within geographically large and diverse countries [256]. People who are geographically isolated often have limited access to services because of the relatively high cost of providing these services and long travel times to access formal services. Older Australians are less likely than the general population to live in major cities [257]. As of June 2011, 23% of Australians aged over 70 years were living in inner regional areas, with 10% in outer regional areas, 1% in remote areas and 0.3% in very remote areas [258].

Aged care providers in rural and remote areas face challenges from higher cost pressures and geographical isolation, affecting staff retention, travel costs and access to allied health and technology [256, 259, 260]. Approximately one-quarter of aged care homes are located in inner regional areas, while remote and very remote areas have only 2% of all homes [258]. Residential aged care homes in rural and remote areas are also generally smaller in size; no homes in very remote areas have more than 60 places [258]. A viability supplement is available for small, rural providers of residential aged care to subsidise the higher costs involved [261]. Rural and remote aged care services are mostly provided by community-based organisations or by state or local government providers, differing from the general profile of services across Australia [262] and suggesting that for-profit providers do not see commercial value in delivering services in these areas [259]. The Australian Government and state/territory governments jointly run the Multi-Purpose Services Program to address equity of access to aged care services for people from rural and remote areas. The program provides more than 3,000 flexible places per year delivered as residential or home care, and the number has been gradually increasing [259].

The use of both home care and residential aged care services is much lower in rural and remote areas [259]. Older people in these areas are more likely to use home care services than residential care, due to factors including a lack of places, longer wait times and more informal support [259]. More effective professional assessment processes are needed in rural Australia, a finding supported strongly by rural healthcare practitioners [256].

Innovative approaches to providing care to older people living in rural and remote areas overseas include, for example, programs that provide care coordinators to deliver or coordinate supports in China and Canada. Other programs, such as the Dementia RED

(Respect Empathy Dignity) community in the UK, aim to mobilise the local community to build a supportive environment for people living with dementia in the community, or engage university students in structured sessions with older people as part of their placement (US).

In Australia, outreach programs provide support and services to people with dementia and their carers living in areas with limited service provision, though these are not widespread. One example is a multidisciplinary, community-based dementia outreach service which includes case management, home visits, assistance with changed behaviours, carer support programs and health service consults [263]. Another is a multicomponent mobile respite service providing respite in addition to relationship support and support for the caregiver including a focus on reablement [264]. Telehealth approaches can also support older people living remotely; these are discussed below, under 'Communications and connection technologies' (page 38). A dyadic in-stay program for people with dementia and their caregivers (the Going Away to Stay at Home program as described under 'Dyadic caregiver interventions for people with dementia', page 17) has also been run out of serviced apartments in a rural location.

Aboriginal and Torres Strait Islander populations

In Australia, Aboriginal and Torres Strait Islander people are eligible to access aged care services from the age of 50, due to having a life expectancy approximately 10 years less than that of the general population [265] and higher rates of disease. In particular, rates of dementia in the Aboriginal and Torres Strait Islander population are 3–5 times higher than that of the general population [266-268].

The multiple challenges faced by Aboriginal and Torres Strait Islander people in accessing aged care include remoteness, economic disadvantage and the lack of culturally appropriate services [269]. They are less likely to access aged care than their non-Indigenous counterparts in both the general population and in CALD communities [261, 270] due to such challenges. Older Aboriginal and Torres Strait Islander people also receive assessment for aged care services at less than half the rate of the broader population of older Australians [269]. The Australian Association of Gerontology Aboriginal and Torres Strait Islander Ageing Advisory Group has recommended improved access to culturally appropriate aged care assessments, preferably conducted by Aboriginal assessors, and more trained Aboriginal and Torres Strait Islander aged care assessors across Australia [269].

The limited or non-existent number of Aboriginal-specific residential aged care services within communities, particularly rural and remote communities, severely restricts options for older Aboriginal and Torres Strait Islander people and their carers. In most cases, people need to travel long distances to access services in regional or urban areas, requiring extended stays separated from family and community. In these situations, they have to access mainstream services which may not be aware of, or know how to provide, the type of care they require,

even though cultural competency courses are available.[vii] Aboriginal and Torres Strait Islander people generally want to be cared for in their communities where they can be close to family and where they can die on their land [271].

Key examples of innovative approaches to aged care tailored for Australia's Aboriginal and Torres Strait Islander people include the following:

- Tjilpi Pampaku Ngura Aged Care Facility — This is the only residential aged care facility in the Anangu Pitjantjatjara Yankunytjatjara (APY) Lands, located in the Pukatja (Ernabella) community, in northern South Australia, approximately 450 km from Alice Springs. The program is operated by an Aboriginal Community Controlled Health Organisation, within the Nganampa Health Council, rather than an aged care provider. It provides culturally appropriate respite and permanent care to the local community and other older Anangu people from APY communities [272].
- Bidyadanga Dementia Support Pilot — This started in 2016 as a result of a partnership between Alzheimer's Western Australia, Bidyadanga Community Council and Kimberley Aged Care Services. It provides person-centred care tailored to the specific cultural needs of older people living with dementia so they can stay in their community. Educating communities through presentations and workshops to increase dementia literacy is a key feature of the program. An innovation in delivering care from the program includes the creation of a personalised box for each resident filled with special objects, music and stories of the person's choosing. Residents can take this box with them should they need to leave their community to go to hospital or residential aged care, to help make them feel more comfortable in unfamiliar surroundings [58, 59].
- Lungurra Ngoora Pilot — This is a culturally appropriate model of community care developed for frail older people, extended to others with physical disabilities and mental health problems, developed in consultation with older people, their families and carers, as well as community members and stakeholders. The model was implemented and evaluated in Western Australia over a period of 12 months. This locally designed, collaborative community service model led to a significant increase in services available as well as community knowledge about health service delivery. After one year, the program was ceased due to limited-term funding [273].

[vii] The Centre for Cultural Competence Australia is one example of a national organisation providing online accredited courses in Aboriginal and Torres Strait Islander cultural competence. It has developed its courses in collaboration with Aboriginal and non-Aboriginal academics and professionals with extensive experience working with Aboriginal and Torres Strait Islander peoples. The course was designed to achieve specific learning outcomes that focus on service delivery and program outcomes, improve workplace culture and increase confidence.

