Curtin University

A SCOPING REVIEW ON BEST PRACTICE FOR HOME MODIFICATIONS SERVICE DELIVERY

Report of Findings
Conducted January 2015
Published March 2016

Prepared by the School of Occupational Therapy and Social Work in partnership with the Independent Living Centre WA

Independent Living Centre WA
Making choices finding solutions

hacc
home and community care
A JOINT COMMONWEALTH AND STATE/TERRITORY PROGRAM
PROVIDING FUNDING AND ASSISTANCE FOR AUSTRALIANS IN NEED

Acknowledgements

For further information about this report

Dr Courtenay Harris
School of Occupational Therapy and Social Work
Faculty of Health Sciences
Curtin University

Phone: 08 9266 3683
Fax: 08 9266 3636
Email: C.Harris@curtin.edu.au

Investigators

Dr Courtenay Harris, School of Occupational Therapy and Social Work, Curtin University
Mrs Alex Andrews, Occupational Therapist and Project Officer, Independent Living Centre WA

Authors

Dr Courtenay Harris
Mrs Alex Andrews
Ms Emma Logan
Dr Elinda Lee

List of Acronyms Used

ADLs	Activities of Daily Living
AT	Assistive Technology
CALD	Culturally and Linguistically Diverse
CAs	Community Assistants
DVA	Department of Veterans Affairs
HACC	Home and Community Care
HM	Home Modifications
HMM	Home Modifications and Maintenance
IADLs	Instrumental Activities of Daily Living
ICT	Information Communication Technology
ILC	Independent Living Centre
MDT	Multidisciplinary team
OT	Occupational Therapist / Occupational Therapy
OTA	Occupational Therapy Assistant
P-E	Person-Environment
P-E-O	Person-Environment-Occupation
RAS	Regional Assessment Service
RCT	Randomised controlled trial
TA	Trusted Assessor
WA	Western Australia
WAAF	Western Australia Assessment Framework

Executive Summary

Background

A 'Scoping Review on Best Practice for Home Modifications Service Delivery' was undertaken by the School of Occupational Therapy and Social Work in partnership with The Independent Living Centre in Western Australia (ILCWA) and the WA Home and Community Care (HACC) Program. The need for research into best practice for home modification (HM) and assistive technology (AT) service delivery has arisen through an increasing demand for these services resulting from the ageing demographic trend and an increasing awareness of the benefits of HMs and AT.

HM has been a service type under the HACC program since 1986 and targets people who are older and frail and having difficulty with everyday tasks, younger people living with a disability, and carers of a frail older person or someone living with a disability. Goals of the HACC program include maintaining or improving independence, minimising carer stress, and reducing admissions to long-term residential care through increasing safety.

Since the introduction of the Wellness Approach in 2006 and the implementation of the Western Australia Assessment Framework (WAAF) in 2011, referrals for HM and AT have increased through improved awareness and a greater emphasis on the benefits of these services in supporting independence and wellbeing. As a holistic approach, the concept of wellness addresses all aspects of wellbeing and focuses on minimising illness and dependency, whilst maximising wellness and independence. Within a service delivery model, wellness places the client at the centre of decision making and aims to enhance physical and psychological wellbeing through participation in everyday activities and community engagement.

To date, within Western Australia (WA) there are a number of pathways to HMs and AT services for HACC clients; however, approaches to service provision are inconsistent leading to much confusion and frustration for clients, professionals, and service providers. To ensure the development of future services is sustainable and equitable, an improved service delivery model for HMs and AT underpinned by best practice is required for these consumers. This service model needs to enable consumers and their relatives to be better informed about HM and AT options, provide greater choice to meet individual needs, have greater control over decision-making, and importantly, promote capacity for community living in older adults.

The research was funded by WA HACC and undertaken between September 2014 and January 2016 by a joint Curtin University and ILCWA research team comprising Dr Courtenay Harris, Mrs Alex Andrews, Ms Emma Logan, and Dr Elinda Lee.

Aims and Approach

The overall aim of the review was to address the question:

- *What are the key factors that influence best practice HM as identified in the literature?*

Further objectives included:

- *To identify, evaluate, and summarise the literature on best practice in HMs, in particular focusing on the key components that contribute to service delivery including end-to-end process.*
- *To develop a service delivery model informed by best practice guidelines.*

Underlying our approach to this scoping review was a focus on re-ablement, taking a multi-component approach to exploring current practices for HMs that promotes capacity for community living in people who access HACC. A report was completed to provide a summary of the review undertaken, examine innovative practice in HM (with particular focus on service delivery and referral processes), highlight some gaps in the current research base, and make recommendations from key findings to inform and underpin the further development of a service delivery model for WA HACC clients that is informed by best practice guidelines.

The scoping review results are findings from reported literature at a given time and place, and are not necessarily able to be generalised. The findings are, however, able to guide future service planning and offer evidence for practice.

Methods

A systematic search of eight electronic databases, key websites, relevant texts and key occupational therapy (OT) journals from Britain, Australia, America, Canada, Scandinavia, and New Zealand was undertaken from September 2014 to January 2015. To ensure a comprehensive review, we contacted experts in the field to identify any further potentially relevant papers.

Key search terms included: (home modification OR home adaptation OR adaptable housing OR environmental intervention) AND (guidelines OR models OR service delivery OR evaluation OR outcomes). Papers published in English after the year 1999 were included if they focused on research methodology, evaluation, and outcomes (e.g., quality of life, cost effectiveness, effective assessment, approaches with evidence of components of best practice, or issues from various stages of the home modification process). Papers were excluded if they were too general in relation to the aim of this review (e.g., about general OT interventions), focused specifically on only one area of HM (e.g., rails or ramps), or had an environmental focus that was too general (e.g., not on physical environment issues). Any paper based on opinion or that had a predominately educational/teaching focus was also excluded.

We found many relevant articles, reports, and organisation and legislative specifications. This scoping review presents an international summary on HMs, focusing specifically on the key components that contribute to best practice in the development and delivery of HMs from end-to-end process. The review does not address the methodological rigour of the included papers. Given the nature of the topic, the review was not limited to published journal articles, but rather included a range of published and grey literature sourced via databases, the Internet, and in consultation with experts in the field. It is expected that the broad range of search methods used enabled the greatest chance of obtaining relevant papers. Figure 1 demonstrates the paper selection process.
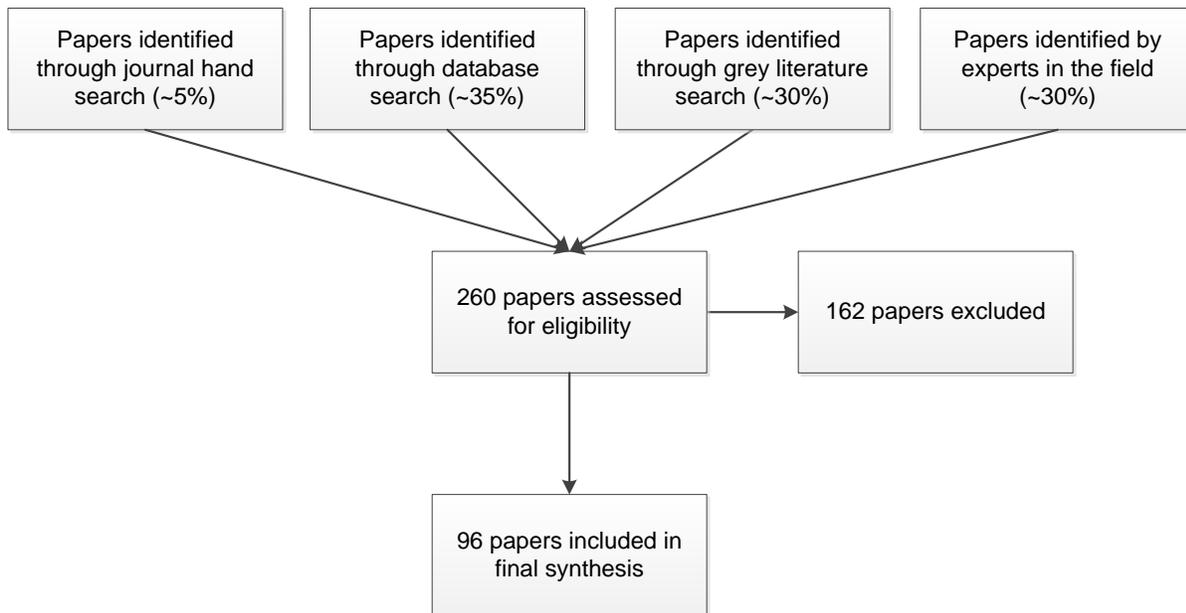
Figure 1. Flow diagram of paper selection process.

Ninety-six of the retrieved papers were considered eligible and are categorised in Table 1. In total, 11 categories were formed to reflect the most salient elements of best practice for HMs. The study designs were classified according to the RTI-UNC Classification Tool for analytic and descriptive studies (Hartling et al., 2010).

Table 1

Papers Categorised by Theme

Category	Number of papers
Service delivery	36
Practice guidelines	51
Policy	19
Workforce and training	43
Barriers and enablers	25
Prevention	22
Role of the client in HMs	27
Assessment and follow up	45
Follow up and maintenance	21
Minority, remote, and rural groups	6
Funding	21

Note. Several papers contributed to more than one category.

Key Findings

The scoping review findings are presented across three key areas: (1) overview of current HM practice, (2) essential principles of HM service delivery, and (3) environmental factors related to service delivery.

Key Findings – Overview of Current HM Practice

- ***Consumers-*** Most commonly female, individuals over 65 years, for conditions including diabetes, stroke, hip fracture, fall or joint replacement, and those who live alone and / or have lived in their home for 10+ years.
- ***Types-*** Most frequently obtained HMs include lighting installations, facilitators to self-care (e.g., bathroom and kitchen accessories), and mobility and accessibility enablers (e.g., ramps, handrails, and grab bars) Older adults tended to receive less expensive HMs than younger age groups.
- ***Client benefits-*** increased health, freedom, accessibility, confidence, independence, safety, privacy, self-rated ability, quality of life, and sense of normalcy. Reduced deterioration in health, fear of falls, depressive symptomatology, and reliance on formal and informal carers.
- ***Caregiver benefits-*** relief of burden, diminished worry, reduced personal pain / injury, and improved social inclusion and sense of security.
- ***Social / economic benefits-*** Cost effective compared to residential care; reduced health care costs as a result of fewer falls, faster hospital discharge, a reduction in cost of GP visits and hospital admissions, safer working environments for staff, and reduced demand on formal care and admissions to residential care.

Key Findings – Essential Principles of HM Service Delivery

A number of the reviewed papers discussed the specific components considered best practice HM service delivery, or at least partially addressed aspects of service delivery. These included national and international government documents, organisational reviews and guidelines, literature reviews, a scoping review, and a combination of qualitative and quantitative research.

In total, 51 papers offered suggestions for practice guidelines. These included elements of good practice, client and family-directed considerations, practice issues (including delays for services and strategies to reduce wait times), theoretical frameworks guiding practice, examples of innovative approaches / models, collaborative decision making, outcomes of good practice, and aspects of good design.

Clear themes across these papers included: re-ablement, accessibility, assessment and review, education and training, and service evaluation and improvement. Also highlighted was a lack of research in some important areas.

Re-ablement

- The outcomes of HMs are significantly improved when embedded in a holistic, re-ablement focused approach. HMs should harness the strengths of the individual and be chosen to improve independence in activities of daily living (ADLs), increase safety in performing these activities, and reduce caregiver burden. To facilitate this process, a combined HM / AT service is recommended to maximise the benefit for the client and ensure that re-ablement does occur.

Accessibility

- Service provision must be timely and efficient to avoid unnecessary delays and meet demands as they occur, as timely and early adaptations dramatically decrease admissions to hospital and residential care.
- With an increasingly culturally and linguistically diverse (CALD) population and with greater geographical spread, HM accessibility for people of all cultures, locations, socioeconomic statuses, ages, and disabilities is paramount. Flexibility of services, adequate prioritisation, and provision of funding is necessary to meet the growing needs of a changing demographic.
- Streamlined processes, centralised point of contact, screening / triage processes, technology, and 'Fast Track' systems can significantly reduce waiting times, lessen the risk of potential injury or declining health, and increase overall client satisfaction.

Assessment / Review

- Consistent assessment involving initial screening or 'triage' to determine level of need and identify risk is a critical element. Eligibility criteria should be based upon current physical function over medical diagnoses; and caregiver needs should also be given priority.
- Holistic HM formalised assessments should evaluate both the physical function of the environment and the specific needs of the individual. It is important to focus not only on safety and performance problems, but also on injury prevention, caregiver health, and social integration. Assessment tools should be chosen for their purpose, clinical utility, validity and reliability, and suitability to the population of interest.
- Follow up and re-evaluation capacity is essential to measure functional changes and usability; to prevent accidents and falls; and to increase the knowledge of the effects of HMs on service users. This is important when considering preventative strategies. Additionally, continuity of personnel is important in follow up.
- Service delivery models are different for metropolitan vs rural and non-complex vs complex HMs, requiring different services, follow-up and workforce.
- Service evaluation including both consumer and service provider assessments are important.

Education and Training

- Training and professional development is required for all staff involved in HM service delivery for quality service delivery. Complex HM require specialised skills and further training will be required by the HM workforce.
- Training should cover disability awareness, HM processes, and good practice but should ultimately be informed by consumer feedback to address current gaps in understanding.

Service Evaluation and Improvement

- Measuring and estimating the need for HM services is difficult. Assessment of outcome quality should focus on both staff and customer perspectives (e.g., experience of positive outcomes, satisfaction with service, whether target timeframes were met).
- When monitoring client outcomes, focus should be placed on person-centred approaches to community care. Examples of outcomes are numerous but may include increased safety and reduction of falls, greater capacity for independent living, ability to stay at home and restored access to all areas of the home, and improved physical and mental health. To promote these outcomes, performance targets should be set around reasonable timeframes for minor and major adaptations.
- Organisations involved in HM service delivery should have clear governance frameworks which incorporate controls, checks, and appropriate reporting.

Key Findings – Environmental Factors Related to Service Delivery

Policy

- 19 papers specifically discussed policies, benefits and challenges with their implementation, and recommendations for future policy development.
- In Australia HM services occur across four policy areas, ageing, health, community care, and housing. There is a lack of a public policy framework to guide the design and implementation of HM programs. Such a framework is recommended to formulate a coordinated, integrated, nationally recognised HMs policy to address the current mismatch that exists between client needs and policy instructions in many areas. Consumers are often confused by multiple policy areas and personnel and navigating these areas can be timely and result in reduced access.

Funding

- 21 papers reviewed funding issues related to HM service provision. Demand for HM services in Australia is expected to grow, and HM schemes are unlikely to meet growing needs.
- As limited funds are now available, alternative options for funding HMs are necessary. Individual service delivery and housing policy planning is essential and universal design principles should be incorporated. There is a need for an equitable and transparent structure to fees and payment plans for all consumers.

Workforce

- 43 papers reviewed HM workforce, with occupational therapists (OTs), trusted assessors (TAs) and occupational therapy assistants (OTAs), other service providers (e.g., housing support officers), handypersons, and construction, design and building industry professionals as the key workforce.
- OTs are seen as central to the HM process and experts in identifying and quantifying the environmental factors that impact on occupational performance and implementing services. The role of the OT is greatest in the initial stages of service delivery; however, OT roles are not always a legislative requirement. OTs may not have required knowledge of complex HM recommendations related to construction and building design.
- Best practice involves coordinated collaboration between members of the HM team. Joint builder and OT assessment for complex HM services are recommended.
- Employ suitably qualified health professionals based on non-complex / complex service models. TAs and handypersons have a role in minor / non-complex HMs under guidance of OT. Clear guidelines for HM workforce and service delivery roles are required.
- Rural and remote consumers' access to HM workforce is often complex and time consuming.

Rural / Remote / Vulnerable Populations

- HM services, policy, funding, equity and housing limitations are evident for vulnerable populations. There is no clear evidence for the best type of service model for vulnerable groups and service delivery in rural and remote settings. There is a need for improved access and understanding of HM needs for vulnerable groups and the development of cultural competence in delivery of HM services.

Implications of Key Findings

Overall, findings from this research demonstrate the importance of effective HM service delivery for consumers, caregivers, and society. For best practice service delivery in an environment of increasing demand for HM service, well designed policy and legislation and funding model solutions are required to ensure that individuals can continue to access services to maintain their health, safety, and quality of life.

Findings from the scoping review are comprehensive and provide practical guidance and suggestions at the societal context, service delivery process and individual levels. To plan and implement best practice service delivery in WA the scope of interventions will need to be made at all levels to ensure sustainable and effective HM service delivery.

How can this Research be used to Strengthen Best Practice HM Service Delivery?

Figure 2, Re-ablement Home Modification Service Delivery Model, is based on the findings of this scoping review research project and illustrates a recommended best practice model for HMs in WA. To better understand how the scoping review findings can strengthen best practice in HMs, the key findings of the scoping review will be discussed in relation to aspects of the model.
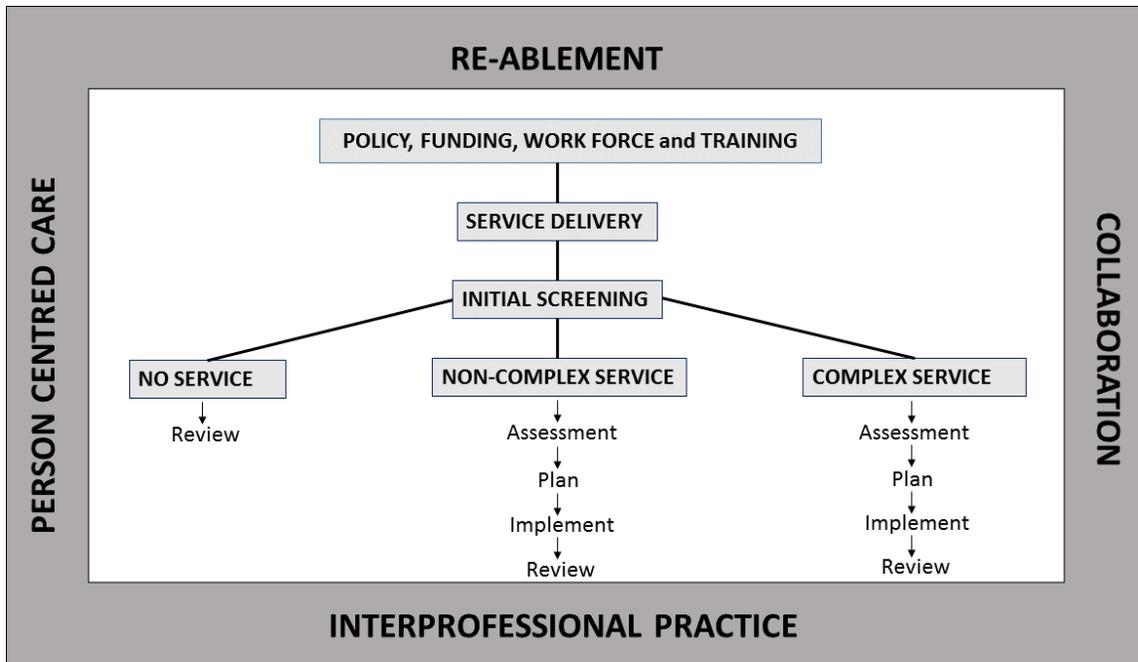
Figure 2. Re-ablement Home Modification Service Delivery Model.

Overview of Model

- This service delivery model is unique in its ability to differentiate no service from non-complex and complex services.
- Such differentiation ensures equitable access; efficient screening of clients; appropriate assessment dependent on client's function, home environment, and caregiver needs; allocation of an appropriate workforce to implement the plan; and relevant follow up evaluation and review as deemed suitable for each service delivery pathway.
- For the non-complex and complex pathways, service delivery timeframes are established to ensure efficient and timely service provision. A focus on early referral and intervention effectively captures individuals with conditions shown to commonly require HMs, before more significant issues occur.
- Pathways apply to rural / remote and vulnerable populations but are offered further support and linked in with relevant policies to ensure equitable HM access and service provision.

Re-ablement

- Re-ablement approach focusses on the strengths of the individual and their carers/supports. Screening, assessment, and re-evaluation tools are specifically designed to elicit such information and service delivery goals and intervention plans are developed accordingly.

Collaboration

- All stakeholders strive to maintain effective collaboration, communication, and coordination throughout the HM process. Consumers and their caregivers are placed at the centre of all planning with a focus on common client goals.
- Disability forums and expert panels are established to promote discussion and advocacy around disability-related issues and evaluate new equipment and technologies for consumers.

Interprofessional Practice

- Promote effective interprofessional practice through clear role clarification, ongoing collaboration across the multi-disciplinary team, and a single point of contact for consumers. Team members share a common vision focused on effective and timely delivery of services to consumers.
- Offer shared training and educational opportunities to promote interprofessional collaboration and encourage the shared transmission of knowledge.

Person Centred Care

- Placement of the client (including the individual, his / her family, and caregivers) at the centre of all assessment, decision making, and implementation.
- Give special attention to the client's meaning of 'home,' encourage empowerment in clients to manage their own wellness, and value the contributions of clients to the HM process.
- This approach increases the likelihood of successful uptake and continued use of the HM, minimising common barriers that have emerged in the literature.

Policy

- Develop a coordinated, integrated nationally recognised HM policy to guide the design and implementation of HM programs. Aim to integrate elements of previous ageing, health, community care, and housing policies to minimise existing confusion and develop a better match between client needs and service provision.
- Utilise consumers and professional perspectives to inform policy change, ensure applicability of policy across a range of people and places, and disseminate policy broadly to increase awareness of HM options and pathways.

Funding

- Maximise available funding by creating fast-track systems and shorter application forms, utilising technology to aid with assessment, and developing self-assessment systems to accelerate high priority cases.
- Encourage universal design principles in new and renovated homes to reduce the costs of HM over time.
- Adapt loan schemes to select individuals based on key demographics, rather than relying on time consuming case-by-case means testing. Promote State and Territory-supported preventative HM measures to prevent further health decline in individuals who fail to meet eligibility criteria.

Workforce and Training

- Develop appropriately selected, skilled, and educated HM workforce teams. Promote specialised skills in eligibility / funding / legislation compliance, philosophies of re-ablement and person-centred practice, and safety and quality standards.
- Training, supervision, support structures, and service delivery guidelines are required for all team member roles within HM services for both complex and non-complex pathways.

Table of Contents

Section 1 Introduction

1.1 Background

The ILCWA has been a key independent provider of information and advice about assistive technology (AT; often referred to as aids and equipment) since 1978. The number of older persons accessing the ILCWA services has steadily increased over the last ten years, with over 50% of current ILCWA clientele over 65 years of age. This proportion is continuing to increase and is consistent with the ageing demographic trend. The need for appropriate HMs and equipment to support a person who is older or living with a disability to remain at home and overcome difficulties in daily living activities is an area growing in demand.

The ILCWA is working in partnership with the WA HACC Program to inform the further development of a sustainable and equitable service delivery model for HACC eligible persons to access HMs and AT throughout WA. A key driver for this initiative is the move towards greater consumer choice and control in Australia within both the Disability and Aged Care sectors. This move suggests that in order for consumers and family members to truly have informed choice and greater control in decision-making, they must be assisted to develop greater knowledge and awareness of HMs and AT that is appropriate, obtainable, and cost effective.

HM has been a service type under the HACC Program since 1986. The HACC Program was established as a joint Commonwealth, State, and Territory Governments initiative. The target group for the HACC Program is people who are older and frail and having difficulty with everyday tasks, younger people living with a disability and carers of a frail older person or someone with a disability. Within the context of HMs, the HACC Program aims to provide a range of basic support services for clients and their carers to reduce stress, increase safety, and maintain independence at home and stay connected to the community. Further goals include enhancing quality of life and reducing admissions to long-term residential care through providing flexible, timely services responsive to the needs of consumers. Despite recognition of need, there is considerable variation across Australia in the level and distribution of HM services available. When preparing for the introduction of the Commonwealth Home Support Programme in July 2015, the Commonwealth Government began reviewing specific HACC programmes including HM services.

The introduction of the WAAF in January 2011 signalled a significant reform and major redesign in community care that addressed population change and delivered choice and control to consumers. The WAAF was the first implementation of specialist screening and assessment services for HACC clients across a jurisdiction in Australia. In addition, the WA HACC Wellness Approach was developed and incorporated into WA in 2006. Wellness is a holistic approach that covers "physical and psychological wellbeing, individual health, community connections, practical support and whatever gives each individual's life meaning and purpose" (O'Connell,

2013, p. 26). Wellness "builds on disablement theory conceptualising illness / dependency versus wellness / independence cycles and identifying a range of measures to minimise the former and build on the latter" (Layton, Wilson, & Andrews, 2014, p. 20). This concept of 'Wellness': "addresses a client's needs in a holistic way considering their strengths, abilities and difficulties; enables a client to set their own goals and make decisions about the support they receive; ensure the support is delivered in partnership with the client; encourages clients to remain involved in their community and maintain social connections; supports client choice and decision making" (Layton et al., 2014, p. 20).

The Re-ablement Service Model refers to support within the home environment, namely rehabilitation of occupational and social functions in frail older adults with chronic illness.[50] Re-ablement in WA is currently targeted through initiatives such as the Home Independence Program and Personal Enablement Program. Re-ablement services aim to promote skill development and confidence for living independently, reduce caregiver burden, and prevent residential aged care admission by building capacity in individuals to 'do for themselves', rather than 'have done for them.' From a re-ablement perspective, programs are developed to incorporate exercise and health promotion, as well as interventions including HMs, aids, and equipment where required. Recently identified, "combining a period of re-ablement intervention with HMs has been shown to reduce the subsequent use of care services" (p. iv).[50] Consequently, "HMs can have positive outcomes for individuals and may reduce the need for downstream care" when embedded in a re-ablement focussed approach (p. iii).[50] It is suggested that a re-ablement approach provided as an intake mechanism for all new home care consumers is cost-effective in terms of preventing residential aged care admission, cutting demands on higher level services,[34,35] and minimising the use of home care services.[40,41] A randomised controlled trial (RCT) of a home independence project by Lewin and colleagues (2013) reported a lessened need for ongoing personal care in an intervention group, compared with a control group. At the 12 month follow-up, control group participants also showed a significant increase in dependency on instrumental activities of daily living (IADLs), unlike the intervention group who did not. Similarly, a reduction in the risk of mortality was reported in a study in New Zealand by the Ministry of Health (2006).[77]

The philosophies of Wellness and Re-ablement have encouraged a greater focus on identifying a person's needs for HMs and AT as part of the assessment process to enable clients to remain as independent as possible in their own home. Different to other states and territories, since 2006 WA and Victoria have provided their services within broader HACC models with a focus on a re-ablement approach. The growing awareness of the benefits of HMs to people living with disabilities and older persons has also highlighted the barriers to accessing HMs and AT within the current system. In WA there are multiple access points and pathways to HMs and due to a range of different funding sources and their respective criteria, clients, service providers, and professionals can experience confusion, frustration and inconsistent approaches.

As part of a continuous improvement process in WA HACC and to further develop a best practice HM & AT service model for HACC clients, the ILCWA engaged the School of Occupational Therapy and Social Work at Curtin University to work in partnership to conduct a scoping review of the literature on best practice in HMs. This scoping review examines innovative practice in HMs with particular focus on service delivery and referral processes. The understanding of best practice will inform development of a sustainable and equitable service delivery model for people in WA. The model is developed in the context of major disability, health and aged care reforms, and housing policies, such as the National Health Reform package and Living Longer Living Better Reforms. Understanding the context ensures that the best practice policies and strategies developed support educators and assessors to provide individuals with the information to make informed choice; a factor critical in ensuring client-centred and consumer-directed care.

1.2 Approach

Guiding Principle

Underlying our approach to this scoping review was a focus on re-ablement, taking a multi-component approach to exploring current practices for HMs that promote capacity for community living in individuals accessing support.

Question

The question addressed by the review was:

What are the key factors that influence best practice HM as identified in the literature?

We aimed to address service delivery including end-to-end processes, specifications, early intervention, prevention, access, assessment, follow up and maintenance, and the role of the service providers (i.e., training and quality standards of assessors and tradespeople). From the re-ablement perspective, our goal was to explore the practices that best support the safe, confident, independent living of individuals accessing support in the community.

Objectives

The primary objective of this scoping review was:

To identify, evaluate, and summarise the literature on best practice in HMs, in particular focusing on the key components that contribute to service delivery including end-to-end process.

The secondary objective was:

To conceptualise a service delivery model that is informed by best practice guidelines.

The purpose of this report is to provide a summary of the review undertaken, highlight some gaps in the current research base, and make recommendations from key findings to inform and underpin the further development of a best practice HMs service delivery model for WA HACC clients in WA.

Across the reviewed papers, the terms 'home modifications' and 'home adaptations' were used interchangeably. For the purposes of consistency, this report will use the term 'home modifications' (HM / HMs) throughout.

1.3 Structure of the Report

Chapter 2 of this report outlines the scoping review plan including the search strategy, eligibility criteria, and screening and data extraction processes.

Chapter 3 presents the study results organised according to an overview of HMs, principles of best practice service delivery, and environmental factors relating to service delivery. Tables preceded by the letter 'A' can be found in the Appendix at the end of the report.

Chapter 4 offers a summary of findings and their implications for practice, introduces a model for HM service delivery based on best practice principles, and reviews a number of identified practice and research recommendations.
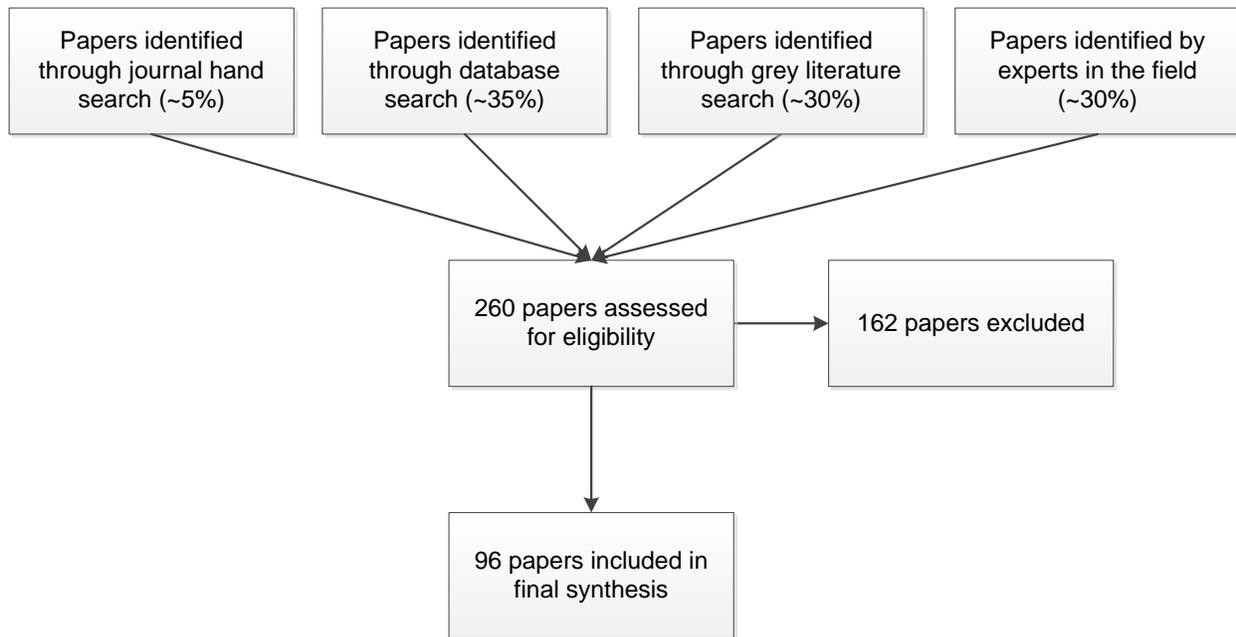
Section 2 Methods

2.1 Search Strategy

We searched CINAHL, MEDLINE, OTSeeker, ProQuest, PubMed, Scopus, ScienceDirect, and the Curtin University Library Catalogue from September 2014 to January 2015. We also hand searched relevant text books and key OT journals from Britain, Australia, America, Canada, Scandinavia, and New Zealand. A general search of the Internet was conducted through websites such as HM Clearing House NSW, Home Modification State Council in NSW, Australian Housing and Urban Research Institute, EnableNZ, Age Concern UK, and Care and Repair UK. To ensure a comprehensive review, we contacted experts in the field to identify any further potentially relevant papers.

2.2 Eligibility

Key search terms included: (home modification OR home adaptation OR adaptable housing OR environmental intervention) AND (guidelines OR models OR service delivery OR evaluation OR outcomes). These search terms were used in varying combinations and full search strategies are available from the authors upon request. Papers were included if they focused on research methodology, evaluation, and outcomes (e.g., quality of life, cost effectiveness, effective assessment, approaches with evidence of components of best practice, or issues from various stages of the HM process). Only papers written in the English language were considered eligible. Papers were excluded if they were too general in relation to the aim of this review (e.g., about general OT interventions), focused specifically on only one area of HM (e.g., rails or ramps), or had an environmental focus that was too general (e.g., not on physical environment issues). Any paper based on opinion or that had a predominately pedagogical focus was also excluded. Processes to modifying homes in metropolitan, urban, and rural areas were included.

2.3 Screening and Data Extraction

Two reviewers independently screened titles, abstracts and / or contents pages, introductions, and conclusions against eligibility criteria (Figure 1). Any disagreements were resolved by discussion and / or in consultation with a third reviewer. The search identified a total of 260 papers. Papers were imported and managed using EndNote software and data were extracted and categorised into an evidence spreadsheet. A narrative synthesis of the data was conducted to summarise the key factors that influence best practice HM processes.

```
┌─────────────────┐  ┌─────────────────┐  ┌─────────────────┐  ┌─────────────────┐
│ Papers identified│  │ Papers identified│  │ Papers identified│  │ Papers identified by│
│through journal hand│ │through database  │  │through grey literature│ │ experts in the field│
│  search (~5%)    │  │  search (~35%)   │  │  search (~30%)   │  │    (~30%)        │
└─────────────────┘  └─────────────────┘  └─────────────────┘  └─────────────────┘
```

Figure 1. Flow diagram of paper selection process.

Ninety-six of the retrieved papers were considered eligible and are categorised in Table 1. In total, 11 categories were formed to reflect the most salient elements of best practice for HMs. The study designs were classified according to the RTI-UNC Classification Tool for analytic and descriptive studies (Hartling et al., 2010).