New models of aged care service delivery for Aboriginal and Torres Strait Islanders are currently being investigated in two Australian projects:

- Culturally Safe Workforce Models for Rural and Remote Indigenous Organisations — This project is being conducted by the South Australian Health and Medical Research Institute to identify how organisations can deliver culturally safe aged care services. Six principles of cultural safety in aged care were identified through interviews with 63 older Aboriginal people in three South Australian rural and remote locations. The principles were developed into a training program for aged care organisations that is currently being run as a pilot program [274].
- Realising the potential of remote art centres to support older Aboriginal people and people living with dementia within the context of consumer-directed care — This project is being conducted by the National Ageing Research Institute, Flinders University, University of Western Australia, the Ngaanyatjarra Pitjantjatjara Yankunytjatjara Women's Council, Mangaka Arts, Ikuntji Artists and Kimberley Aged and Community Services. It aims to determine how art centres are providing support to older people by investigating the level of collaboration with local aged care providers and the potential to formalise aged care support within the policy context of consumer-directed care [275]. To date, the project has identified that many Aboriginal art centres are already working closely with their local aged care providers. The project examines the strengths of these collaborations to inform the co-design of services that maximise existing capabilities in communities.

An overseas example of these types of initiatives is the Resources for Enhancing Alzheimer's Caregivers Health (REACH) program, which is a dyadic caregiver behavioural intervention that has been applied in American Indian and Alaska Native Communities [165, 166] (see 'Dyadic caregiver interventions for people with dementia', page 17). The implementation focus of the program has been on the fit and utility in tribal communities and requirements for adaptation and spread. This model has not been trialled in Australian Aboriginal and Torres Strait Islander populations.

Culturally and linguistically diverse populations

Older Australians from CALD backgrounds are less likely to use aged care support and services than non-CALD groups, due to lack of awareness and knowledge of available services, system complexity, language barriers, and lack of culturally and linguistically appropriate aged care providers [53, 276, 277]. People from these communities generally prefer home care services, for safety as well as cultural reasons, and rely more heavily on family members for support, indicating a need for more support and resources for family carers [53, 278, 279]. For those older CALD Australians who do consider residential care, a clear preference from most family carers is to use ethno-specific or multicultural services rather than mainstream services [277, 280].

Ethno-specific aged care (also known as culturally congruent care) refers to aged care catering for a specific racial, cultural or language group. Many of these services in Australia have arisen from government funding in the late 1980s for the provision of ethno-specific residential care places [281]. Most ethno-specific providers have many of the same features as 'multicultural' residential aged care providers, with the addition that architecture, furnishings, communication, activities and food are designed for a specific culture [277, 282]. Examples of Australian ethno-specific residential aged care services include Scalabrini in Sydney which caters to the Italian community and delivers aged and dementia-specific care [283], Parque Habitacional for older Spanish speakers in Sydney [284, 285], Martin Luther King Homes for German speakers in Melbourne [286] and a new Indian aged care home under development in Melbourne [287].

Many ethno-specific providers have transformed into multicultural providers. Multicultural or culturally diverse care services are residential aged care homes or home/community care services that specialise in providing care for older people from CALD backgrounds. They have cross-culturally trained staff and provide appropriate food, staff, pastoral care, bilingual support and activities, and may prioritise access to CALD groups [277, 282]. Multicultural services often have bilingual/bicultural staff who act as a bridge between CALD communities and mainstream services [280]. Australian examples of this approach include MiCare [288], Umbrella Multicultural Community Care Services [289], Multicultural Care [290], and Australian Multicultural Community Services [291].

Shared housing arrangements (as described under 'Innovative models of residential aged care' on page 8) can be well adapted to the strong family ties of ethnic groups [100]. This approach to residential care generally involves providing care in large apartments or houses in mostly urban settings, in small group homes, with the main aims of providing family structure, connection to neighbourhood and attainment of autonomy [100, 102].

Culturally specific education and awareness programs are a key way to help older people, their carers and family members access existing services rather than create parallel services. In Australia, the Department of Health funds the Partners in Culturally Appropriate Care program, which includes delivery of information (by organisations in each state) to older people and their families via face-to-face information sessions and a national website hosting documents and links to multicultural resources [292, 293]. A greater level of health professional support is offered by programs such as the Specialist Dementia Nurse model, developed by researchers from the Royal District Nursing Service in Melbourne, that provides tailored education and system navigation assistance for people with dementia and their carers [294]. Information resources provided through such programs include, for example, practical advice on preparing a safer home environment for growing older [295] and support for carers who are themselves from CALD backgrounds [296].

Another important approach is training so that aged care workers and providers understand and deliver culturally appropriate care to older CALD populations. The Partners in Culturally

Appropriate Care program, for example, supports CALD-specific dementia behaviour management training and capacity-building activities for staff in home and residential aged care [292, 293]. One organisation funded by the program is the Centre for Cultural Diversity in Ageing, which has developed a framework, outlined online via videos and documents, to assist aged care providers to meet inclusive service standards, for which an accreditation tool is also being developed [297]. Some other examples in Australia are the St Vincent's Hospital Cultural Diversity Training Program, which is a series of workshops to develop the cultural knowledge, skills and competence of its staff [298, 299]; the Diversity Conceptual Model of the Royal District Nursing Service, which is an approach to building cultural understanding and resolving problems, including a visual tool [300]; and Dementia Australia's digital application called Cultura, which contains information for 21 different cultures on topics such as religion, communication style, food and diet that can be used in discussion with the care recipient and their families [301, 302]. An example from the US is Penn Asian Senior Services, an organisation that trains bilingual Asian immigrants to become certified nursing and home health aides, who then provide culturally tailored home care services to the client (e.g. cooking traditional meals) with knowledge of the cultural norms of older Asian Americans [303].