Given the nature of the topic, the review was not limited to published journal articles, but rather included a range of published and grey literature. The broad range of search methods used enabled the greatest chance of obtaining relevant papers. We found many relevant articles, reports, and organisation and legislative specifications. This scoping review presents an international summary on HMs, focusing specifically on the key components that contribute to best practice in service delivery. The review does not address the methodological rigour of the included papers.

Table 1

Papers Categorised by Theme and Study Design

Categories	No.	Study Design
Service delivery	36	Cross-sectional,[30,47,49] descriptive,[2,9,15,16,18,22,24,39,40,42,46,50,57,64,66,67,73,80,89,96] mixed methods,[17,41,78,90] non-randomised controlled trial,[70] qualitative,[5,36,37,65,72,74] systematic review,[31,91]
Practice guidelines	51	Before-and-after,[82] cross-sectional,[30,47,68] descriptive,[2,9,10,11,15,18,19,20,21,22,34,35,39,40,42,50,53,56,63,64,66,73,77,80,81,85,89,96] mixed methods,[17,90] non-randomised controlled trial,[70,75] qualitative,[5,36,37,45,65,72,74,76] randomised controlled trial,[86,87,95] systematic review,[8,92] time series[27,28]
Policy	19	Cross-sectional,[47] descriptive,[11,18,21,22,24,35,40,42,46,67,81,93] mixed methods,[41,78] qualitative,[5,36,38] systematic review[31]
Workforce and training	43	Before-and-after,[82] cross-sectional,[26,30,47] descriptive,[2,3,4,16,18,20,23,24,32,35,39,40,42,46,50,56,57,63,64,66,67,73,77,80,81,84,88,96] mixed methods,[17,41,90] qualitative,[1,5,36,51,65,72,76] systematic review[31]
Barriers	25	Before-and-after,[82] cross-sectional,[68] descriptive,[2,10,16,18,24,35,42,46,50,53,60,77,80] mixed methods,[41,43,78] qualitative,[5,36,37,72] systematic review[8,92], time series[83]
Prevention	22	Cross-sectional,[47,49] descriptive,[11,18,39,42,46,50,66,77,81,89] non-randomised controlled trial,[70] mixed methods,[90] qualitative,[5,36,37,74] randomised controlled trial,[86] systematic review,[13,91] systematic review and meta-analysis[14]
Role of the Client in HMs	27	Cohort,[52] cross-sectional,[7,47,49] descriptive,[35,40,46,50,53,60,64,77,80] mixed methods,[41,78] non-randomised controlled trial,[70,75] qualitative,[5,6,36,37,38,45,51,65,72] systematic review[31]
Assessment and follow up	45	Before-and-after,[62,82] cross-sectional,[26,30,49,68,69] descriptive,[9,19,25,32,34,35,39,40,46,50,54,56,57,59,60,79,81,96] mixed methods,[12,17,41,43,90] non-randomised controlled trial,[70,71] qualitative,[5,36,51,76] randomised controlled trial,[86,87,95] systematic review,[13,92] systematic review and meta-analysis,[14] time series[27,28,29]
Follow up and maintenance	21	Cross-sectional,[47] descriptive,[15,18,21,46,50,53,60,63,89,77] mixed methods,[41] non-randomised controlled trial,[71] qualitative,[5,72] randomised controlled trial,[86,95] systematic review,[31] systematic review and meta-analysis,[14] time series[28,83]
Minority, Remote, and Rural Groups	6	Cross-sectional,[47] descriptive[16,50,93], mixed methods,[41], systematic review[31]
Funding	21	Cross-sectional,[49] descriptive,[2,4,11,15,16,18,32,40,42,46,50,67,80,81] mixed methods,[41,78] qualitative,[36,65,76] systematic review[8]

The review spanned eight countries (with some originating in more than one country). The largest proportion of papers were sourced from Australia, followed closely by the USA and UK (Figure 3).
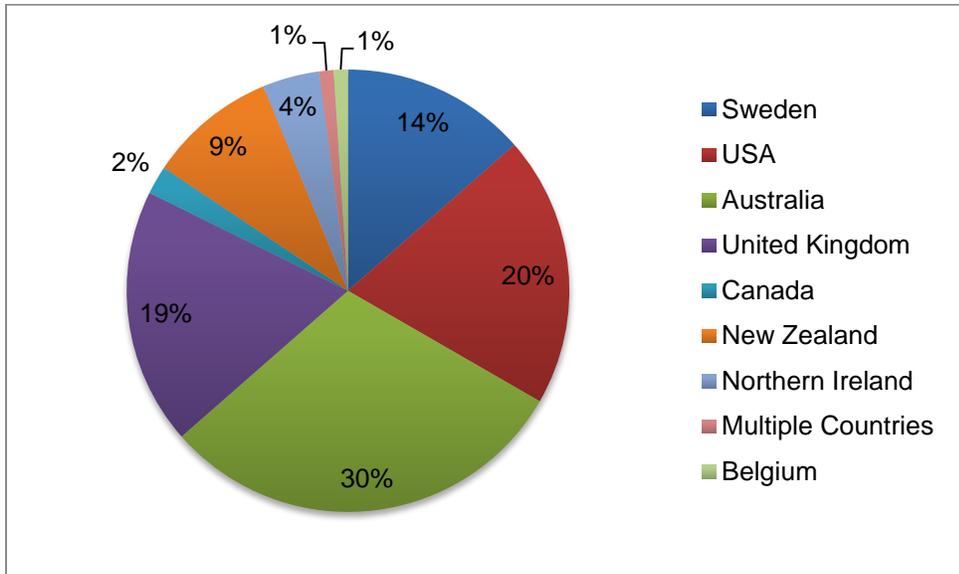

Figure 3. Proportions of reviewed papers by their country of origin.

Section 3 Results

This section outlines the findings from the literature reviewed, across the themes examined as specified in Table 1 above. An overview of HM is provided to give a detailed understanding of the complexity of service provision in this field, its purpose and documented benefits.

The findings then fall into two broad categories. Firstly the key components of best practice are identified as essential principles that must be considered in service delivery. Secondly, a range of environmental factors, including policy, legislation, funding, workforce, barriers and enablers, vulnerable groups, and prevention informs the service delivery context.

3.1 Overview of HMs

<div>

KEY HIGHLIGHTS

➢ Rates of hospitalisation in older adults are strongly linked to nature and quality of home environment.

➢ HMs are most frequently obtained for reasons of safety.

➢ HMs are most common in females, individuals over the age of 65 years, and those who live alone and/or have lived in their home for 10+ years. Specific health conditions (e.g., diabetes, stroke, fracture, joint replacement) increase likelihood of HMs.

➢ Older adults tend to receive less expensive HMs.

➢ Most frequently obtained HMs include lighting installations, facilitators to self-care, and mobility and accessibility enablers.

➢ Following HMs, the majority of recipients expect to live in their home for a further 10+ years.

➢ Greatest improvements as a consequence of HMs tend to be in the first three months.

➢ Benefits to client include: increased freedom, accessibility, confidence, independence, safety, privacy, self-rated ability, sense of normalcy, and reduced fear of falls and depressive symptomatology.

➢ Benefits to caregiver include: relief of burden, diminished worry, reduced personal pain/injury, and improved social inclusion and sense of security.

➢ Social/economic benefits include: reduced health care costs as a result of fewer falls and hospital admissions, safer working environments for staff, and reduced demand on formal care and admissions to residential care.

</div>

Across the chosen papers, this review identified the overall purpose of conducting HMs; the types of HMs typically sought; and the short and long-term impacts of HMs for the client, their caregiver(s), and the wider society.

Purpose of HMs

- There was an increasing desire of older adults to remain at home for as long as possible, regardless of ageing-related declines in health and mobility. Many countries

have responded to this need to enable and encourage older adults to remain in their own homes and benefit from the higher quality of life associated with living at home.[49,51,53,73] "A high percentage want to remain in their existing housing as they age, but a very high proportion of existing housing is inaccessible" (p. 266).[12]

- The most commonly reported reasons for obtaining HMs included: accessibility to bath / shower (83.7%), feeling safe (79.3%), general household functioning (73.9%), toilet use (69.6%), requiring less help (68.4%), mobility outside the house (66.3%), and continuing interests (55.4%).[7]
- HMs were more common in adults over 65 years,[41,46,62] and in females.[41]
- There is a clear need for ongoing evaluation to assess the degree of fit between the client's level of functioning and what their physical environment can provide.[43]
- A family caregiver study illustrated that "modifying P-E interactions can reduce caregiver upset, enhance efficacy in managing complex behavioural problems, and slow the rate of functional decline in persons with dementia (Gitlin, Corcoran, Winter, Boyce, & Hauck, 2001). Similarly, a second study of frail older adults demonstrated a slower rate of functional decline following a HM intervention (Mann, Ottenbacher, Fraas, Tomita, & Granger, 1999)" (p. 635).[34]
- "There is recognition of the links between rates of hospitalisation of older people and the nature and quality of their home environments" (p. 29).[46]
- In the only study in this review on visual impairment all participants agreed that use of HMs could improve quality of life.[74]
- "There are also specific health conditions, such as diabetes, stroke, hip fracture, fall or joint replacement that increase the likelihood of having HMs (Tabbarah, Silverstein, & Seeman, 2000)" (p. 59).[46]
- The physical functionality of older adults was one of the main factors for HM.[49]
- HMs are much more common in those who live alone, than with others.[46]

HM Types

- The most common HM being the installation of lighting, facilitators to self-care (e.g., bathroom and kitchen accessories), and mobility and accessibility enablers (e.g., ramps, handrails, and grab bars).[7,36,43,46,50,53,60,62,71,74,78,82]
- Older adults tended to receive less expensive HMs than younger adults.[51]
- Most common HMs of participants in one study of 121 disabled people identified included: "widened doorways; adjusting the height of sinks and benches; wet area bathroom and other bathroom modifications; easy to get at toilet; access to kitchen; and handrails" (p.19).[78]
- Research on HACC service users revealed "the most common structural work includes changes to bathrooms and kitchens, and widening of doorways. Non-structural work

includes fitting of rails, ramps, alarms and other safety and mobility aids (Australia Department of Health and Ageing, 2006)" (p. 36).[46]

- Identified across several studies, a significant proportion of older people in the UK, Australia, and the US require assistance with property maintenance because of age or disability, i.e., "difficultly maintaining pavement surfaces, carpets, stairs, clutter, plumbing and electrical fittings, as well as roof, windows, doors, and furnaces (Mann et al., 1994)" (p. 56).[46]
- "Apartments are also more likely than a detached dwelling to have modifications, with rented apartments being more likely than owner-occupied units (Kutty, 1999)" (p. 62).[46]

Short- and Long-Term Impacts

- HMs are most common in people who have resided in their house for at least 10 years (Kutty, 1999).[46] Further, the majority of clients expect to remain in their homes for at least another 10 years after having HMs.[7,49]
- A range of short and long-term benefits for the client, their caregivers, and society in general, were reported.
- The perseverance of these changes was varied, the greatest improvements were reported over the first three months, with little change between three months and two years.[83]

Benefits to the Client

- Increased freedom and autonomy;
- Improved accessibility;
- Increased or maintained confidence and independence in daily activities;
- Greater safety and privacy;
- Quicker performance and satisfaction in performing ADLs;
- Enhanced quality of life and wellbeing, slowing the impact of age related disability, and preventing illness;
- Improved self-rated ability;
- More frequent activities outside the home;
- Reduced dependence and burden of responsibility on caregivers and others;
- Regaining a sense of normalcy;
- Relief from pain;
- Reduced fear of accidents;
- Reduced symptoms of depression;
- Fewer behavioural problems in people with dementia;
- Lower mortality rates;
- Lessened strains on spousal relationships and experiences of humiliation as a consequence of toilet adaptations;

- Increased independence & reduced pain & dramatically reduced danger of falls as a result of stair lifts;
- Decreased overall prevalence of disability among elderly adults;
- Promotion of strengthened social networks and relationships.
  [5,10,11,12,13,14,34,35,36,37,43,46,51,52,53,60,62,64,66,68,71,70,73,77,82,83,87,91]

Benefits to the Caregiver

- Relief of burden;
- Diminished worry;
- Improved familial relationships;
- Reduced personal pain and injury when moving clients;
- Greater sense of freedom and autonomy;
- Improved social engagement;
- Increased engagement in extracurricular activities, e.g., education;
- Improved sense of security;
- 75% of carers reported that HMs have been able to assist with their overall management in the home;
- In some cases, especially elderly family members would also benefit from using the HM.[5,11,12,34,36,37,46,51,53,60,64,66,74,77]

Benefits to Society

- Reduced health care costs and fewer hospital admissions as a result of decreased incidence of falls at home;
- Prevention of admission to residential care;
- Energy efficiency from improved heating systems;
- "Social services and health providers also benefit from reduced demand (less need for care, less onerous or risky work for professional carers, less accidents, less likelihood of depression)" (p. 35).[36]
- A safer, more efficient working environment for staff operating in the client's home;
- Reduced hours for carers.[11,36,49,51,60,65]

3.2 Best Practice Service Delivery

A number of the papers reviewed discussed the specific components considered best practice HM service delivery or at least partially addressed aspects of service delivery. These included national and international government documents, organisational reviews and guidelines, as well as three literature reviews, a scoping review, and a combination of qualitative and quantitative research.

In total, 51 papers offered suggestions for practice guidelines. These included elements of good practice, client and family-directed considerations, practice issues (including delays for services and strategies to reduce wait times), theoretical frameworks guiding practice, examples of innovative approaches / models, collaborative decision making, outcomes of good practice, and aspects of good design.

There were some clear themes across these papers including: **re-ablement, accessibility, assessment and review, communication and collaboration, and education and training**. The importance of **outcome measures and service evaluation** to inform practice and service improvement were highlighted. It was also evident there was a lack of research in some important areas.

The findings firstly provide a summary of some of the major issues and challenges in service delivery, and secondly outline the components of best practice HM identified and grouped under the key themes.

KEY HIGHLIGHTS

➢ Timely adaptations dramatically decrease admissions to hospital and residential care. Longer waits are associated with increased difficulty in performing everyday tasks and poor mental health.

➢ 'Fast Track' systems can significantly reduce waiting times and increase client satisfaction.

➢ Initial screening or 'triage' can be effective for collecting customer information, identifying desired outcomes and preferred solutions, and assessing urgency.

➢ Eligibility criteria should be based upon current physical function over medical diagnoses and caregiver needs should also be given priority.

➢ Simplify processes, e.g., reduce funding application forms.

➢ Referral points should be centralised to assist users in accessing relevant services. Target resources at those with the greatest needs.

➢ Consistent approach to assessment, using formalised assessment tools.

➢ The use of ICT by professionals can be cost effective & improve service delivery, especially in remote areas.

➢ Information and support for alternative HM options, e.g., downsizing, accessing equity, or self-funding can result in significant savings

➢ Service providers should ensure they have capacity for follow up and reassessment to ensure outcomes are achieved.

➢ Arrangements should be made for the provision of repairing or recycling products/equipment installed.

➢ Earlier intervention can often result in cheaper solutions or encouragement to self-fund improvements, rather than the commonly held fear of it resulting in higher levels of unmet need due to limited resources.

➢ Elements of good practice include: a reliable screening system, a P-E focus, multi-disciplinary approaches, staff working together in a single team, setting performance targets to improve outcomes, and consideration of the client.

➢ OTs must understand individual needs and not be driven by HM design process. OTs must be aware of quality products and ensure aesthetics and changing client needs are considered.

➢ Delays for HMs can be reduced through: installing HMs when the need arises, employ suitably qualified health professionals when modifications do not warrant OT referral/assessment, employ self-assessment to release staff time, develop a single database of client information, and utilise portable IT to communicate and capture information.

➢ Develop a charter for simple and complex HM timeframes with particular focus on priority cases.

➢ Programmes should incorporate elements of re-ablement or restorative approaches to better support ageing in place.

Issues and Challenges

Many common and significant issues were identified with regard to end-to-end processes of HM service delivery:

- the application of relevant legislation;
- inequity and inconsistencies in standards, policies, and service frameworks;
- complex funding arrangements;
- low level of alignment with core principles;
- confusing eligibility criteria;
- lack of prioritisation; and
- poor user and professional knowledge of access to HM services.
- building professionals having inadequate information about benefits, products and / or services as well as a lack of understanding about building code requirements impacting on HM uptake, quality, and costs. [2,22,24,30,37,41,42,46,47,50,66,74,78,80,89]

Across the reviewed papers, specific issues included:

- A lack of awareness or ignorance of reforms (e.g., Ageing in place, and innovative approaches to treatment such as re-ablement) had major implications.[50]
- Other issues with governance included poor referral management, poor knowledge or understanding across sectors, and lack of arrangements between key stakeholders (e.g., funders, Department of Housing, DVA) which impacted on managing referrals and duplication. [9,46,66,65,72]
- There was a lack of psychometrically sound instruments for outcomes evaluation and assessment tools, a lack of follow up processes and maintenance services, insufficient reporting processes, and inadequate on-going audit processes and procedures across tenures.[5,41,46,66,70,78]
- Some papers reported no formalised guidelines for workforce competencies, resulting in poor quality service at all stages, and a lack of appropriate database systems for tracking equipment.[22,66,78]
- The impact of poor access to HM services had a major effect on those from minority groups (e.g., CALD and Aboriginal communities) often due to a lack of culturally appropriate services, extra costs, and lack of staff.[42,46,47]
- The specified and actual wait times for all stages of the HM process varied, that is, assessment, quoting, funding, works completed and follow up, with variations across services and types of works completed.[36,41,46,65]
- Due to various demands placed on health professionals, they often had limited time available to spend with clients to enable them make informed decisions about HM.[65] According to Heywood (2004), "in some cases, professional judgement may be distorted by these organisational constraints, resulting in recommendations by OTs being ineffective or even seriously harmful to service recipients" (p.71).[46] One study found that

the most common causes of specifications not being adhered to were rigid rules in budgets and lack of time for assessments.[36]

- The role of the OT is central to the HM process. It is important that OTs are guided by specific principals of ethical and legal issues (particularly in relation to funding and building codes and standards) in HM practice. [2,21,50,73] Good documentation is also essential.[2]

- In a study of 1,679 OT's many issues impacted on practice, i.e., lack of feedback, insufficient processes, organisational constraints verses client needs, different professional perspectives, obligations, and mutual understanding.[30] In Australia, the KPMG report identified "a low level of alignment to contemporary person-centred practice" as a problem (p. vii).[50] Further, a key issue identified in other research was the lack of knowledge service users, health, and building professionals had about the benefits impacting on uptake and quality of HMs.[2]

- The lack of attention given to certain client groups who would benefit from more research and education was reported. "The traditional housing adaptations focus has been on the needs of people with mobility impairments. Increasingly the housing adaptations needs of other groups of users such as people with sensory impairments are being given a higher profile" (p. 67).[65]

- In many countries, legislation does not include mandatory accessible quality and design of private homes.[2] One exploratory study provided an overview of issues in rural Australia in which OTs revealed it was not always possible to comply with Australian Standards 1428 (AS1428) and that regulations in rural building practice are relaxed due to the informal work nature and access to qualified HM personnel.[47]

Components of Best Practice HM Service Delivery

Key Theme: Re-ablement

HM service design and delivery requires a re-ablement approach, enhancing and empowering individuals with ageing, disabilities and other related conditions to maintain independent living for as long as possible. HMs should harness the strengths of the individual and be chosen to improve independence in ADLs, increase safety in performing these activities, and reduce caregiver burden. Service provision must be timely and efficient to avoid unnecessary delays and meet demands as they occur. Identified here and elsewhere, the outcomes of HMs are significantly improved when embedded in a holistic, re-ablement focused approach.
Benefits of a re-ablement approach include reduced care needs, health care cost savings, major reductions in hospital stays, better self-care, household management and mobility, reduced falls and likelihood of visiting Accident & Emergency, higher morale, and reduced carer burden.[77]

A Person-Environment Focus

With time-limited multi-intervention is described as the appropriate theoretical framework for re-ablement. Many papers provide evidence supporting the person-environment (P-E) fit approach as an important concept in HM practice and research [11,27,28,76,82,85,86,87,92.] One study concluded that "the most effective interventions will be those that increase the capacity of the individual and decrease the demands of the environment" (p. 2315) [86.] Service providers need to ensure congruency between individual capabilities and the environment in they operate, in order to achieve positive results in occupational performance.[82]
"Modifying P-E interactions can reduce caregiver upset, enhance efficacy in managing complex behavioural problems, and slow the rate of functional decline in persons with dementia (Gitlin et al., 2001)" (p. 635).[34]

One longitudinal study using the P-E-A concept reported the need for considering both components of P–E interactions, in order to improve the utility of housing. This approach highlights the importance of practitioners paying attention to both objective and subjective aspects of person and environment.[27] Some programs demonstrated improved service outcomes such as reduced use of hospitals, home care, and nursing homes when using components of the Active Service Model, i.e., re-ablement, social rehabilitation, and cognitive rehabiliation.[77]

One paper reported on a variety of similar programmes that have been developed throughout Australia, UK, US, and New Zealand that incorporate elements of the active service approach, i.e., programmes incorporating re-ablement or restorative approaches with clients with various levels of dependency in order to support people to 'age in place.'[42,77] A key consideration when introducing new preventative services includes consideration for improved quality of life, as perceived by the older people. "Clients should be provided with training to empower them to identify barriers in the home and implement their own solutions, thereby enabling them to manage their own wellness" (p. 2). [60]

Therapy-based rehabilitation services (i.e., OT, physiotherapy, and other MDT staff) appear to improve independence in personal ADLs such as walking and dressing. These services also reduced the likelihood of health deterioration, institutionalisation, and unnecessary deaths. [77]

Three papers report on an innovative approach to HM intervention called The Community Aging in Place, Advancing Better Living for Elders (known as CAPABLE). Methods include rigorous clinical trials and demonstrated strong external validity. CAPABLE examines whether home-based intervention can improve physical performance and reduce health care costs as a result. The program provides OT, physiotherapy, nursing, and handyperson interventions. "The primary outcome from the preliminary trial [was] decreased disability in self-care ADLs. Secondary outcomes [included] sustained decrease in self-care disability and improvement in instrumental IADLS, strength, balance, walking speed, and health care utilization" (p. 102).[87] Ninety four per

cent of the participants reported the CAPABLE intervention made their life easier.[86] The intervention group improved on all outcomes. When comparing mean change from baseline to follow-up, the CAPABLE intervention resulted in effect sizes of 0.89, 0.63, 0.62, and 0.55 respectively for quality of life, less difficulty in ADLs, less difficulty in IADLs, and falls efficacy.[86] These studies suggest significant potential for the elderly to remain more independent as they age in place. This approach demonstrates major potential for reducing hospital and residential care admissions, preventing accidents, reducing functional limitations, and improving well-being.[86,87] One limitation of CAPABLE is that it is a short intervention with older adults who may potentially require longer-term strategies due to ageing-related and other disabilities.

Client Focussed Care

An important element of re-ablement is client-focussed care. There was an emphasis in the literature on empowerment, autonomy, choice, and control by involving clients throughout the HM process, particularly when it came to problem solving and decision-making. Also rated as important was ensuring regular updates and consultation and decreasing factors that undermine control, [5,36,37,40,65,66,75,76,86,87] i.e., hazards within the home, pain and depression as a result of feeling dependent on others, isolation, humiliation, loss of control, and meaning of home for the person.[2,5,37,45,68,76,86,87]

HM intervention using a client-centred approach is an effective method for improving occupational performance and adherence to using recommended HMs. [82,83] Health professionals, particularly OTs, need to understand their client's personal experience of home and provide comprehensive follow up and evaluation.[5]

Clients should have a single point of contact throughout the process, checking regularly to ensure quality of work, client satisfaction, and to deal with problems as they arise.[15,36,65] When works are completed, a final evaluation should be done for quality purposes and to ensure clients are aware of the full benefits of the HM.[65] Other recommendations for improving the client experience include:

- "Carry out joint site visits at critical stages of the process to ensure clients are clear about the work being carried out.
- Provide good visual presentation of complex adaptations.
- Give clients step-by-step guides to the process including timescales" (p. 38).[65]

It is important to have policies in place to provide pathways to other options if the current service provider is unable to fulfil client needs. Some options identified in the literature that have merit include: moving or downsizing homes[15,50] self-funding, supporting universal design principles, access to equity,[50] updated databases for qualified tradespeople and private service options for repairs and maintenance, and lastly use of local accessible housing registers.[15] For example, the provision of early information about options, advice, and financial and practical support to

move can result in significant savings.[15] Given the importance of this element, the role of the client in HM is explored in more detail in section 3.3 p 67.

Carer Empowerment

"The needs of the informal caregivers should also be considered, because any changes in the living environment will simultaneously affect both the care recipients and caregivers" (p. 654).[49] HMs should promote independence, privacy and safety, and positive outcomes for both clients and their caregivers.[64] Core processes should produce the desired outcomes for service users and their carers, including risk management and re-ablement[50,66] as measured by user satisfaction and acceptability.[40,66]

Good Design

OTs must understand the needs of the individual and not be driven by HM design process. OTs must be aware of quality products and ensure aesthetics and changing client needs are considered.[2] Some of the items considered essential for best practice in designing HMs included:

- HM design standards for all tenures;
- Design formats for visualising and discussing proposed HMs. For example, developing scaled drawings using software such as IDAPT spatial planning;
- Addressing design issues in and outside the house;
- Utilising space standards, functional considerations, and design templates to assist with space requirements. This is important for standardised formats for HM recommendations, financial governance, specifications, and follow up.[20]
- Universal forms for technical specifications and electronic formatting to improve communications.[20]
- Develop a design guide that reflects common community care needs, and put processes in place to ensure a single point to manage and update the guide. Make the guide freely available.[65]

The Northern Ireland Housing Executive (NIHE) design practice guidelines state key elements to consider during the design process include: function, affordability, appearance, and keeping in with current design practice.[6] The Home Adaptations Consortium guidelines UK[40] supported by several other papers, identifies principles of good adaptation design as:

- Promoting independence, privacy, and safety through good environmental design.[15,19,20,40,64]
- Offering options through innovative design, within financial constraints;[15,20,40,64]
- Maintaining efficiency and effectiveness – giving clear specification to meet the needs of the user.[19,40,72] For example, the use of sketches prepared through computer aided

design, such as 3D modelling, portable IT, and web based presentations, provide opportunities for clients to see and try potential solutions;[10,15,20,40,64,65]

- Design addressing impairments related to mobility, agility and dexterity, balance, and stamina;[80]
- Incorporating design features to increase autonomy and choice promote ongoing tenure.[80]

Use of Technology

A good practice HM model should include good alignment with technology, from simple to complex aids and equipment, especially "where it can assist in bridging workforce shortages, support less experienced staff, and support time efficient practices within service delivery" (p. 44).[50]

The role of AT within HMs requires ongoing evaluation to ensure compatibility between assistive technologies.[65] Service providers and funders need to ensure appropriate systems and resources are in place to keep up to date with the use of emerging technologies that assist in providing safe and secure home environments for older persons e.g. mobile technology, smart homes, telehealth. Providers must incorporate both user and technical dimensions. "HM design also needs to consider using new and specialist equipment in people's homes to support community care…. As new design guidance and technology emerges to meet the needs of various user groups, it will need to be reflected in new design guides" (p. 67).[65] Technical awareness should enhance inter-agency communications to ensure the client's needs are best met. "Key areas for technical awareness training include: awareness of new housing design standards relating to the needs of people who are disabled [and] improving visual communications techniques - sketch drawing, reading plans, using digital cameras and laptops" (p. 47).[65]

The use of information communication technology (ICT) by professionals can also be cost effective[31,46] and improve service delivery. For example, camera phones to capture necessary evidence, drawing applications for smart phones, the use of Skype for videoconferencing, and other technologies used to complete application forms and calculate financial contributions.[40,46,50] ICT facilitates better collaboration between all parties involved in the provision of HMs and allows all stages to be delivered in a time-efficient manner. Life Tec in Queensland found using ICT "helps compensate for the difficulty in accessing OTs and has been especially beneficial for those in rural and remote areas" (p.10).[46] Middlesbrough Council in the UK introduced mobile working and, as a result, made significant improvements around waiting times, enabling assessors to make referrals from the client's home.[40]

Key Theme: Accessibility

With an increasing CALD population and with greater geographical spread, HM accessibility for people of all cultures, locations, socioeconomic statuses, ages, and disabilities is paramount. Flexibility of services, adequate prioritisation, and provision of funding is necessary to meet the growing needs of a changing demographic.

Equitable Access

Equitable access to basic and essential HM should be integrated consistently across all health services, community providers, and other agencies.[22] "Resources should be targeted to those in greatest need" (p. 137).[66] Develop agreed priority criteria and procedures for dealing with clients with urgent needs. The user and carers should experience a co-ordinated service regardless of budgetary constraint.[15,40,66] To empower people who are older or living with disabilities with greater rights for access to HM assessment, access routes into the service need to be simple and direct. A single central point of enquiries for referral, with a consistent response at the first point of contact and good feedback about progress, would assist users in accessing relevant services.[15,46,64] Whether the initial access point is facilitated through a one-stop-shop approach or a single free-phone number and on-line access, the point of access should be universally available and acceptable, providing cost effective HM information and advice, regardless of eligibility for support.[15,40,57] "Early liaison between health and HM services has also been identified as important in reducing the length of stay of people in hospital and facilitating early return to home" (p.69).[46]

Evidence suggests eligibility criteria should be based upon physical function rather than just the specific medical diagnoses aiming to address functional goals of the client and not just their medical issues[35,68,86,87] and include consideration of the caregiver's needs. A good practice example has occurred in Ontario, Canada. Here eligibility is simple: frail older adults aged 65 or older, or family members housing a frail older adult. "There are no income restrictions, clear guidelines are provided regarding which renovations can be reimbursed, few restrictions are imposed related to maintaining the reimbursed status, and incentives are simultaneously provided for both caregivers and their older care recipients (Ontario, 2013)" (p. 655).[49]. There needs to be clarifications for palliative clients, as to whether they are appropriate for major HMs.[41]

Transparent Decision-Making

Transparent decision-making is fundamental to equitable access to HM services. Health and construction professionals and researchers should be clear on who is responsible for HM decision making and what influences these decisions in order to maximise the benefits for older adults and their caregivers.[49] To improve service user involvement / interfaces in decision

making, HM organisations need structures that will inform service planning, delivery, and evaluation. The following actions emerged from the literature:

- "Establish a disability forum to further strengthen representation of disability issues" (p. 52) within the health, community care, and housing sectors.[66]
- HM organisations to "determine the most efficient user involvement framework" (p. 52) in consultation with the client, family, and aged and health care bodies.[66]
- "Establish an expert panel of service users, community OTs, designers and relevant housing officers, to evaluate housing design standards and fixtures and fittings required by disabled people. The standards and performance criteria agreed will inform relevant procurement processes" (p. 52).[66]
- Quality and choice should be the shared goals of all partners in service delivery. HM should be delivered sensitively and with consideration for changing needs.[15]
- "Further support the development of user interfaces with housing adaptations information services and in particular the development of an accessible housing registers" (AHR; p. 52).[66] (For examples of AHRs see Table A2:4.0).

"All relevant statutory bodies [must] work within the key values and principles that underpin and define partnerships between Government and the voluntary sector…clearly recognising the roles and responsibilities of each partner (p. 52)."[66] Information provided must be consistent and ensure clients and family are involved and informed of what is happening at all stages of the process.[50,65] Having a range of options available will enable individuals to make appropriate choices[15] and allow a uniform approach to major HMs.[41] Different methods to providing information were suggested, the most appropriate will depend upon the type of interaction and feasibility. For example, face-to-face contact is the best means for providing in-depth information and advice.[65] Decision-making should take into account key design criteria for HMs, specifically, that they should be functional, affordable, look good, and keep up with current design practice.[64] The client role in decision-making is explored further in section 3.

Timeliness

"Timely adaptations can have a dramatic impact on admissions to hospital and residential care" (p. 11).[40] Long waits for assessment and intervention can have negative outcomes, e.g., accidents, hospitalisation, poor occupational performance, and reduced mental health[36,70] As one study reported, "for each consecutive month the person waited for their HM the difficulty of performing everyday life tasks increased" (p. 78).[70]

HM services should be provided within specified time frames, within agreed budgets, and as soon as a need is identified[15,22,50,70,91.] WA Health require HM services to be delivered "within a clinically appropriate time frame, regardless of geographical location within WA" (p. 5).[22] Providing HMs in a time and cost efficient manner without compromising on quality and safety was emphasised as a crucial factor in achieving good client and service outcomes by many of

the papers reviewed. Two papers stated that providers should aim to install HMs as soon as possible after the need has been identified.[70,95]

One approach to speed up the provision of some minor HMs is to employ a suitably qualified health professional (e.g., an OTA or TA) when HMs do not require a OT referral or full OT assessment[17,20,39,40,50,64,65,73,90,96] "OTAs (supervised by OT) can provide a valuable additional resource for carrying out assessments" (p. 42). The efficiency of this approach has the potential to offer significant benefits for minor HMs.[40] This issue is explored further in section 3.8 Workforce.

Using self-assessment is another option. It has the "potential to provide faster, easier access to services, promote self-determination, release staff time, and save costs" (p. 23).[90] One study reported that "the mean time between referral and completion of assessment was shorter for the self-assessment recipients than for the traditional assessment recipients (NHS Information Centre for Health and Social Care, 2008)….This led to a shorter waiting time between referrals (five days as opposed to 23 days)…..The equipment provided via self-assessment was primarily intended to help people bathe and mobilise, assist with visual and hearing impairments, and promote independence and re-ablement" (p. 30).[90] Similar to previous research, this study showed no evidence that self-assessment negatively affected levels of satisfaction. The study also demonstrated more expensive equipment could be delivered via self-assessment. Cost savings occurred in the cost of the assessment itself and through less professional time.[90]

Streamlined Processes

Another approach to reducing delays is to avoid duplication of services by using a single database of client information, providing initial screening to identify desired outcomes and preferred solutions, and assessing urgency to resolve immediate AT and minor HM requirements.[15,50,66] All relevant agencies should have a single shared database of client information, including preferred methods of communication, to avoid duplicating records and to enable effective progress tracking. Partnerships should consider joint service standards, pooling of funds, and monitoring of outcomes.[15] Well-established reference groups can act as advocates between services and Government departments.[41]

One service dramatically reduced wait times and costs by eliminating means tests or tenure conditions for simple, single items, e.g. stair lift, level access shower, or ramp. This service involves one joint visit with the OT and caseworker, a rolling contractor list, a simple two-side application form managed via email, processing of electronic drawings on site, and approval notification within 24 hours.[40] Use 'fast track' systems for those in need, e.g., using 'movable' equipment to provide a rapid response. Edinburgh Council created a multi-tenure HMs team that aims for 14 days for assessment by an OT, 28 days for completion of a minor HM, and 13 weeks for completion of a major HM. The team completed 280 major adaptations and 992 minor HMs in one year with a 92% satisfaction rate. [15,18,65] Developing an appropriate procedure, which

minimises the timescales whilst maintaining integrity and value for money is maximised, should be a core objective for all HM services.[15] "There should be sufficient capability both in terms of resources and skill mix to ensure that the processes and internal controls work effectively" (p. 137).[66] For efficient response, initial screening or 'triage' should be used to collect customer information, identify desired outcomes and preferred solutions, and assess urgency.[15] Also recommended is an "immediate (same day) acknowledgement of receipt of a service request, information about how and when the service will be delivered" and a "resolution of immediate requirements, e.g., aids, equipment, and minor adaptations" (p. 8).[15] The use of portable IT to search for retailers or service providers, calculate financial contribution, and complete application forms at the client's home can speed processes up.[40]

Equipment Maintenance and Recycling

Some items installed as part of a HM, such as stair lifts and ceiling hoists, need regular servicing and provision made for repair. It is good practice for these arrangements to be secured at the time of installation, covering the likely service life of the equipment.[15,66] There are also considerable cost savings in recycling adaptations no longer needed by households.[15,36,40] There should be review procedures for dealing with HMs no longer required.