Younger People in Residential Aged Care

In Australia, as of 30 June 2018, 6045 people aged under 65 were living in residential aged care [304]. This included people with intellectual and learning, physical, psychosocial or sensory disabilities, younger onset dementia and premature ageing associated with life experiences. These people typically entered the aged care system due to the lack of availability of more appropriate care services.

In 2006, the Australian Government and state and territory governments jointly established and funded a five-year Younger People in Residential Aged Care program (YPIRAC) to reduce the number of younger people with disabilities living in residential aged care, with the initial priority being people aged less than 50 years. The initiative provided young people with support to live in alternative accommodation (either purpose built or modified private residences) and prevent them entering residential aged care [305] before this support became available through the National Disability Insurance Scheme. Most Victorian participants who exited residential aged care entered shared housing with supporting services (i.e. residents live within their own room in a shared house with shared support services). A program evaluation indicated that the move to shared housing with supporting services led to recipients participating in more life roles [306, 307]. However, these housing and support options were not suitable for everyone, and there could be difficulty in attracting and retaining quality skilled staff [306]. Although this type of housing is currently not widely available for young people with complex needs, there are currently more than 400 shared housing facilities under development Australia-wide [308].

There are a number of alternatives to the shared housing with supporting services model:

- Integrated or co-located housing — This is individual units built within new mainstream apartment developments, allowing residents with a disability the same tenancy rights as others in the community [309]. The units are customised to individual needs, residents are provided with personal support services, and smart technology enhances accessibility, usability and communication.
- Individual units with shared supporting services [310, 311] — An example of this is Fern River, where residents each occupy their own smart-home technology unit while sharing high-level support services. Unlike the integrated housing model, all units in the complex are occupied by young people with a disability.
- Rapid Interim Housing — This new initiative involves relocatable self-contained units, with provisions of a hoist and other assistive technology. The units may be co-located on shared blocks of land, located close to disability or health supports and with onsite support delivered by a National Disability Insurance Scheme provider. Alternatively, the units can be placed on an individual's own property, when sufficient space and family support is available [312].
- Combined aged and disability services for families — This model has accommodation in adjoining individual units for younger adults with intellectual disabilities and their parent carers. This type of service is offered by, for example, the Leonard Florence Center for Living in Chelsea (US). It provides support for younger people living with amyotrophic lateral sclerosis and multiple sclerosis and is the first centre providing support for younger people in the US to adopt the Green House approach (see 'Small-scale domestic living models', page 8) in a multi-storey urban home [313, 314].

Lesbian, gay, bisexual, trans and/or intersex populations

It is estimated that 11% of the Australian population identify as LGBTI and it is likely that this is also reflected in older populations [315]. Throughout their lives, LGBTI elders are likely to have experienced stigma and discrimination. This may negatively impact their likelihood to disclose their identities to aged care services, resulting in isolation, invisibility and unmet needs and thereby reducing the applicability of person-centred care approaches [315]. Consequently, aged care services are often not tailored to the specific requirements of LGBTI people and LGBTI elders are less likely to use mainstream aged care services due to a fear of being misunderstood or mistreated [315].

Internationally, services that support older LGBTI people include befriending services, where LGBTI elders are linked with volunteers who provide companionship and friendship, to reduce isolation and improve quality of social life. Examples include the SAGE Friendly Visitor Program in New York City, 'Out and About' in Victoria and the Mobile Care Unit in Berlin [316-318]. In-home LGBTI-friendly aged care services provide standard aged care services; however, the service providers are sensitive to, and considerate of, LGBTI issues [319, 320]. Examples include Daughterly Care in Sydney and SAGE Services & Advocacy for LGBT Elders in the US [320, 321].

In the Netherlands, Germany and Australia, initiatives aimed at educating staff and accrediting services as LGBTI-friendly have been implemented, such as the Pink Passkey, Regenbogenschlüssel and the Rainbow Tick, respectively [322, 323]. This accreditation indicates that the service providers are knowledgable about issues facing older LGBTI people and embrace their diversity. Recommendations to develop inclusive care homes for older LGBTI people in the UK and Australia are emerging, which include staff training on social inclusion of LGBTI elders [315, 322, 324-326]. To increase the implementation of inclusive services in Australia, a national roll-out of sensitivity training for aged care staff delivered by the National LGBTI Health Alliance has been requested [327].

Retirement villages for LGBTI elders exist internationally and are becoming increasingly available, particularly in the US [328-331]. However, the number of residential aged care centres providing high-level support that specialise in LGBTI awareness appears to be limited. Models identified in this review include the following:

- Affirmative assisted living services, which generally includes LGBTI-specific services (e.g. HIV counselling) located with LGBTI-friendly communities where elders can interact and feel accepted [332-334] — Lebensoft Viefalt in Germany is an example of affirmative assisted multigenerational living where LGBTI values are openly accepted and included within the service provision [237, 238]. The Plejecentret Slottet Centre in Denmark also provides affirmative assisted care, though it does not involve multigenerational living [335]. A similar model is under development in Lifeview Prahran in Victoria, Australia.

- Naturally occurring retirement community, an example of which is operated by SAGE in Harlem — This model allows LGBTI older adults to age in place by surrounding the community with LGBTI-relevant services, allowing them to receive the services they require and desire without having to travel out of their community or re-locate [336].

- A multiagency collaboration model was used in San Diego County for a program called Aging as Ourselves. This provided a network of services for LGBTI elders, and educational components of the model increased community awareness of issues faced by LGBTI elders [337]. Due to funding difficulties, the program was terminated in 2009; however, many of the program's direct services to LGBTI seniors were still offered by participating organisations after this time [337].

Homeless people

According to the Australian institute of Health and Welfare, in 2016 one in six (16%) of all homeless people were aged 55 or over, which is around 18,600 people [338]. Mainstream aged care, however, is not adequately resourced to manage homeless older people who have other complex needs, including a high prevalence of mental illness and substance abuse [339]. Comorbidities related to environmental factors and substance abuse are evident in older

homeless people, including chronic medical conditions (e.g. diabetes, HIV infection), constant upper respiratory tract infections, inadequately treated disabilities, post-traumatic stress and psychiatric or alcohol-related brain injuries [340, 341]. Such complex needs require neuropsychological assessment, demanding case management and personalised behaviour management planning, implemented by specialised staff. These needs plus a high level of anti-social behaviours, including violence and drug and alcohol addictions, make it particularly challenging for older homeless people to integrate into mainstream care services. There is frequently difficulty adapting to new unfamiliar environments, routines and living standards. Therefore, many aged homeless people are not considered manageable in conventional aged care, leaving them with limited housing options [339]. Many may also be reluctant to seek assistance due partly to a strong sense of independence and dignity [341].

There are also financial barriers to accessing housing or aged care services for aged homeless people [342, 343]. In the US, pensions, savings and income are virtually non-existent for most homeless elders, ruling out the possibility of market-rate housing. Subsidised housing is scarce and there are long waiting lists for rental assistance programs [342]. In Australia, there are user contributions and it is common for applicants to partially cover these by selling their family home. However, this is not possible for people who are homeless, in social housing or in a private rental [343]. Although the Assistance with Care and Housing for the Aged program can help older adults access appropriate accommodation, such services require expansion to adequately serve older homeless adults [343]. A homeless supplement is granted to aged care homes that are registered and have more than 50 percent of all residents meeting specific criteria, including a history of or severe risk of homelessness and requiring intensive assistance with activities of daily living (e.g. personal care and hygiene) [344]. Regardless, elderly homeless people are often reluctant to use such services, which is likely to stem from negative past experiences with social service and health providers [342]. The current system's procedures for admission also provide significant barriers to aged homeless people accessing appropriate aged care [341].

Innovative models of care for homeless elders adhere to the notion that physical shelter or housing alone is insufficient to address the vulnerabilities of many homeless people [342, 345, 346]. Generally, key components of the identified models involve secure housing in combination with case management, neuropsychological assessment, individualised behaviour management, diversional activity support, medical care, assistance with activities of daily living and access to primary health care [339, 347-349]. Yet, evidence for the impact of these programs on individual outcomes and systems costs is limited.

The residential/supported accommodation for aged homeless model focuses on transitioning older individuals who are homeless, or at risk of homelessness, to access more traditional aged care services, with the aim of breaking the cycle of homelessness and burden on acute medical care. Generally, this model uses a holistic approach, providing supported housing with access to assistance with daily and recreation activities and multidisciplinary community

care. Examples of this model of care are the Wintringham model (Vic), Hearth's service-enriched housing (Boston, US), St Bartholomew's House (WA), Mission Australia residential aged care (NSW) and the Old Colonists' Association (Vic). Program reports have described a significant reduction in behaviours of concern, including substance and alcohol abuse, and acute medical care [339]; however, the evidence is limited and has not been evaluated systematically. The majority of residents successfully secured long-term accommodation and created connections with community-based care [342]. Maintaining positivity among staff was identified as a challenge, particularly when managing aggressive behaviours [339].

An Australian Homelessness Assistance program is a community care model for vulnerable people aged 50 or over. It provides case management, with the aim of building an individual's independence and transition to secure housing [350]. Similarly, case managers in the Hearth Outreach Program (Boston, US) visit homeless shelters weekly and assist elders with the process of applying for, and securing, housing, while also providing ongoing emotional support and assistance with maintaining occupancy [351]. Another program, Housing First, aims to provide homeless individuals with immediate access to permanent housing, based on the premise that housing is a precondition for recovery. While this program has been widely implemented for homeless people of all ages, only recently has there been a focus on the evaluation of the program in older homeless adults [352, 353]. No systematic review evaluating the evidence has been conducted, but a randomised controlled trial indicated that the Housing First model, in older adults, resulted in a greater number of days stably housed and improved mental status and quality of life compared to usual care, but no difference in community functioning and integration, and severity of substance use problems [352].

Table 3 Innovative models of care for diverse populations

Model type	Key features	Examples
Models for rural and remote areas	**Outreach:** Required to reach rural and remote areas, where isolation and difficulties of service provision exist.	Dementia outreach service [263] Mobile respite service [264]
	Community engaged scholarship: University students participate in structured sessions with older people as part of their placement.	Rural Caregiver Network Project [354]
	Friendly communities: Initiatives to make rural communities accessible and acceptable to older people in general and those living with dementia.	Dementia RED [355]
	Coordinator and navigator: Based on principles of being relationship-centred, enablement, holistic and accessible. The role involves referral, linkage to and navigation of services, education and information provision, emotional and practical support, and advocacy.	Nurse-led palliative navigation [356] Care Coordinators (China) [171]
Models of care for Aboriginal and	**Remote dementia support program:** Builds local capacity to keep older people living with dementia in their community.	Bidyadanga Dementia Support [58, 59]

Model type	Key features	Examples
Torres Strait Islander populations	**Collaborative community service model:** Locally responsive and culturally appropriate model developed for frail older people and those with physical disabilities and mental health problems.	Lungurra Ngoora Pilot [273]
	Culturally specific aged care: Residential, respite and community care model, operated by the Indigenous community for Aboriginal people from the region and employing and training local people as care providers.	Tjilpi Pampaku Ngura aged care [357]
Models of care and supports for CALD groups[viii]	**Ethno-specific or multicultural aged care:** Care services to CALD groups utilising and training staff from the same cultural backgrounds.	Penn Asian Senior Services (US) [303]
	Education and awareness programs: Support for older CALD people and their families to understand and access care services. May include provision of information by health specialists or through workshops and the internet.	Partners in Culturally Appropriate Care [292, 293] Specialist dementia nurse model [294]
	Cultural training programs: Provision of information and tools to help aged care workers and providers understand and deliver culturally appropriate care. Examples include workshops, visual tools and digital applications on topics such as religion, communication style, and diet that can be used in discussion with care recipients and their families.	Partners in Culturally Appropriate Care [292, 293] Cultural Diversity Training Program [298, 299] Conceptual Model [294] Cultura app [301, 302]
Models of residential care for young people	**Integrated / co-located housing:** Young people with a disability reside in units equipped with new smart-home technology, built within new apartment developments that also house other members of the general public.	Abbotsford Housing and Support Demonstration Project [358] Hunter Housing Support Demonstration Project [359] Summer Housing [309] The Square Woodville West Project [306]
	Individual units with shared supporting services: Young people with a disability reside in their own unit equipped with smart-home technology and share support services/facilities with one another.	Perth Fern River High Support Accommodation [310, 360] Harmon Apartments [311, 361, 362]
	Shared housing with supporting services: Young people with a disability live in their own room, sharing house and support services/facilities with one another.	Frankston Accommodation Brightwater [363] Supported Independent Living [360, 364] SACARE, The Gums [365]
	Combined aged and disability service for families: Young people with a disability co-habit or reside in close proximity to older adults. At Kemira and Wintringham, these older adults are their parents.	Kemira at IRT William Beach Gardens [366] Wintringham Eunice Seddon Home [367] Leonard Florence Center for Living [313, 314]