Key Theme: Assessment and Review

Initial assessment should be standardised and used to form a complete picture of the consumer and their needs in order to increase the likelihood of a successful HM. Follow up should be included as a routine component of HMs. Review should include re-assessment to evaluate the usability and effectiveness of installations as well as to account for changing client needs. The focus of both assessment and review should be on increasing the quality of service and consumer satisfaction and minimising resource wastage.

A Reliable Screening System

To determine level of need and identify risk was identified as a critical element of best practice HM.

Robust Assessment

Research findings demonstrated that "traditional outcome measures focusing on occupational performance and safety are not adequate as it may not provide sufficient insight into the broader impacts of HMs" (p. 8).[5] One guide to practice highlighted the importance of using an individual approach and training OTs in various tools and measurement techniques. It was suggested that OTs should use both conceptual and procedural models.[2]

The majority of OTs did not use standardised HM assessment tools,[5,41,46] potentially due to the limited availability of psychometrically sound instruments. They often relied upon information

concerning the home environment from relatives, property-owners, and building engineers instead of conducting their own assessments.[30]

OTs must use formalised assessment tools to ensure consistency of recommendations, particularly for major HMs. A holistic, client-centred approach to assessment is necessary to identify the most appropriate and cost effective HM solution, which may include aids and equipment and / or incorporate re-ablement.[50] In Australia, "due to the specialist nature of HMs, an additional layer of assessment is required which should include consideration of intersections with other service types such as goods and equipment and rehabilitation" (p. 39).[50]

Professionals should take an equitable and consistent approach to assessment (including intake and specialist assessment), prioritisation, and decision making needs to be transparent.[22,50,57] Service assessment and provision should be culturally appropriate. Meeting the needs of vulnerable groups is explored further in section 3.3.

In order to support practical decision making, it is recommended to use both objective and subjective evaluations in combination. Consider "suitability and safety for the whole household, pre- and after-sales services, ease of cleaning and maintenance costs" (p. 41), and attractiveness and value of a property (in order to avoid reducing value). To ensure this, it has been suggested that counselling be a part of assessment.[36]

When considering possible HM solutions, it was suggested that assessors are guided by four key elements: timeliness, meeting the disability-related needs of the person and their family, cost effectiveness, and providing value for money.[56] To achieve successful aging in place, measures should capture "perceived satisfaction, usability, and housing-related control beliefs, as well as examining health outcomes, safety, and well-being in home settings" (p. 655).[49] In order to identify the most appropriate HM solution to meet an individual's needs, assessors need to consider a range of options including: equipment and support packages, the person's ability to benefit from potential HMs, physical features of the home and surroundings, long term feasibility of any proposed HMs, and consideration for cost-effectiveness.[57]

Assessment tools should cover "history of falls, patterns of usage of the home, protective and risk-taking behaviours, functional vision, physical and cognitive attributes that affect mobility and task performance, and fall risk situations such as reaching, climbing, and transferring (Clemson, 1997; Peterson & Clemson, 2008)" (p. 969).[14] Assessment tools should evaluate both the physical function of the environment and the specific needs of the older person. It is important to focus not only on safety and performance problems, but also on injury prevention, caregiver health, and social integration.[46] Development of a 'kit' for OTs that includes: assessment tools, overview of programs and eligibility for them, detailed description of works, practical tips for providers, an OT report template, and a selection of diagrams to accompany reports.[41] Current gaps for further investigation include a valid assessment tool and integrated assessment model for OTs that would improve consistency in applications. In addition, a holistic model that

includes both AT and HM options, encouraging OTs to explore the full range of available solutions.[81]

A total of 29 assessment tools were identified across 45 papers. These assessment tools were used for screening the home environment to modify the landscape for ramps or lifts access, and for analysing the outcomes of HMs. A key theme that emerged was that assessment tools should be chosen for their purpose, clinical utility, validity and reliability, and suitability to the population of interest.[9] A summary is shown in Table 2. These assessment tools were administered by specifically trained professionals,[29,69,76,90] via self-assessment,[9,12,26,27,28,29,51,62,68,86,87,90] through a combination of self-report and clinical observations,[9,57,68,69,70,71,79,86,87] or through a combination of interview and clinical observation.[5,9,13,25,27,28,29,34,35,43,46,49,50,59,60,76,82,92,95] Ease of access and consistent response at an initial single point of contact is crucial for equitable access to assessments for HM needs and also reduces duplication of services.[40,50,57,67,78,81] WA has adopted this model with a central access point and regional assessment teams for conducting holistic assessments.[81]

Table 2

Assessment Tools and Associated Constructs

Constructs	Tools
Person-environment interaction	• Housing Enabler[9,25,27,29,34,60,92] • The Safety Assessment of Function and the Environment for Rehabilitation-Health Outcome Measurement and Evaluation (SAFER-HOME)[5,9] • Meaning of Home Questionnaire[12,68] • Home Assessment of Person-Environment Interaction (HoPE)[76] • Home Environment Assessment Protocol (HEAP)[34] • Housing Related Control Beliefs[68] • Task Management Strategy Index (TMSI)[34]
Accessibility and usability	• Usability in My Home (UIMH)[12,27,28,29,51,68] • Accessibility in My Home[62] • Physical Housing Environment Self-Assessment[26]
Occupational performance	• Canadian Occupational and Performance Measure (COPM)[9,13,35,46,82] • Client-Clinician Assessment Protocol (C-CAP)[69,70,71,86,87] • C-CAP Registered Nurse (RN)[86] • Falls Efficacy Scale[9,86,87] • ADL Staircase[28,29] • A Way to Stay[50,59] • Functional Independence Measure (FIM)[82,95] • In Home Occupational Performance Evaluation (I-HOPE)[5] • EASY-CARE Assessment Tool[90] • Occupational Questionnaire[62] • Katz Index of ADL[49]
Quality of life and satisfaction	• EQ-5D or EuroQOL[87,96] • Housing Satisfaction[68] • Assessment of Quality of Life (AQoL)[32]
Needs prioritisation	• Prioritisation Tool[57]
Miscellaneous	• The Gerontologic Environmental Modification Assessment Forms[43] • Telerehabilitation Housing Assessment[43] • Canadian Mortgage and Housing Corporation Assessment Form[43] • Philadelphia Corporating for Aging Housing Department OT Evaluation[43]

Regular Home Visits

Regular home visits need to be made to maintain a high standard of work and manage problems as they arise.[65] Service providers must ensure they have capacity for follow up and reassessment to ensure outcomes are achieved and address consumer needs as these change over time.[50]

Follow-up

Only one paper focused exclusively on follow up processes for HMs. However, many Australian and international papers provided important insights into some of the issues and approaches to current follow up practice including Commonwealth HACC service reviews, literature reviews, and service guidelines.

Follow up after HM was considered best practice to measure functional changes and usability;[28,72,83,86,95] to prevent accidents and falls;[5,15,53,89] and to increase the knowledge of the effects of HMs on service users.[14,15,21,28,31,46,50,77] Studies demonstrated statistically significant improvements in self-rated ability in everyday life, less difficulty and increased safety, and less decline in functional dependence especially in self-care tasks after having HM,[28,71,83,95] and follow up helps to gauge compliance with recommendations. Extended follow up was found to be more effective with a lower number of admissions to nursing homes.[18]

Issues identified in follow up for HM included "failure to deliver equipment, wrong equipment being delivered, improper installation of equipment, and difficulties in use of equipment" (p. 71).[46] However, there were inconsistent approaches and little or no formalised follow up processes in most HM practice. [28,31,41,46,50] Specifically, there was no clear evidence for follow-up measures and procedures,[31] including who should be responsible or pay for maintaining the equipment. There was also limited research that provided insight into follow-up costs. Finally, there was no evidence on training and education for best practice follow-up practices.

Several different modes of service delivery for follow up were identified including face-to-face interviews in clients' homes; telephone calls (the most common mode) with or without survey; postal questionnaires; and televideoing / teletechnology. No evidence was found from the literature that would support one method of follow up over another.[31.] Usually, minor HMs could follow up over the telephone,[50] while complex HMs should occur in person[31,50] or telephone calls and extra home visit if required.[89] "Reported benefits of telecommunications offset the difficulty in accessing experienced OTs required for HM assessment, follow up and evaluation. It is specifically beneficial in regional areas, enables real time liaison between professionals and clients and reduces travel needs and costs" (p. 34).[50]

Evidence suggested that continuity of personnel is an important component in follow up and the initial health professional, that is, the OT who administered the assessment, should provide

follow up input for all complex HMs.[31,50] There was some evidence that health professionals, other than OTs, could be employed to complete follow up if training was provided and they were supervised by an OT.[31]There was no strong evidence on the role of carers in the HM follow up process, despite being able to provide valuable insights from providing daily care.[31] However, studies found caregivers capable of doing follow up on equipment and HMs related to bathing.[31]

Common characteristics for complex HM follow up included a component of quality assurance and a comprehensive review that was outcome focussed, seeking to understand personal experiences.[5,21,50] Four key factors to be included in follow up:

- <u>quality of installation</u> as specified by OTs,[31,46] including timing of work and communication with staff; [21]
- <u>actual use</u> of the HM as recommended,[31,46,50] and whether the client and family feel confident using the HMs;[15]
- <u>functional independence</u>; whether the goals of the client have been met,[15,21,31,41,46,60] and whether the quality of life of the clients has been improved with the HM intervention;[41] and
- <u>safety</u>; whether the HM has had an effect on safety such as reducing the risk of falls[31,41,46,50] or unexpected difficulties or concerns regarding manual handling, or additional hazards identified and adjustments made.[31,46,50]

There were variations in suggested timeframes for follow up. A study reported that greater than three months was required for clients to become accustomed to their environment, indicating that good practice would be to resume contact with clients 6, 12, and 36 months following completion of HMs.[15] It is recommended that follow-up occur across a longer period of time to include: the level of independence, levels of support required, rates of hospitalisation, and the time between HM installation and re-location and / or residential aged care.

Key Theme: Communication and Collaboration

Stronger partnerships and liaison between all stakeholders throughout the HM process offers the potential for a more holistic, less siloed system with more effective use of resources. Consumers *and* their caregivers should be placed at the centre of all planning, and communication should be maintained throughout the process to enable informed decision making and effective uptake of HMs.

Multi-Disciplinary Team-Based Care

The literature supports multi-disciplinary approaches that are: individualised client centred or directed, informative (including being aware of local resources / services), integrated, consistent, outcomes-focused, swift, and culturally sensitive. Further they involve cost effective interventions delivered by experienced or well-trained staff, consideration for health and wellbeing, concern for safety and independence, and are centred around engagement in meaningful activities at home and the

community.[2,8,9,11,15,22,35,37,39,40,45,50,56,70,73,75,76,77,81,82,85,86,87,89,95] (For practice examples of multi-component intervention from multidisciplinary teams [MDT], see Table A4:5.0). The best service models now involve staff working together in a single team. These include fully integrated services but co-located staffing arrangements can also be successful.[15] (See Table A4:5.04 for examples)

UK

In the UK, re-ablement teams usually consist of OTs, social workers and home care agency staff, as well as sometimes physiotherapists.[77]

Australia

As the gateway to HACC services, all new HACC referrals in West Australia are managed by the Regional Assessment Service (RAS) for screening and assessment. RAS assessors complete a face-to-face wellness assessment to determine a client's specific needs while encouraging optimal independence and engagement with daily and social activities. Introduced as part of the WAAF reforms, the RAS is considered innovative due to the incorporation of the 'Wellness' approach by assessors.[50,81]

In an evaluation of HACC Queensland service providers, many "mentioned client benefits due to effective teamwork and good referral processes" (p. 60). Respondents reported this contributed to timely and effective HM.[41]

New Zealand

The structure of NZ Equipment Management Service (EMS) consists of EMS Provider who manages all AT and HM service requests from the EMS assessor (i.e., an accredited OT in HM and AT), provides a full assessment, determines eligibility for HM, co-ordinates and liaises with appropriate ministerial, housing and funding services, completes the prioritisation tool, completes sketches, and schedules. Further, they liaise with clients, support people and contractors as required, inspect final works, and advise clients on operation and maintenance of HM. They are also responsible for the return of any equipment no longer needed and complete paperwork for funding to be processed.[57]

The provider is responsible for providing information about the services available and co-ordinates EMS advisors and housing advisors who will provide support to the assessors on matters such as technical advice, ministerial policies, funding guidelines, eligibility and access criteria. They also guide the assessor with decision making and clinical reasoning. EMS and housing advisors are suitably qualified and have a vast range of appropriate competencies. The provider will work with the assessor to determine the most cost effective and suitable option.[56,57]

Needs Assessment Service Co-ordination (NASC) "collaborate[s] with the person, their family or whānau, the EMS Assessor and the EMS Advisor to ensure that there is an alignment between the person's identified needs and goals and the support package and services provided" (p. 50).[57]

"Designers complete the drawings for HMs that require a building consent application. A designer may be an architect, architectural designer, or a draughtsperson" (p. 50).[57] Plans and specifications may be co-ordinated through a Project Manager for "technical advice, facilitating tenders or quotes, supervision of the building work, gaining building consent, and verifying that the work has been completed to specification" (p. 51). "A consultant may be a building contractor, engineer, project manager, or quantity surveyor" (p. 51).[57]

"The EMS Provider maintains a list of building contractors who are approved to provide housing modifications within a set standard of work and to agreed specifications" (p. 51).[57] They are responsible for ensuring all people are aware of the impact of proposed HMs on the surrounding environment, e.g., the need to upgrade existing plumbing, or replace rotten flooring before a level access shower can be installed. They confirm arrangements for disposing of unwanted materials, and the extent to which they will 'make good' of areas surrounding the HM. The EMS Provider will also confirm work commencement dates with the client (must be within 10 days of receiving notification); notification of any time delays, and liaise with the assessor regarding specifications. EMS Providers complete works in accordance with assessor specifications and any relevant building regulations and product specifications. They have full responsibility for sub-contractors (e.g., plumbers, electricians, and plasterers) and ensure that any disruptions are kept to a minimum. On completion of works, they will arrange a full inspection, obtain copies of necessary building consents, and provide instructions for care and use of equipment. Finally, they will remedy any defects arising for material or workmanship for up to three months after works are completed.[57] (For multi-component intervention and multidisciplinary independence programs see Table A4.5.0 and A2.1.2).

Other Effective Strategies

Co-located staffing arrangements have also proven to be successful. For example, "at the Knowsley Centre for Independent Living Care and Repair HIA (UK), Council OTs and technical staff who can advise and assist people with all aspects of adaptations, including DF grants, are co-located. [Similarly], in St Helens in the UK, OT services are based in the same location and under the same management as the Home Improvement Agency and technical services, thereby providing a 'one stop shop' for service users. This ensures a co-ordinated approach to service delivery and maximises service user access to a range of additional support and preventative services" (p. 9).[15] A number of positive outcomes have been identified in the literature:

- One study reported on a randomised control trial (RCT; Gitlin et al., 2006) involving 320 adult aged over 70 years, who had ADL difficulties. Intervention involved HMs and OT and physiotherapy sessions focusing on training "strategies of problem-solving, energy conservation, safe performance, fall recovery techniques and balance, and muscle strength training. At 6 months post intervention participants had less difficulties than controls with ADLs, with largest reductions in bathing and toileting. They also had higher self-efficacy, lower fear of falling, fewer home hazards and greater use of adaptive strategies. Benefits were sustained at 12 months for most outcomes. Lower mortality rates were also observed in the intervention group" (p. 55).[77]
- In a two year RCT, the treatment group received an in-home evaluation of their equipment, behavioural modifications, and HM needs by an OT and equipment specialist. "This led to appropriate identification, installation, and training as needed on the AT, task, and HMs. Participants with varying diagnoses demonstrated a slower functional decline, especially in mobility and bathing" (p. 216).[95]

Service changes can improve collaboration i.e. increased meetings, training, and development of communication tools targeting common client goals (e.g., a self-care progress chart, documents of staff responsibilities).[77]

Due to the "multitude of actors involved in the HM process, each provider applies his or her professional standards and perspectives therefore the need for clear-cut feedback procedures within the team is considerable" (p. 238).[30]

It was also found that home care nurses and personal aids wanted to be involved in HM process as they felt their work is affected by HMs and they identified difficulties related to thresholds, kitchens, bathrooms, and narrow spaces.[51]

Service Promotion

Some authorities fear that promotion of the service will result in higher levels of unmet need due to limited resources. However, earlier intervention can often result in cheaper solutions or encouragement to self-fund improvements.[15]

"A glossary with consistent terminology and service items needs to be considered for HMs, with the option of changing terminology from 'minor' and 'major' modification to 'simple' and 'complex' modification" (p. 43).[50] This change would facilitate more accurate reporting of spending and would drive the requirements for assessment. Minor HMs should include "works up to a low dollar amount, which would likely incorporate around 90% of current HMs, and complex modifications would reflect more expensive HMs (due to cost and / or number of HMs" (p. 43).[50] Major HM services should aim to provide both minor and major modifications.[50]

Presentation of technical information to users can be improved through the use of iPhones and iPads and 3D Visual Display equipment.