[viii] For CALD populations, innovative models of care specific for this population were not identified, thus culturally specific existing approaches and supports are listed.

Model type	Key features	Examples
Innovative models for LGBTI populations	**LGBTI affirmative assisted living:** Elders reside in assisted living community where LGBTI values are embraced and accepted.	Lebensort Viefalt [333, 335]
	Naturally occurring retirement community: LGBTI-specific services for older people visit the area to support those living in the community.	SAGE Harlem [336, 368]
	Multiagency collaboration: Collaboration of LGBTI-friendly agencies to increase community and health professional awareness of issues facing LGBTI elders and enhance access of services for LGBTI elders.	Aging as Ourselves [337]
Innovative models for homeless people	**Residential/supported accommodation for aged homeless:** Shared residential homes with additional housing, clinical and complementary support (e.g. substance abuse counselling, individualised support planning, case management).	Wintringham [369, 370] Hearth [342, 351] Mission Australia [347] Old Colonists' Association of Vic [348] St. Bartholomew's House [349]
	Permanent housing and support services: Provide assistance to secure housing and case management to maintain tenancy.	Aged Homeless Assistance Program [350] Hearth Outreach Program [351] Housing First [352]

Technology to support LTC for older people

Technology to support aged care traditionally provides additional capabilities to those supplied by human carers [371]. These types of technologies can be conceptualised according to four main areas of usage:

- assistive and supportive technologies
- monitoring devices and systems
- communications and connection technologies
- intelligent health information systems.

Assistive and supportive technologies

Mobility and dexterity supports

Use of mobility assistive devices allows an individual access to their broader living environment, exercise and social participation [372]. Sophisticated technologies incorporated into devices, such as walking sticks and wheelchairs, can include motion surfaces, limb supplementation and balance enhancement, and detection and prevention of falling [373, 374]. These technology solutions can have limited acceptance by older users due to their perceptions and reservations on ease of use and suitability for purpose [375, 376].

Robotics

The possibility that routine home care activities to assist ageing in place could be conducted by a robotic assistant has become a popular view [377-379]. The roles of robots that have been targeted include addressing social isolation [380], assisting people with functional limitations [381] and performing helpful activities for daily living and management of certain diseases or health conditions [382].

Some unmet needs for which robots may be appropriate include preventing or easing the effects of physical decline [383] and robots with multiple functions including a range of cognitive stimuli and health education [384]. There have been several approaches for socialisation assistance and interpersonal interaction developed specifically in robots for older persons [385]. One such category, robots mimicking pets or small humans, has been found to provide therapeutic effects [386]. This raises issues on determining appropriate rights and values for people, depending on whether the robot is used to assist, monitor or comfort them [387]. The broader question of ensuring acceptance of robotics and its capacity to support models of care reliably is also yet to be resolved satisfactorily [388].

Box 10 ***Case Study: Humanoid robots as in-home assistants***
Several humanoid robotic helpers have been released in the health care area, two of the more popular ones being Nao and Pepper[ix]. This type of robot is mobile on legs (or wheels) and usually has highly movable arms and hands (or grippers). Typically, they have a chest-mounted display screen for communication. They are also generally equipped for voice recognition and synthesis and scene understanding through computer vision. Their primary function is social in that they communicate and interact using speech and body language in ways that seem realistic [389]. This characteristic enables them to achieve many types of human-like interactions, mimicking those between carers and care recipients [390]. Automation of some simple care tasks can be achieved with these robots, such as medication management [391], and they offer the potential to extend to assisting in caring for people living with mental conditions or dementia [392]. A current limitation is that they lack the strength to perform tasks involving major limb or full body movements and manual handling (e.g. providing assistance to stand or get out of bed), apart from those actions that can be achieved by self-standing accompaniment (e.g. active engagement for walking) [393]. A recent analysis, which included Australian case studies, indicated that while robotic technology was advancing quickly, acceptance and adoption were proving to be challenging [394].

Monitoring devices and systems

Sensors

Wearable monitoring devices can provide ageing support by collecting data and providing measurement and feedback on someone's health circumstances [395]. The information collected may include aspects of healthy lifestyle habits, physiological status, and preventive practices to help people manage and maintain their condition [396]. Accelerometry-based devices can measure limb movement as an indicator of physical activity and mobility [397, 398]. Other devices allow for prediction or detection of adverse circumstances by combining measurement of movement with physiological measures such as falling [399] or cardiac [400] situations.

More comprehensive data collection can be used for the tracking of performance of daily living activities [401] or the remote observation of individuals by health service providers [402, 403]. For example, sensors may be able to trigger an alarm in cases of significant deviations from normal activities [404]. Increasingly, these types of devices have 'smart' inbuilt control and data processing logic, which promotes efficiency and reliability and may allow individual customisation [405].

Another popular target for technology solutions has been cognitive decline, including loss of memory, balance, location and situational awareness, logical reasoning or understanding of context through to pathological brain ageing or mental diseases [406]. Care benefits can be achieved by providing assurance of normal living patterns to carers, by helping people

[ix] https://www.softbankrobotics.com/emea/en/ (accessed 11 June 2019)

compensate for (and in some cases improve) their cognitive impairments, and by assessing cognitive status [407].