Adapt information for people who have sensory impairments and speak languages other than English. Specifically for visual impairment, colour contrast should be used in guidelines and checklists as well as through the design of walls, furniture, and other AT to improve visibility.[74]

NIHE found that building capacity of helpline services:
- "Create[s] a greater awareness of the adaptations service among the general public leading to a higher proportion of people requiring adaptations applying for them;
- Improve[s] the availability of information on access to adaptations and the adaptations process; and
- Enhance[s] the sources of accurate and up-to-date information across the province" (p. 87).[65]

Interface between Agencies

Client-centred practice, collaboration, communication and coordination between professionals working in adjacent areas is essential to achieve effective service delivery[45,50] in particular between health, housing, and social services must be promoted (Heywood, Oldman, & Means, 2002).[46]

Establish and maintain collaborative partnerships with DOHA, ADHC, NDIS Launch Transition Agency, and relevant Ministers and Policy Advisors.[67] (See Table A4.3.1 for other recommended Alliances and Partnerships).

HACC services should work collaboratively. Past evidence suggests that competition leads to duplication of services and does not make HM services more accessible to those in need.[16]

Working relationships between the service provider, OTs, and home care agencies can be maintained through regular meetings and collaborative training. Shared IT systems reduces duplication of information and increases efficiency.

Ensure joint visits and regular meetings with key staff take place at critical stages.[50,63,65] "Consider the development of schemes with the voluntary and independent sectors to provide garden design and maintenance services" (p. 69).[65] Other strategies proposed to enhance collaboration include:
- Joint postgraduate training for HM service staff on design solutions for people living with disabilities including specifications and quality assurances.
- Joint surveys / research.
- "User involvement in the evaluation of housing adaptations and the development of housing design standards is essential" (p. 69).

- A forum with representatives from the key areas including the voluntary sector.[65]

Key Theme: Education and Training

All staff members involved in the HM process require extensive education and training in their area of expertise as well as ongoing professional development to enable upskilling and awareness of the latest available products. Specific areas for training should also be informed by consumer feedback to decrease the gap between staff and consumer understandings. Staff members and contractors should receive training on disability awareness, HM processes, and good practice.

A specific need identified was continuing education: "needs, solutions, and referral criteria need to be developed and delivered" (p. 21) to eye care professionals.[74]

A training pack for 'client centred design' should include the following content:
- "Introduces clients to the concepts of universal and user centred design;
- Explores the historical evolution of housing design standards for older and disabled people;
- Encourages participants to define the parameters of current design standards through practical testing of existing standards from a client perspective;
- Raises awareness of the role of design standards in promoting social inclusion;
- Debates the interface between the equality agenda and design standards" (p. 88);[65]
- Provide good practice examples including AT vs HM and wellness and re-ablement approaches;
- Due to the variation in the types of approaches to HM practice, many factors need to be considered, "e.g., functional capacity, magnitude of dependence in ADL, usability ratings, housing conditions, and types of adaptations thus affecting the outcomes of housing adaptation" (p. 301).[28]

The issues of education and training are further explored in section 3.3 (p. 45) on Workforce.

Key Theme: Service Evaluation and Improvement

Measurement of client outcomes and evaluation of service performance against agreed targets, are essential for continuous HM service improvement. It is also necessary to demonstrate cost effectiveness and compliance with government and legislative requirements.

Outcome Measurement and Evaluation

It is difficult to estimate the need for HM services. Approaches to gathering data will enhance understandings of potential service users and local needs.[15,16] "Quality should be assessed through a combination of staff assessment and customer feedback" (p. 17).[15] One paper identified that some overall key measures should include:

- % of service users who identify positive outcomes as a result of the service;
- % of service users satisfied with the service;
- % of services delivered within target timescales.[15]

Another recommendation from the literature was that outcomes should be classified as either consumer or policy outcomes in order to guide service providers to establish processes around quality and process that underpin research.[46] Monitoring client outcomes should align with person-centred approaches in community care. Also it can be "useful in evaluating the savings for clients and the public health system where clients are able to remain in their own homes, rather than staying in hospital or residential aged care facilities" (p. 5).[16]

The focus should be on accountability, objective assurances as to the robustness of the processes in key areas, and effective communication and consultation across sectors and with clients.[64,66] The following is a set of client outcome factors that could underpin Australian research and help provide an evidence base in this area. These outcomes were suggested by one paper[46] and supported by several other papers:
- "Increased safety in the home environment, and reduction of falls and other accidents;
- Greater capacity for independent living including capacity to undertake a wide range of tasks without external assistance;
- Restoration of access to all areas of the home;
- Enhancement of lifestyle choices, and ability to pursue interests and activities;
- Capacity to maintain and extend social networks and social participation;
- Enhanced personal meaning of home;
- Ability to 'stay put' and avoid undesired moves;
- Improved physical and mental health;
- Improved health and lifestyle for family members and carers;
- Satisfaction with home modification and maintenance (HMM) services;
- Confidence in managing building and maintenance contractors;
- Ability to afford the cost of home maintenance and modification" (p. 82).[46]

Setting Performance Targets to Improve Outcomes

Improvement of HM services should be based on evaluation of service performance against agreed targets. Include targets that indicate how long the entire HM process, from start to finish, will take to complete e.g. the City of Edinburgh Council created a multi-tenure HMs team within Housing and social work departments. The team set performance targets i.e. "14 days for assessment by an OT, 28 days for completion of a minor modification, and 13 weeks for completion of a major HM" (p. 112). In addition, around 80% of the tenants were advised of important details, i.e., start dates, potential disruptions, and duration of work times. As a result they eliminated a large waitlist for HMs. They completed 280 major adaptations and 992 minor HMs in one year with a 92% satisfaction rate and 99% of tenants using their HM every day.

Main causes of dissatisfaction were due to "length of waiting time, views not taken into consideration, conflicting information or lack of information, and changes in start dates" (p. 9).[65]

The literature suggests priority cases including people at risk of injury or falls, living with an elderly or person with a disability, or terminally ill and will need to go into residential or hospital care without HMs should be assessed within the following timescales:

- Assessment to start within two weeks of referral;
- Minor adaptations - recommended within another five working days[65] and supplied within seven working days of the request being made.[39]
- Major adaptations to be recommended within four weeks of referral.[65]

Cost Effectiveness

HMs are a cost effective option particularly over institutional care. To illustrate, "the median cost for an assisted living facility in the US is $3450 per month. In contrast, the median one off cost of HMs $4000" (p. 654).[49] (For examples of cost-effective HM practices refer to Table A2:2.0, A2:3.0, and A2:5.0).The evaluation of the UK Handyperson Program found small repairs and installation of home security measures at a relatively low cost managed to avoid incurring larger costs, including residential aged care services, hospital services, and major high cost HMs.[50]

Governance and Legislative Compliance

All organisations involved in delivering HMs should have "a clear governance framework which includes appropriate controls, checks and reporting" (p. 136). Governance / controls assurance for HMs should address decision-making and approval process within each organisation.[66]

Provision of HM should "be consistent with relevant legislation, agreements, programs, policy and standards of practice" (p. 4).[22] The service user is at the centre of planning and decision making[22,40,50,57,64] and the interventions and services are co-ordinated for the person[57] with a focus on solutions to enable a person to use their home more effectively rather than on the physical modification itself.[40]

The delivery of HMs must conform to building codes.[36,50] It is evident that harmonising building standards makes economic sense. To build capacity across the HM sector, services need to be responsive to local reforms and those reforms interface with key elements (e.g., support services, OT and building services, clients, policy advocacy, and development) in order to provide information and advice to the mainstream.[67]

3.3 Environmental Factors

Policy

Although phrases such as 'informing policy' emerged across the majority of the reviewed papers, only 19 papers specifically discussed policies, benefits and challenges with their implementation, and recommendations for future policy development. When considering HMs, according to Clapham (2005, p.234), the "aim of public policy should not be to achieve particular outcomes on the housing pathway but to enable people to take control of their pathway through the ability to make choices." A useful definition of 'successful policy' is thus one that meets the needs of people as they age with consideration of their changing needs, circumstances, and preferences.[18] In WA, HMs are governed by a range of legislation, programs, agreements, acts, standards of practice, and policies. Research findings suggested that positive experiences of HM services are a direct result of effective policies in place that underpin and guide these services.

KEY HIGHLIGHTS

➢ In Australia, home modification services have emerged in the context of four key policy areas: ageing, health, community care, and housing.

➢ There is a lack of a public policy framework to guide the design and implementation of HM programs in Australia.

➢ Consistent mismatch exists between client needs and policy instructions.

➢ Issues may arise when mainstream policies are applied in rural or remote areas.

➢ Inconsistent referral processes and allocation policies.

➢ It is recommended to formulate a coordinated, integrated, nationally recognised home modifications policy.

➢ Redressing the balance of control and increasing the utility and applicability of policies is also necessary.

➢ Consumers must remain active contributors to the Australian HM system so that changes reflect other dimensions of the home such as social, temporal, and cultural. This shift will work to move beyond functionality to reintegrate the meaning of concepts of self and home into housing modifications.

Current Policy Context

In Australia, HM services have evolved at the intersection of four key policy areas: ageing, health, community care, and housing.

Ageing policy provides the broadest context for HM services and focuses on the themes of positive ageing, ageing in place, and fiscal sustainability.[46] Ageing policy was formally introduced in the early 1980s and is focused on meeting the growing needs of a steadily ageing population impacted by reductions in death rates and increases in life expectancy.[46]

Health policy also has a direct impact on HM. Key goals of health policy include reducing morbidity and mortality, decreasing rates of hospitalisation, and preventing accidents.[46] According to current WA health policy "The provision of aids, equipment and HMs will comply with relevant clinical and other standards / legislation, including Infection Control standards, the requirements of the Therapeutic Goods Act 1989 and Regulations (Medical Devices) 2002 and the Building Code of Australia"(p. 14).[22] Also relevant is the Western Australian Health Services Patient Fees and Charges Manual (August 2011 edition).[22]

HMs are also considered in light of community care policy with a shared focus on promoting greater social and community participation, reducing demand on residential aged care facilities, and facilitating independent living by enabling older adults to 'stay put.'[46] An example of this in WA is the Arrangements for the Provision and Charging of Aids or Equipment, Home Assessment and Home Modification for the Department of Veterans' Affairs (DVA) Entitled Persons (WA Health Operational Directive 0096/08).[22]

Housing policy is directly linked to HM services with a common goal of expanding housing options in older adulthood by modifying homes in response to changes in individual circumstances.[18,46]

According to the Australian Housing and Urban Research Institute report, "HMM services in Australia have developed in an incremental fashion across several policy and service fields, and have lacked a clearly articulated or integrated policy framework. The HMM system is characterised by unclear and poorly integrated policy goals, complex and unsystematic funding arrangements, unevenly developed service models and systems, and lack of evaluation of outcomes" (p. 2).[46]

Issues and Challenges

It has been suggested that although poor practice can, at times render HMs ineffective, more often it is poor or inappropriate local or national authority policies that result in the greatest waste of resources.[36]

There was a lack of an overarching HM policy at state and national levels.[41,46,67,81] The findings of the Australian Housing and Urban Research Institute report suggest that the placement of HM services at the intersection of health, community care, and housing policies has impeded the development of a stand-alone comprehensive HM policy.[46] As a result, a number of key issues have arisen:

- The number of HM programs in Australia is steadily increasing; however, there is a lack of a public policy framework to guide the design and implementation of these programs. Important links between HM services and Australian ageing policies are gradually increasing but are poorly articulated.
- Due to its fragmentation across the health, community care, and housing policy fields,

there are a lack of overarching goals to propel HM service provision. With no publicly available documents to dictate a broad policy framework at national or state / territory levels, individual services and programs have formed unique goals and objectives which are, at times, at odds with one another.

- In Australia and internationally, there is a poor evidence base for HM services and the policies that underpin them. Current research in the Australian context is limited to professional practice, rather than policy development; focusing on need and demand for services, types of services available, and impact of services on consumer performance and satisfaction. Policy outcomes following HM service provision are limited and inadequately disseminated. [41,46,67,81]

Key challenges faced by consumers and service providers as a result of this fragmented policy framework include:

- <u>Consistent mismatch between client needs and policy instructions</u>. For example, many have recognised that funding and reimbursement policies limit the amount of time service providers can spend in the home of clients. This has far reaching implications including misinformed decision making by clients and their families and distorted professional judgement about client needs and the best HMs to meet those needs.[46,78]

- <u>Limited applicability of existing policies</u>. Assessment can be compromised and resources can be wasted when policies are too rigid or prescriptive for the circumstances in which they are applied. Specifically, this may result in delays to work, poor quality specification and supervision of work undertaken, ineffective adaptations, pressures to skimp on assessments, and HMs that are expensive to maintain. For example, in Australia as many as 8 per cent of people aged over 70 years and 6 per cent of people with disabilities live in strata apartments. It has been recognised that current housing policies can be at odds with strata regulations, penalising residents of these tenures and rendering HMs less effective. Similarly, issues may arise when mainstream policies are applied in rural or remote areas where needs and circumstances differ. Specific issues in these areas include skills shortages, disadvantaged consumer groups, and regulatory and education issues (see Minority, Remote, and Rural section for further detail).[24,36,47,93]

- <u>Consumer confusion around funding</u>. Due to poorly communicated eligibility policies, clients have reported uncertainty about who meets the cost of certain HM or how HMs in a lifetime they are eligible for. Eligibility for HACC subsidies currently lacks any means test. Consequently, there is inequitable service provision due to clients determining their own ability to contribute to HM costs. This has resulted in an increasing number of clients paying too little or too much for their HMs, or waiting a significant amount of time for approval before works can be completed.[41,78]

- <u>Inconsistent referral processes and allocation policies</u>. For example, HACC operational guidelines specify the acceptance of referrals from all sources (from health professionals to families and the client themselves); however, many service providers will only accept referrals from OTs. Further, service deliverers utilise a range of prioritisation tools

resulting in inconsistent prioritisation that does not consistently meet criteria under the Major HM Program.[41]

In the merging policy environments of disability and aged care, individuals who receive individual home care packages will be able to choose who will complete HM work. Accessing commercial contractors is a concern as the client will need to be able to manage the work and raises issues around their ability to access adequately trained and licenced tradespeople and deal with technical, contractual, and legal aspects. Appropriate safe guards must be put in place. "In the instance where a service provider is managing the package on behalf of a client, the same circumstances may apply whereby the service provider may not have the technical and legal knowledge to manage and supervise construction work. Therefore, the need for an independent building supervisor would be necessary to advocate and manage on behalf of the client and service provider" (p. 23).[67] "Government will need to carefully consider how HMs fit into the future context of a packaged environment for both ageing and disability. If a mix of service providers and commercial contractors are the way of the future, the following points need to be considered:

- The formulation of a clear, nationally consistent policy for HMs to create true equity.
- The policy should reinforce HMs based on the clinically justified need of the client and not renovation of the home.
- The creation of a national accreditation system for builders and tradespeople who wish to work for the frail aged and people with disabilities.
- The setting up of a national register of builders and tradespeople who have completed all necessary training and checks such as police checks, licence, and insurance checks.
- The use of a competency-based training and accreditation system for OTs.
- A mandatory Quality Assurance System to inspect funded work ensuring high quality client outcomes are achieved.
- An advisory service for clients which provides appropriate information and support to assist with increasing the client's knowledge of modifying homes including contractual arrangements and construction to make appropriate decisions" (p. 23).[67]

Policy Solutions

- Formulate a coordinated, integrated, nationally recognised HMs policy. Focus research on increasing the evidence-based of existing policies and developing a framework for this new policy development.[11,18,46,67,81]
- Develop a national core mission statement with clear goals and objectives decreeing the purpose and anticipated outcomes of HMs in Australia. Give specific attention to how these goals align with the broader context of Australian ageing policy.[46,81]
- Increase the contributions of a range of professionals and consumers in advocating for and shaping policy change to redress the balance of control and increase the utility and applicability of policies. Move away from developing policies and programs purely on the

basis of professional opinion. Ensure consumers remain active contributors to the Australian HMs system so that changes reflect other dimensions of the home such as social, temporal, and cultural, which all impact on and are impacted by physical modifications. This shift will work to move beyond functionality to reintegrate the meaning of concepts of self and home into HMs.[35,36,38,40,46,81]

- Disseminate policy information broadly to ensure that funding bodies, service designers and providers, planners, local authorities and consumers are adequately informed about HM options and the pathways to seeking such assistance.[18,78,81]

- Integrate flexibility into policy development, such that a broad range of housing circumstances are supported and there are fewer gaps in knowledge about how HMs can be facilitated in less-traditional housing establishments, varied geographical locations, and in disadvantaged communities.[24,93]

- Develop service provider policies in line with local Government requirements (including mandatory controls and consents) and include project management and timeframes, plans for re-location issues during construction, and strategies for budget control to remain in line with fee policies.[21]

- Continually develop and modify Australian policies based on evidence from other countries. For example, much of the research in this area to date has been conducted in the USA and UK. This research provides a solid foundation for an improved research foundation in Australia and its findings may translate as evidence to inform Australian HM service policy. Australia must continue to promote and contribute to this growing research agenda to ensure the ongoing effective and efficient delivery of HM services.[31,42,46]

Funding

Twenty-one papers reviewed funding arrangements, both nationally and internationally. In Australia, assistance for HMs is provided by both state and federal government initiatives. HACC is a government initiative that supports ageing in place. "HACC is a cost shared programme between the Commonwealth and State / Territory governments for services which support frail aged and younger disabled people to stay living at home" (p. 10).[80] Demand for aged care services in Australia is projected to increase to approximately 1 in 10 people by 2050 (a 250% increase).[40,67] Limited funds will remain to cover major HMs, therefore, alternative options for funding major HMs are necessary.[46]

KEY HIGHLIGHTS

➢ As they currently stand, HM schemes are unlikely to meet growing need.
➢ Under HACC programs, travel, and the increased cost of provision in rural remote areas are not reflected in funding.
➢ The funding criteria of 'essential' versus 'desirable' adaptations ignore the quality and durability of the modifications.
➢ Develop a system for fast track high priority cases. Use a costed schedule of work and encourage greater use of standard solutions.
➢ Facilitation of complex modifications for people using Home Care Packages still needs to be defined.
➢ Eligibility criteria must be simplified to include (1) focus on assessing physical functionality over medical diagnoses; (2) reflection on caregiver needs; and (3) more flexible eligibility to include those who can benefit.
➢ Means testing for loan schemes should be developed based on various demographic groups.
➢ Simplify processes to minimise timescales whilst maintaining and maximising integrity and value for money.
➢ New and renovated homes should incorporate universal design principles to ensure a basic level of accessibility to reduce the cost of future adaptations.
➢ There is a need for an equitable and transparent structure to fees and payment plans for all consumers.

Current Funding Context

"The funding of HMM services in Australia is complex, involving a large number of programs and systems" (p. 49); however, this does allow for flexibility to support consumer co-payments.[46] Currently, the provision of services is based on what one qualifies for, rather than on assessment of need.[49,80] For older adults, eligibility criteria for funding are strict and often difficult to meet.[49,80]

"HM schemes are unlikely, in their current form, to be a sufficient response to meet growing need" (p. 17).[80] Some program providers implemented a 'cap' for HM service types which resulted in "a number of unintentional outcomes including the inability of the program to provide greater levels of HMs if costs exceeded 'caps' and inconsistencies and limitations in the types of HMs accessible across different program providers" (p. 48).[41]

"Private finance and equity release may finance modifications for older people. Equity release was used as a last resort when there was a need for essential work and no other finance was available" (p. 59).[18]

Issues and Challenges

- Grant systems were reported to be complex, bureaucratic and there were usually lengthy waits for people who need HMs.[18]

- Funding systems were inconsistent across providers, states, and countries and were insufficient to meet the growing demand.[18,36,46,49,50,80] A significant proportion of participants who already had HM identified unmet need for further modifications.[78] The cost of HMs was a major barrier to many people[8,41,42,78] and perceived by HACC service providers as the primary reason why HMs were not pursued by clients.[41]

- Funding systems were widely regarded as unfair and limiting.[76] HMs "often required additional expenditure to increase the level of functionality of the modification or to make good poor workmanship" (p. 31).[78]

- For services providing HM services in remote areas, the extra costs involved were not reflected in funding.[2,11,41,42,46,49,50,81] Inequitable access to HM services for indigenous populations living in remote areas. Under HACC programs, travel and the increased cost of provision in rural remote areas were not reflected in funding.[42] Access issues were prevalent for tenants in Aboriginal Lands Council owned properties as it is not financially viable for the Lands Council to maintain / modify properties.

- There was a lack of information and advice about the funding systems and application process for participants.[78]

- Inadequate resources, such as staffing impacted on the quality of assessments and proper supervision. "Inadequate budgets which resulted in rigid rules that led to inappropriate and wasteful adaptions" (p. 32).[36]

- Funding for HMs previously under the Community Aged Care Packages (CACPs) and Extended Aged Care at Home (EACH) were limited to minor HMs only. It was "unclear as to what level of HM can be funded from a person's CACP or EACH package, and what level must be funded through HACC" (p. 7).[42]

- Access was an issue for HMs for tenants, particularly older adults living in community housing and private rental properties.[42]

- HMs were installed without regard for ongoing costs or maintenance; key factors that might have impact decision making concerning the most appropriate type of HM.

- The funding criteria of 'essential' versus 'desirable' adaptations ignored the quality and durability of the HMs.[36,78]

- The delay caused by economic appraisals was either due to complex procedures or clients had issues relating to their ability to make a financial contribution.[72]

Funding Solutions

- The key area for a service provider to consider in the grant process is the availability of information. The public need to be aware of the availability of the grants.[65]

- Realistic timeframes should be given for grant applicants. There should be prioritisation criteria, use of discretion and certain grant cases should be exempt from asset testing. Alternatively, a preliminary test of resources should consistently be included in grant cases.[65]

- Use of a costed schedule of work and encourage greater use of standard solutions.

Consider the use of dedicated HM OT staff for private sector cases and the use of self-assessments for certain home aspects such as heating systems.[65]

- Good information and advice for financing home improvements is crucial, particularly private finance and equity release.[16]
- There is a need for good communication and tendering systems that account for quality.[36]
- How "HMs, particularly major modifications, can be facilitated for people using Home Care Packages needs to be clarified in the development of the Home Support Program, to ensure seamless access for all people requiring home modificaitons" (p. 7).[42]
- "Self-funded HMs can be facilitated through reverse mortgages….However, it is clear that the uncertainties, complexities, and costs associated with these need to be reviewed…. Housing finance agencies and private lenders should also be encouraged to develop loan programs to enable older people to undertake necessary modifications (Pynoos & Nishita, 2003)" (p. 66). It is also suggested that funding HMs would be improved if government health departments (i.e., Medicare) pay for HM assessments and reimburse HM costs as well as raising expenditure caps in order to cover a wide range of HMs.[46]
- To fund improvements to existing housing stock, "loans scheme receiving public funding should build on existing good practice, and have regional or sub-regional coverage such as the Kickstart programme" (p. 60), which is a loan scheme to improve housing conditions for vulnerable people.[18] (For examples of financial support offered by organisations see Table A2.8.0).
- "A planning framework that addresses issues for remote and regional service provision will be important for the success of the Home Support Program….It is necessary to provide resources to ensure that Aboriginal people can equitably access mainstream services, particularly in areas where no Aboriginal specific providers operate" (p. 4).[42]
- Means tests for loan schemes should be developed based on various demographic groups.[40] One way to speed up processes was through having the power to waiver means testing. It has been identified that "the related administrative process of means testing can cost more than the value of a grant for smaller works and result in a significant slowing of the delivery process" (p. 49).[40]
- Developing an appropriate procedure, which minimises the timescales whilst maintaining and maximising integrity and value for money should be a core objective for all HM services. For example, by shortening application forms, limiting the need for means testing to higher value schemes, procuring commonly required HMs and equipment to reduce supply time, and maintaining regular communication with customers.[15]
- New and renovated homes (e.g., in the social rented sector) that incorporate universal design principles to ensure a basic level of accessibility may reduce the cost of future adaptations.[78]
- There is a need for an equitable and transparent structure to fees and payment plans for

all consumers. A KPMG report recommended:
- A consistent approach to means testing (or proxy measure) to determine capacity to pay;
- A sliding scale for contributions, which decreases as capacity to pay increases;
- For HMs, the sliding scale may be different to other services within the Commonwealth Home Support Programme, due to nature of the service; and
- "A consistent approach to payment plans when services are one-off services (i.e., HMs) including length of plans, payment of interest" (p. 47).[50]

Workforce and Training

Forty-three of the reviewed papers examined key components of the HM workforce including **OTs, TAs and OTAs, other service providers** (e.g., housing support officers), and **construction and building industries**. This section outlines general workforce issues and challenges encountered and possible solutions identified. It then considers findings specific to each of the workforce components in turn.

KEY HIGHLIGHTS

➢ A key issue is that home modification services are often provided within siloed settings, without consideration of other solutions, or embedded within a re-ablement approach.

➢ Develop a directory of funding and modification services and distribute to relevant service providers.

➢ Government to carefully consider how HMs fit into future ageing and disability plans for packaged environments.

➢ Link Telecare and telemedicine with handyperson services with a focus on revealing other housing issues which need to be addressed for client safety and which may impact on the installation.

Workforce Issues and Challenges

- Authors reported a lack of a suitably qualified workforce especially for assessment, follow up and evaluation.[2,30,46,50,80] A disconnect between health professionals, service providers, and builders, particularly in remote and rural areas, which results in delays in assessment and provision of services and increased costs of providing HM services in these areas.[50]
- A KPMG evaluation of HACC services reported inconsistent workforce requirements for HMM services. Workforce skill sets were, at times, based on jurisdictional regulations, availability of qualified personal, and cost. "There is a general lack of training and professional development opportunities for builders and OTs in relation to HM services" (p. viii).[50]
- A significant issue for rural Australians is the poor availability of and access to medical

and allied health in their areas.[41,47]

- There is a lack of clarity on the "location of HMM at the intersection of the health, community care, and housing systems, which also creates difficulties of system identity, goal coherence, leadership, and integration of multiple professional perspectives" (p. 53).[46]

- A lack of co-ordination between service providers and a lack of training and support for home health aides result in carers 'doing for' rather than encouraging independence, while allied health professionals are working with clients to increase independence.[77]

- "Social workers and local government housing workers appear to have no training in design or construction" (p. 17).[80]

- "Professional judgement may be distorted by organisational constraints [e.g., strict timeframes] rendering OT recommendations by OTs being ineffective or even seriously harmful to service recipients (Heywood, 2004)" (p. 71).[46]

- "Insufficient training and professional development had resulted in significant differences in knowledge and skills within the workforce, particularly in communication with consumers and knowledge and / or support of re-ablement approaches" (p. 28).[50]

Workforce Solutions

- "Local policies need to consider what staffing levels are needed to prevent waste by delay, bad assessment, and poor supervision" (p.41).[36]

- "Continued education, problem based learning opportunities and graduate training have been identified to increase the knowledge and skills of both providers and therapists on current issues and new developments in HMs (Cowell, Bridge, & Matthews, 2006)" (p. 9).[41]

- "HMM service delivery would be enhanced if education about the need and cost-effectiveness of HMs were provided to a range of stakeholders, including funders, program managers, leaders, medical insurers and legislators (Duncan, 1998; Pynoos, 2004)" (p. 70).[46]

- "Education efforts should not be restricted to the health and community care sectors. Real estate and appraisal professions require education in HMs and universal design… Training for doctors and other points of referral on how to identify a modification need and make a referral to an appropriate service would also improve service delivery (Liebig & Sheets, 1998)" (p. 71).[46]

- A directory of funding and HM services should be accessible for service providers. This directory would be particularly useful for OTs, design professionals, and contractors with specialist interest and skills in HMs (Steinfeld, Levine, & Shea, 1998).[46]

- The use of technology needs to be encouraged, particularly where it can assist in bridging workforce shortages, supporting less experienced staff, and supporting time efficient practices within service delivery.[50]

- "A planning framework that addresses issues for remote and regional service provision

will be important for the success of the Home Support Program" (p. 4).[42]

OTs

OTs are considered the experts in HM, identifying and quantifying the environmental factors that impact on a person's occupational performance and implementing an intervention program to improve functional limitations.[4,47,65,72,82] OT is central in the delivery of HM services. "An OT specialist assessment is required as part of the assessment process for all major modifications and most minor modifications" (p.17).[50]

The interface and provision with goods and equipment often relies on the individual OT and/or service provider.[50] "OTs are responsible for the evaluation, intervention, outcome, and discharge of the client" (p. CE-6).[73]

OTs provide expertise in knowledge of human function, the impact of health changes, and occupational participation, as well as knowledge of construction, architecture, structural design, AT, specialised products, community resources, and legislative guidelines. The OT provides a comprehensive evaluation of the client and their environment with a focus on outcomes of client safety, satisfaction, and participation in desired activities. The OT may manage funding and will train clients in the use of installed equipment.[4] Other types of services may include consultation on projects, e.g., constructing new homes, work environments, and community spaces, and advocating for clients through interfacing with governmental agencies, funders, and community planners.[4] "OTs must adhere to the Occupational therapy Code of Ethics and Ethics Standards (American Occupational Therapy Association [AOTA], 2010a) and the Standards of Practice for Occupational Therapy (AOTA, 2010b)" (p. 5).[4]

"The OT role in the process is greatest in the early stage when the person's needs are being identified and specified. Primary responsibility moves to the housing provider in the middle and late stages of the process. The OT, however, maintains contact with the client and housing provider at certain key stages of the housing provision process" (p. 37).[64] Assessment stage: "the OT will consider whether medical, surgical, or other treatments can reverse or lessen the effect of the underlying medical condition. There are occasions where treatment may be considered before adaptations" (p. 39).[64]

The OT role in environmental interventions requires tertiary education and many undertake post-graduate studies. During the assessment phase, OTs are required to systematically process information about a person's ability to perform roles and activities within the context of their environments. OTs need to be able to synthesise many skills, e.g., communication, observation, interpretation, and clinical analysis, in order to demonstrate competence in this arena. OTs in Australia who assess and prescribe HMs are expected to demonstrate competency.[32]

Organisations are adopting the approach where some minor adaptations are completed without direct OT involvement to speeds minor works up.[65]

"Programs led by OTs have a distinct health outcome focus, and their work (with clients and in business planning and operation) is clearly underpinned by a broader, health focused view of the context for HMs. In contrast, those programs led by individuals with a builder/ tradesperson background tend to have a pragmatic 'getting the job done' approach, with more reliance on the level of priority provided by referring services, particularly OTs. Urgent referrals may be automatically allocated to the top of the list with no review of the 'accuracy' of the referred priority or whether it meets the criteria for Major HM Program prioritisation " (p.28).[41] (For HACC purchasing and works policy see Table A4.17). However, OT assessment is not a legislative requirement.[40]

The OT may also assess the needs of carers "particularly if the person with a disability needs practical assistance with everyday tasks such as assistance to transfer from a wheelchair to bed or with personal care. Where appropriate the carer will be offered advice on how to safely help the person with a disability" (p. 39).[64]

OT Issues and Challenges

- "There are challenges in accessing OT assessments, particularly when the OT is not co-located with the service provider" (p. 18).[50]
- The most commonly identified rural HM issue was recruiting / retaining OTs. Indicators show a greater disadvantage in access to OTs than medical workers. "Very remote areas experienced approximately four times less supply of OTs compared with major cities" (p. 19).[47] In Tasmania, "the availability of OTs is less than 50% per capita than other jurisdictions" (p. 5).[81]
- Access to professional development and supervision for OTs working in HM is often limited. Although competencies have been developed for HMs, these are not widely adopted.[50]
- "OTs lack adequate tools to evaluate the home and needs for adaptation (Mann, Hurren, Tomita, Bengali, & Steinfeld, 1994; Rousseau, Potvin, Dutil, & Falta, 2002)" (p. 290).[76] "Because of the limitations of existing tools, OTs tend to design their own homemade tools, resulting in an intuitive evaluation approach and a lack of objectivity" (p. 290).[76]
- "One of the challenges reported by most program providers relates to the lack of understanding some OTs display about building code requirements. This can have a serious impact on HM plans and costs" (p. 36).[41]
- "The impact of understaffing of OTs on a HM service can include extended waiting lists, delays in hospital discharge, lower functional level independence, and pressure on therapists to do 'quantity' work" (p. 9).[41]
- "There is little guidance for OTs that explains either the role of professional support in

home adaptations or those aspects of the process that could be controlled by the disabled person" (p. 2). In the absence of OTs, other less qualified staff often carried out duties, e.g., co-ordination of major HM.[72]

- Very few specific training programs for OTs specialising in HMs impacts directly on positive outcomes for clients.[41,77]
- Access to HM services (especially OTs) for Aboriginal and Torres Strait Islander people is extremely limited, and particularly so in areas without Aboriginal specific providers.[41,42,65] "Delays in accessing an assessment can increase waiting times for clients for months or years" (p. 10).[42] Skill shortages make it difficult to establish effective contract relationships with builders and tradespersons.[41]