Multiple conditions management in older people

Many older people are managing multiple chronic conditions. Whilst management of multimorbidity is considered to fall predominantly within the health system, successful management impacts significantly on an older person's functional independence and quality of life. Management of health conditions (such as chronic diseases) can be coordinated outside of clinical environments, such as in the home, using measurement devices located on the person or in their living spaces that communicate data remotely [408, 409]. They can also be incorporated into standalone integrated platforms or workstations, which can provide some limited feedback and analysis to the older person while communicating and remaining under control of a central clinical agency [410]. Multiple devices can be combined in a single portable or wearable system with inbuilt data communication and collection capability [411, 412].

Various operational systems aimed at managing health conditions have been successfully implemented by health care provider organisations in the US [413] and Europe [414] and rely on strong information flow and integrated decision support [415]. Evidence of the efficacy of this approach has been shown over relatively long-term application in health [416], so it has been suggested that it could be incorporated into broader social care settings rather than the current health/medical uses [417]. It would also have applicability in remote locations and user acceptability is generally good [418]. Telehealth service delivery aspects for these services have become well established [419] and the approach is in routine use for other common chronic conditions such as cardiovascular disease and diabetes. However reliance on high-quality and accessible monitoring information is seen as a critical success factor [420]

The benefits of individually tailored detection or prediction of critical health events has been established with some confidence [421, 422]. However, the evidence is less conclusive when multiple health conditions must be managed simultaneously [423]. In general, this kind of approach has been seen as successful for self-management and guided management of a number of chronic diseases [424, 425], with a high level of acceptance, adoption and compliance amongst older people [426]. However, cost-effectiveness and economic models for delivery can be a barrier to adoption [427].

Aged independent living

Ambient assisted living environments are sensor-equipped and computer-managed living spaces that observe and respond via messages and alerts to the health status indicators of their occupants [428] (also known as 'health smart homes' [429]). Numerous projects over the past two decades have investigated prototype environments [430, 431], including different embedded sensor modalities, such as networked environmental sampling devices and image capture interfaces [432]. Areas for wider application include health and

environmental monitoring, and providing companionship, social communication and recreation/entertainment [433].

Recent analyses of evidence show this approach to be most effective for monitoring function, cognition and mental health [434], especially when integrated with data from wearables [435]. Improvements in quality of life due to ambient assisted living have been reported [436]. Some applicability to people living with memory loss and dementia has been indicated, through location monitoring and detection of behavioural changes [437]. However, concerns on ethical aspects of ambient assisted living in observing people closely and continuously have been raised [438-440]. A practical unresolved issue is how the large volumes of data generated can be efficiently and reliably processed using 'big data' methodologies [441].

Box 11 ***Case study: Health smart home for ageing***
Amongst numerous health smart homes for ageing, one of the longest continuous examples is Tigerplace, located in a commercially operated aged residential care home in Missouri, US [442]. Studies have been conducted with researchers from a range of disciplines using the adaptive sensor-rich observational infrastructure installed in residents' rooms [443]. This comprehensive initiative includes a variety of sensor types and has provided a wealth of learnings about the health smart home approach [444], including in vital signs analysis for monitoring of health conditions [445] and falls assessment and prediction [446]. Residents have been included in the design of solutions through a 'living laboratory' co-design process [447]. This major longitudinal project can inform policy directions and new models of care [448]. A potential limitation (and for many other health smart homes) is its implementation in a closed, bespoke system with a captive economic model of service [449] and without an option for application programming interface or integration with future externally developed components [450]. Comparable projects have recently been established in Canada (e.g. Smart Condo) [451] and Australia (e.g. Smarter Safer Homes) [452].

Communications and connection technologies

Home telehealth

Telehealth services can offer a technology-based mechanism for supporting person-centred care and enabling new models of care [453]. It involves delivery of care by remote clinicians through teleconsultations and teleprocedures. The ability to deliver remotely to the home, to residential aged care settings, to people with limited access to transport and those living in rural and remote locations is a major strength [454]. This approach can also support chronic disease management in older people [388].

In the UK, it has been suggested that expansion of the Whole Systems Demonstrator telehealth services may provide a favourable environment for achieving integrated care delivery, but workforce training and practice adoption factors are essential to realising the

benefits [455, 456]. Adoption and acceptance of home telehealth depends on the sensitivity with which the service is delivered [457], especially the level of support given to people and their active involvement [458]. Sometimes incorporated into these models are dedicated service elements [459], such as a concierge in shared living arrangements.

Online health maintenance and prevention

Providing online options for older persons to manage their health can be useful because it enables automation of delivery at scale, self-paced progression, continuous monitoring of people's progress, provision of feedback and motivational messages, and possibilities for tailoring to suit individuals' preferences. These types of technologies use interactive software to substitute for a human health coach/facilitator/counsellor for a variety of health education and behaviour management purposes [460], such as health risk factor modification [461] and medication compliance [462]. They are also commonly used for health behaviour change, including in areas of physical activity [463], obesity [464], arthritis [465] and pain management [466]. The success of these approaches is dependent on an individual's adherence to the online guidance they are given [467], which can be influenced by various engagement techniques, including using a surrogate human presence online through conversational agent technologies [468, 469].

A second popular approach to support behaviour change in older people is the provision of games online [470], since the entertainment and engagement aspects may have positive influences [471]. This has been shown as an effective approach in a number of health areas [472], particularly in promoting physical activity using 'exergames' [473]. Use of these approaches in older adults may be more effective in some settings and demographics than others [474, 475]. Dementia Australia's Virtual Forest™ is an example of an interactive screen-projected game that is commercially available and provides an opportunity for people with dementia to input into a virtual park-like setting [476].

Another important issue in healthy ageing that can be addressed through online mechanisms is social isolation [477]. Engagement in conventional public social networking sites (which can be used with appropriate prior training) and an increase in online activity [478] may reduce loneliness and isolation in older people [479, 480]. Whilst these technological approaches are no longer considered innovative in the general population, their potential application to address social isolation in older people is greatly underutilised. Online connections to virtual communities, such as health support groups and peer age groups, can also be beneficial for carers of older people [481, 482].

Box 12 ***Case Study: Conversational agents for health care assistance***
A conversational agent is a computer program that interacts conversationally (by text or speech) with a person: chatbots and avatars are common examples. These have begun to be used in health applications that entail routine human verbal interaction, such as self-reported observations or medication reminders [483, 484]. Specific agents for use in meeting health needs for older people have been proposed [485]. These require particular conversational structures to be effective for aged users [486] and may need to be tuned or adaptive to cater for users' different preferences and abilities [487]. The potential for use of conversational agents for people living with dementia is promising [488]. This form of interactive technology is seen as being more acceptable and of apparent usefulness than some other forms [489].

Intelligent health information systems

Health information and education

The trend for individuals seeking information about their health conditions to make use of internet sources has accelerated [490] and in general has become an expectation in primary health care [491]. People extending their knowledge of their health conditions and histories provides a lifelong mechanism for better engagement [492]. For aged individuals and their immediate family and carers, the use of internet health information may be limited by computer literacy and educational levels [493]. Widely advocated patient health portals can be very complex, which may further limit their usefulness for an older population [494].

Coordinated self-care and home care

Technology can support care delivered in non-clinical settings by a variety of carers in coordination, along with telehealth services and data-driven quality-of-care monitoring [495]. This can assist in meeting three of four areas highlighted as needing policy attention in a recent report on health and care in ageing societies [496]. Coordinated service delivery must be considered in the context of the types of services needed, the ecosystem which influences their delivery [497] and the appropriate integration of information flows between the various service provision agencies [498]. Using technology to enable individuals to have greater control over their health can be achieved by cooperation in remote monitoring of health conditions [499] or in the use of mobile apps for managing day-to-day health care needs [500]. This approach can also help in addressing issues of loneliness and social isolation [501]. The use of web or mobile delivery mechanisms for chronic disease management and associated behaviour change programs is seen as a particularly promising avenue, but again may be limited by computer literacy and socioeconomic factors [502].

Table 4 Innovative technological approaches to aged care

Area of technology usage	Key features	Examples
Assistive and supportive technologies	Provide physical or cognitive aids to activities undertaken by a care recipient as an adjunct component of the activity.	Balance enhancement in walking frames Assistive Robots
Monitoring devices and systems	Measure and analyse personal health characteristics of a care recipient.	Wearables Telecare stations Ambient assistive environments Health smart homes for ageing
Communications and connection technologies	Allow care recipients to interact with health carers remotely.	Health management websites Conversational agents for health care assistance
Intelligent health information systems	Empower care recipients to access information and exercise informed control on their health circumstances.	Health portals and support sites Care coordination

Discussion and conclusions

This review has identified a number of approaches to providing aged care for people in the community and in residential care, many for people living with dementia, both in Australia and internationally. Most innovative models of care have not been rigorously evaluated, however, and evidence of their effectiveness at improving care recipient outcomes is limited. These programs require further testing prior to scaling up more broadly or within the Australian context.

Innovative models of care and complex interventions targeting overall care

Particular innovative approaches highlighted in this report that are considered likely to be of relevance to the Australian aged care population are discussed here:

- Dyadic interventions for people living with dementia in the community and their carer provide individualised training and support with a focus on upskilling the carer. These approaches have moderate-quality evidence to support their effectiveness in reducing depression in carers and delaying functional decline in people with dementia. Two programs available on a limited basis in Australia have shown potential economic benefits (the Going Away to Stay at Home program and Care of Persons with Dementia in their Environments (COPE)). Current Australian Medicare funding limits reimbursement for services required for delivery of many of these programs in the community. In-stay dyadic programs are reliant on respite funding plus out-of-pocket costs.
- Many programs use support workers, system navigators or care coordinators to facilitate a streamlined, integrated approach to care for people with dementia or other chronic health conditions. Some programs appear to be a work around to manage a fragmented system. For people with frailty and multiple chronic health conditions, including dementia, the approach is being implemented to varying degrees in other countries. One example, CAPABLE, that provides a support worker for people with chronic conditions in aged care, has been recently granted Medicaid funding in the US. Similarly, in Scotland, the government guarantees a minimum of one year post-diagnostic support for people with dementia, in a model based around a link worker. While there is no current explicit funding for support worker roles in the Australian aged care sector, there is potential within the consumer-directed care environment of Commonwealth Home Support Programme and Packaged Care to access funds to this end. System navigators, preferably Aboriginal, may also be helpful for Aboriginal people living in remote communities to deal with the processes of MyAged Care.
- Small-scale, domestic models of residential aged care have an emphasis on providing person-centred care that maximises the independence of the residents and participation in routine, domestic activities in a homelike setting for smaller groups of residents, with individual rooms and increased access to the outdoors. Care is often provided by specifically trained care staff who are ‘universal workers’ with increased responsibilities. These models of care have been reported as better meeting consumer

preferences, and limited evidence indicates possible benefits in terms of resident outcomes, such as improved quality of care and reduced restraint use. This model has been successfully implemented in several Australian states but currently has limited availability. The costs to build these homes are slightly higher than those for conventional aged care homes, which may be acting as a disincentive to providers in Australia [83]. However, the facility running costs are likely to be no higher and may be lower when differences in resident and facility characteristics are taken into account [70].

- Respite provided in settings aligned to a person's background, such as farm settings involving farming-related activities, may be relevant to Australian populations in rural/remote areas, from agricultural backgrounds and for those living with dementia. While Australian evidence for the impact on recipient outcomes of innovation in the area of respite is limited, a short in-stay program that provides five days of individualised caregiver training (Going Away to Stay at Home, a dyadic training program) is currently operating under respite funding with some evidence for delaying admission to residential care.
- Innovative models of care for people who are homeless or at risk of homelessness include a continuum of relationships as a key component of the care approach, with a focus on providing services beyond care and accommodation. An Australian example that is considered innovative internationally is the Wintringham model in Victoria, which has been described as a housing model into which aged care has been introduced. Using natural materials, curves and verandahs, there is a focus on creating a home for people with complex psychosocial issues and fostering relationships with staff, including allied health staff, over long periods. Services specific to older homeless Australians are not available in all states and territories.
- The Bidyadanga dementia support pilot program is a model that supports remote-living Aboriginal and Torres Strait Islander people with dementia to remain living in their community on traditional country through community education and empowerment, strengthening capacity within the local aged care and health workforce. Maintaining community and cultural connection is the focus of innovative Aboriginal and Torres Strait Islander programs and such programs take time to build. A key issue for programs in this area is sustainability, as the literature showed short-term project funding had led to the abandonment of a promising model in WA (Lungurra Ngoora).

Approaches to support younger people with disabilities to avoid admission to residential aged care include the following:

- Groups of individual units with shared supporting services for young people with complex medical needs, supported by smart-home technology and onsite nursing care. This approach provides a sense of community for those with high support needs, enabling couples to remain together when care needs change.
- Integrated or co-located housing for young people with a range of disabilities within housing developments for the general public, where residents are supported by

smart-home and communications technologies as well as on-call support — This model allows community integration and connectedness through co-residing with members of the general public.

Approaches to support provision of aged care to diverse populations

There are also a number of approaches that should be implemented in an Australian aged care system to improve the quality and equity of services for people from diverse populations. While there are some good examples, more work is needed in order to ensure that these approaches are universally available across Australia; expansion and ongoing support and funding are required. These include:

- Training and education of aged care staff in provision of non-discriminatory inclusive services that can cater to diverse populations, to potentially ensure high-quality care and help address underutilisation of health services and delayed care-seeking.
- Accreditation of services that have an inclusive approach (e.g. Rainbow Tick accreditation for LGBTI inclusivity), providing recognition and demonstrating a minimal level of competency against set standards.
- Increasing awareness among members of diverse populations of existing aged care services and supports available.
- Improved access to culturally appropriate aged care assessments, preferably conducted by Aboriginal assessors, to increase referrals to aged care packages and services for Aboriginal and Torres Strait Islander populations.
- Strategies to increase the number of trained Aboriginal and Torres Strait Islander aged care assessors across Australia.

Technology-based innovations

Some technology-based models of care that have been shown to be viable internationally but have not seen successful adoption at scale for the Australian ageing population include:

- Telehealth communications and monitoring technologies that enable better access to health care and integration of care for older people less able to travel for services, including those living in residential aged care, at home without accessible transport options and in rural and remote regions.
- Remote support of independently living individuals who are ageing in place under the supervision of informal or formal carers and who are susceptible to incidents, such as falling, or to isolation from physical and social activities, through ambient assistive environments (health smart homes) providing decision support and alerting services.

A limiting factor in both these cases has been lack of cost-effective models for reimbursement or service delivery funding to cover the quite extensive underlying business support services ecosystem. This could be overcome by consideration of a blended public-private approach to cost sharing (e.g. privately funded service subscriptions and publicly funded intervention coverage).

Conclusions

There are many innovative approaches to supporting older people requiring long-term care both in the community and residential care. National regulations and funding have the ability to either provide support for these approaches or limit their implementation or uptake (e.g. the New Orange Plan in Japan). Most of the approaches described in this report have limited evidence for their impact on recipient outcomes. Further evaluation would provide useful cost/benefit information to support wider implementation of promising approaches. In particular, there could be benefits in larger-scale assessment in the Australian context of the following:

- Alternative building models of residential aged care, in particular addressing whole-of-system resource use and delivery of relationship-centred care for older Australians with dementia and specialised care needs (e.g. older homeless populations). Such assessments need to capture both not-for-profit and for-profit providers and include multiple providers of alternative models of care (e.g. small-scale domestic living models).
- Non-pharmacological programs to support people living with dementia and their carers in the first-year post-diagnosis (e.g. the Scottish 5-pillars model of post-diagnosis support).
- Community- and neighbourhood-based models of support for older people living in the community that involve whole-of-community guidance, using individual and community assets.
- Remote support of independent living through ambient assisted living or health smart homes, in particular considering cost-effective models of support for older people living with cognitive impairment or dementia that may be suitable for consideration for reimbursement or service delivery funding.

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Appendix 1: Interventions/approaches not included

Excluded approach	Explanation
Advanced care planning	Not a model of care.
Ageing in place	Not a model of care but a philosophy.
Carer support and education, community support groups	Widely available, not innovative.
Chronic disease management (e.g. management of diabetes)	Delivery of health care.
Culture change	Not a model of care but a philosophy. A component of many innovative models of care.
Dementia care mapping	Not innovative.
Dementia-friendly design	Not a model of care but a component of many innovative models of care.
Intergenerational playgroups	An intervention. Intergenerational models of care (e.g. residential care) included.
Integrated care	Delivery of health care (however, included where overlaps with other categories, e.g. support workers).
Memory clinics	Not innovative.
Palliative care	Delivery of health care (however, included where a developed for a specific target population, e.g. dementia).
Patient-centred medical homes tailored to the homeless	Not aged care specific and delivery of health care.
Person-centred care	Not a model of care but a philosophy. Now considered good standard care, rather than innovative. A component of many innovative models of care.
Rehabilitation/reablement approaches	Not a model of care but a philosophy. Not innovative, widely available although not universally performed for people with dementia or in-home settings.
Single component or limited scope interventions or therapies targeted at a single aspect of care (e.g. art therapy, music therapy, exercise, cognitive rehabilitation, behaviour management interventions, pharmaceutical management)	Not a model of care but an intervention.
Specialist geriatric management	Not innovative or a model of care.
Staff or professional education/training/communication programs	Not a model of care, included as a component of some innovative models of care.
Street clinics for homeless people	Not aged care specific, not innovative.

Excluded approach	Explanation
Technologies for business management and non-clinical services delivery	Not a model of care.
Technology used routinely for clinical process support (e.g. patient record systems)	Not a model of care.
Theoretical approaches not applied or implemented	Approach too premature for consideration as applicable.
Transitional care	Delivery of health care.

Appendix 2: Contributors to this report

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