OT Solutions

- OTs should have in-service training post-grad and should experience joint training with other key HM personnel, e.g., housing officers.[36]
- OTs should be educated about issues relating to HMs and strata properties.[24]
- Build relationships with OT departments at the universities to work together to develop "workshops on reading plans and disability product evaluation within the community module…. [and offer] continuing professional development analysis of post-graduate OT training needs in relation to housing for older and disabled people…..Accredited training in this specialist area is identified as a priority" (p. 47).[65]
- OTs should maintain a good working knowledge of technical terms and the benefits of emergent technologies for individuals living with disabilities.[65]
- For OTs working in complex HM, training is needed in "environmental or functional evaluations, accessible building guidelines, universal design, AT and architectural products and their installation, ergonomic design, and advocacy" (p. 5).[4]
- "Recognition of the role of OTs in HMs as a specialist position" (p. 49).[50] The role of HM should be further integrated into a broad rural health system and recognise the unique perspective and skill set of the OT in the prescription of environmental modification to improve functional outcomes" (p. 20).[47]
- "The OT needs to have the capacity to undertake a face-to-face specialist assessment (either in person or via technology) and, if possible, undertake the specialist assessment with the builder. Where practical, the OT and builder should be employed within the organisation that is co-ordinating the implementation of the HM. This should be undertaken at a service provider level" (p. 44).[50]
- "To improve the integration of OTs into the provision of HMs, the OT should be funded and located with the service provider where possible. If the OT is not funded through the service provider, clear and evident links to the service provider should be demonstrated, including consideration of co-location with the service provider or using technology and innovative service delivery options" (p. 49).[50]
- "Addressing workforce challenges through the development and delivery of systems to

provide support, supervision, and mentoring of less experienced OTs, and promoting service models that incorporate joint assessment visits by the OT and builder as well as joint professional development events for OTs and builders" (p. ix).[50]

- Changes to workforce and training should be trialled and implemented gradually to ensure sustainability. And a different approaches will need to be considered for remote and rural areas, including ICT and to vulnerable groups, i.e., CALD communities will require different approaches.[50]
- OTs should use open-ended interviews to collect data on satisfaction and meaning of home into consideration in intervention planning.[26]
- "The use of dedicated OT staff for private sector cases could speed up the assessment process" (p. 55). Performance targets should cover the entire process from start to finish. Set ambitious timeframes.[65]
- "Review minor works which can be provided without OT assessment" (p. 39).[65]
- Boundaries must shift for OTs to perceive themselves as having broader responsibilities in advocacy on behalf of clients in areas, e.g., housing policy and environmental issues (or challenging some inequities in housing) and should be supported by employers, local government and educators to do so, in order to seek better housing provision and social integration.[35]

TAs and OTAs

There was strong support for minor HM assessments being conducted without OT and by a range of workers known as Trusted Assessors (TAs), OT Assistants (OTAs), and Community Assistants (CAs) [17,20,31,36,39,40,50,64,65,73,90,96] Many organisations provide minor HMs as a part of landlords service where a handyperson provides the work without an OT visit (see Table A4.2.1), systems of screening at the point of entry (Table A4.8c), accepting requests from professionals other than community OTs, and using support people to seek out and identify health needs of older persons and linking them with a prevention programme.[39]

Figure 4. Examples from the Northern Ireland Housing Executive (NIHE; p. 56).[64]

"OTAs (supervised by OT) can provide a valuable additional resource for carrying out assessment and represent an efficient approach that should be used more consistently for assessing for minor HMs" (p. 42).[40]

"A competency framework for TAs has been developed within the context of change in roles and education within the NHS (p.48; see Table A4.1.3) There is potential for TAs to assess the majority of low level service users depending upon "skills of the practitioner, the systems in place and context in which the provision takes place, i.e., reasoning skills, professional behaviour, and supply process" (p.26).[96] (See Table A4.1.3).

Essential practice elements for TAs include: client centred approach; comprehensive information for tenants; reliable screening systems; identifying risk; swift, knowledge of tasks / activities and how equipment can help; good reasoning skills, understands process (i.e., follow up and works in a safe and professional manner); cost effective delivery of high quality items; adequate resources; cultural sensitivity; and flexible approaches and systems for monitoring outcomes including client satisfaction and changes in health and quality of life.[39,96]

The benefits of using TAs include: removes cause of delay for assessment of minor HMs; the swift supply reduces risks of accidents; frees up OT time and therefore reduces wait for assessment for major adaptations; gains in workforce efficiency and job satisfaction.[39] (see Table A4.2.2 for practice examples and opportunities for using the model).

Most of the participants in a survey on the TA framework reported it would be practical to implement this model within their service. Some of the strengths and opportunities mentioned most frequently were:

- "Enhanced service provision, with increased clarity about who does what,
- The provision of clear, formal training programmes,
- The opportunities for increased confidence and job satisfaction for support workers" (p. 94).[96]

In the same survey the barriers and threats highlighted by most people were:

- "The costs of implementing the initiative in terms of training and time,
- Access to sufficient training courses and assessors,
- Threats to traditional roles and status" (p. 94).[96]

American Occupational Therapy Association (AOTA) states in their speciality certification criteria in environmental HMs OTAs must work in collaboration with a supervising OT in all matters of assessment, reasoning and intervention.[88] A HM service business model must "ensure that they do not conflict with applicable laws governing practice, e.g., an OTA working in private practice independent of an OT is both an ethical and legal violation" (p. CE-6).[73] (see Table A4.1.1 for AOTA scope of practice). The London College of Occupational Therapists "takes the view that some items may quite reasonably be fitted without assessment and that the benefits of doing so are considerable" (p. 8).[39]

Victoria has the State-Wide Equipment Program (SWEP) credentialing framework for Allied Health and Nursing wanting to become skilled in assessment and prescription of aids and equipment.[84] (see Table A4.1.4)

There are anxieties about excess demands with authors reporting that it is common for OTs to be used not only for their skills, but also as a method of rationing demand. Other issues include risk, liability, and responsibility of providing minor HMs without a 'professional' assessment.[39] An earlier study reported minor equipment in the wrong place(e.g., handrails) "highlights the danger of using registers and re-allocations of 'adapted properties' if they are not accompanied by OT assessment and relevant changes being made" (p. 8).[36] Good aspects of implementation should include training by OTs, ethics training, risk assessment and protection from liability (see Table A4.2.0), information to tenants, and funding.[39]

Other Service Providers

In Northern Ireland an Area Welfare Officer (AWO) provides case management for major HMs, and operates on a joint basis with a Housing Support Officer (HSO) who deals with the assessment phase. They liaise with the client, OT, designers, and engineers throughout the process and instigate checks for eligibility.[64,66]

A Grants Officer has a key role in NIHE for private sector grants. They will liaise with the OT and, if necessary, visit the client at home. They assist agencies in the administration of the application and co-ordinate requests for HMs.[64] (See Table A4.4.1). "The type of help most appreciated from grant officers was in form filling, choosing builders, and coordinating the work" (p. 5).[72]

One paper reported appointing a housing adaptations liaison officer "primarily to facilitate interagency work to ensure that people who have a disability receive the best possible housing adaptations service regardless of housing tenure" (p. 11).[65]

Case worker role is appropriate for basic advice and direction, but can also provide more intensive one-to-one support to older and / or vulnerable people who were experiencing considerable housing difficulties. The case worker can direct people to services that might be able to help.[17]

The use of volunteers to deliver home maintenance services, and for other types of services delivered is considered good practice. However, many service providers report recruiting volunteers is becoming more challenging.[42] (see Table A4.5.3).

Handyperson Services

Handyperson service schemes are enabling people who are older or living with disabilities to get repairs and minor HMs. They are being linked to services including falls and accident prevention, home security, fire safety, energy efficiency, adaptations, and targeted health improvement (p. 70).[18]

In the UK, Handyperson Services are sometimes part of the wider package of services provided by Home Improvement Agencies. Three studies found the low cost preventive interventions provided by many handyperson services either reduced or offered the potential to reduce demand for health and social care services. Many agencies employ handyperson services to carry out: property maintenance checks, gardening, and small jobs around the home to improve independent living. Handyperson services work under a service scheme to improve home safety and security (including falls prevention) and improve energy efficiency which lead to improvements in health and wellbeing, increase comfort and decrease expenditure on fuel, and / or make homes suitable for people on discharge from hospital.[1,17,18] (for frequency of services undertaken see Table A4:4).

Outcomes of using handyperson services include increased capacity and range of services provided, and new client groups served. The small tasks done by handyperson services were viewed as a key element in preventive services for older people. "A visit from a handyperson to undertake a small job is often the first step in identifying potential risks and hazards in people's

homes (which may be easily remedied by the handyperson), as well as a range of previously unrecognised and unmet needs" (p. 4).[17]

Service users reported that "handypersons sometimes did more than the job they had requested; for example, checked appliances, and offered to fit fire alarms or a new lock" (p. 37). This contributed to the high levels of satisfaction. Having work completed within two weeks of having contacted the service added to client satisfaction.[17] "When complex needs were beyond the handyperson, they were able to redirect people to other services, reinforcing the crucial preventive role of services" (p. 62).[17] "A full time handyperson can make up to 1,200 visits in a year offering the potential for an informal 'check' on many older people living alone" (p. 4).[17] The quality of Handyperson Services judged by users was: trustworthiness, attitude, personality reliability, affordability, and knowing there was a service that could offer help with small tasks that could generate considerable anxiety if left.[1,17] As a result, handypersons services reduced waiting lists for OT assessments.[17] (For examples of strategic initiatives see Table A4.2.1). There is evidence that handyperson services generate modest cost savings to health care, social care, and to service users.[1,17,18,33,40,46,50,80,85,86,87]

One report identified that although the majority of HIAs "run a handyperson scheme, [they have] a restricted reach in relation to the number of homes in poor repair….These services are not getting to enough people in need, early enough" (p. 68-69).[18] In a national evaluation of Handyperson programmes the author states "based on the case studies it would be difficult to make a judgement as to whether either model – employing in-house handypersons or subcontractors – works best" (p. 52).[17] "Handyperson schemes still suffer from being 'nobody's baby' because their benefits straddle housing, social care, health, and other policy agendas" (p. 3).[1] "Handyperson Services should become part of mainstream services for older people, commissioned by housing, Supporting People, primary and out of hospital care bodies, and Social Services" (p. 3).[1] "There is significant scope for linking Telecare and telemedicine with handyperson services. Installation of such technology may reveal other housing issues (e.g., inadequate wiring) which need to be addressed to ensure a person's safety – or even be crucial to the installation".[1]

Builders and Contractors

National guidelines state only licensed or registered builders may undertake major HMs.[23] The contractor's role may vary depending upon tenure: responsible for minimising disruptions for residents and neighbours (see Table A4.3), ensuring health and safety issues are considered, and to implement specifications.[64]

"Participants who were most happy with HM, more often than not, had a positive experience of their builder. A builder, who was respectful in their home, clean, took care to involve them in the process and listened to their needs, was highly valued by participants….Almost all of the clients who reported positive experiences of their builders were clients of the community HM service. In

this service OTs had close contact with the builders and used the same builders consistently rather than contractors….Poor workmanship resulted in modifications that were messily completed, de-valuing participants' need for a comfortable aesthetically pleasing home, and in the most concerning circumstances caused safety hazards" (p. 6).[5]

Joint builder / OT assessments, as per the Scope Access model in NSW has led to high take-up of HMs, particularly in rural and remote areas: "The value of having teams of both OTs and builders and mobile workshops, as per the Scope Access model in NSW, particularly in rural and remote areas. This has led to 100% take-up of HMs and improved cost efficiency after joint builder / OT assessments" (p. 12).[81] Training targeted at health and building professionals pertaining to HMs is critical to achieve successful client and service outcomes.[5,41,66,67]

Building and Construction Issues

- Some have reported many "difficulties encountered by health and community care professionals in interfacing with this [building] industry…..Getting cost estimations, dealing with specialised trades, storing materials and tools, subcontracting, managing liability, and quality control are not familiar to professionals from the health and social sector (Pynoos, Tabbarah, Angelelli, & Demiere, 1998)" (p. 69).[46]
- "Contractors and remodellers are also not well informed about the needs of older people or suitable adaptations (Auriemma, Faust, Sibrian, & Jimenez, 1999; Pynoos et al., 1998; Steinfeld et al., 1998) and very few have developed adequate skills and experience to undertake HMs (Duncan, 1998). They often have established traditions in building that are difficult to overcome and are reluctant to try new methods and products (Pynoos et al., 1998; Steinfeld et al., 1998). In addition they are often not interested in small HM projects (Pynoos, 1993; Steinfeld et al., 1998)" (p. 69).[46]
- It is also difficult to find skilled contractors particularly in remote areas and who can co-ordinate the HMs recommended.[46]
- Poor workmanship has resulted in the poor installation of or positioning of equipment.[46]
- The "specialist knowledge of most allied health workers and builders in the area of home maintenance and modification is currently based on 'learning by doing' due to a lack of specialist training programs" (p. 9).[41] (See Table A4.7.1 for HACC workforce initiatives for OTs and builders) Building professionals maybe unaware of the specialist nature of HM work.[65]
- "Rigid and variable interpretations of codes can sometimes make it difficult to creatively negotiate a solution that meets the requirements of both the code and the householder (Pynoos, 2004; Tanner et al., under review)" (p. 70).[46]
- "Contractors often seek to comply with standards and codes that were not developed with older people in mind and are not required in or suited to a residential environment (Klein, Rosage, & Shaw, 1999; Pynoos & Nishita, 2003; Sanford, Follette, & Jones, 1997; Steinfeld et al., 1998)" (p. 70).[46]

Building and Construction Solutions

- Consider the issue of "the impact of increased client choice when it comes to selecting a builder. This could possibly lead to builders undercutting each other to get the job and the cheapest offer being accepted" (p. 11).[81]
- Contractors need opportunities and support to develop adequate skills and experience to undertake HMs. This is a challenge to a service as contractors and builders often have well established traditions in building that are difficult to overcome.[46]
- NCOSS recommends "engaging licensed builders and tradespeople directly rather than relying on contractors; not only would this improve efficiency, but also build expertise amongst the construction industry in HMs" (p. 2).[16]
- The NSW HMMS state council reports that to create a truly equitable system one key recommendation is to create "a national accreditation system for builders and tradespeople who wish to work for the frail aged and people with disabilities. The setting up of a national register of builders and tradespeople who have completed all necessary training and checks such as police checks, licence and insurance checks" (p. 32).[67]
- HM services need to "aim for working partnerships between OTs and builders where they can work collaboratively, develop respect for each other's knowledge and have opportunities for discussion regarding projects" (p. 7).[5]
- Select consultants and contractors based on quality and price. Organisations should develop pools of builders who specialise in HMs.[65]
- "Give builders a schedule of works for grants cases containing total estimated costs" (p. 58). Revise cost levels at which warranted builders must be used for.[65]
- "Nationally recognised competencies and, then, competency based training for both OTs and builders. More use of traineeships, apprenticeships and paid placements in home HM services….Widespread OT and builder knowledge on the full range of commercially available products" (p. 10-11).[80]

Designers

The designer's role is to advise the HM team on the range of options available, produce sketches and drawings based on OT recommendations, and consult with other team members as required. Designers provide the builder with specification explaining plans for implementation, materials to use, and visuals of the house once completed. The designer may provide oversight supervision, issue invoices on behalf of contractors, and manage health and safety files.[64] (See Table A4:4.2 for examples of features influencing design).
"Principles of Good Adaptation Design according to NIHE:
- incorporate the views of the user and other family members (A User Centred Design approach);
- fully inclusive communication involving the disabled person, OT, designer, and housing providers;

- give clear specification to meet the needs of the user;
- promote independence, privacy, and safety through good environmental design;
- offer options through innovative design, within financial constraints;
- efficiency and effectiveness – the design should have a positive outcome for the user and be achieved rapidly and cost effectively" (p. 15).[64]

"Establishing design awards and documenting and publicising notable success stories would also assist in raising awareness of the design considerations for older people (Duncan, 1998)" (p. 70).[46] For particularly complex HMs an architect and / or designers should be used before grant monies are released.[64] Technical awareness training is also recommended, for example see Table A4:7.2.

According to a NIHE review Interagency Working in relation to the design process:
- "[Joint training] to ensure effective design solutions are implemented for disabled people;
- [Input from OTs] into the selection and evaluation of housing fixtures and fittings for disabled people would help to strengthen the interface between product and housing planning / provision;
- Joint surveys / research into areas of shared concern enhances interagency co-operation and maximises the expertise available for disability related research. User involvement in the evaluation of housing adaptations and the development of housing design standards is essential. A forum with representatives from the voluntary sector to assist with service development;
- Consider the development of schemes with the voluntary and independent sectors to provide garden design and maintenance services" (p. 69).[65]

Barriers and Enablers

Across the review, three papers focused solely on barriers to the uptake and maintained use of HMs. However, a further 22 papers provided valuable insight into the barriers that affect older persons' access to and use of HMs. Types of barriers identified were grouped into psychological, practical, or physical domains. A key theme identified across the papers was the increasing prevalence of psychological resistance to HMs. In a review paper, psychological resistance to HMs emerged more commonly (60%) across the papers than practical resistance (40%).[8]

Psychological Barriers

- Lack of social support: Some older persons regard the process of making major HMs to their home as too complicated and time consuming and are unaware of available support.[2,8,41,46] Some people are reluctant to seek appropriate supports due to not wanting to appear as though they are complaining or giving up.[37,78] Lack of experts in HM and poor communication, especially for assessment, follow up, and evaluation, impact on uptake of HM.[2]

- Low perception of need and denial of disability: Some people feared the prospect of their own decline and put off getting recommended HMs.[8] Evidently a person's perceived difficulty of an environmental barrier has more of an impact on accessibility than the actual barriers present: "the greater the difficulty the individual experiences as a result of a barrier in the home, the less likely they are to cope within the home and maintain their independence" (p. 14-15).[60] In some situations a person's disability influenced their perception of whether they could cope and were overwhelmed by the process.[37,72]

- Stigma: People requiring HMs can often be concerned or embarrassed about stigma associated with HMs, especially external modifications, as it may make their disability obvious and many people do not want to be thought of in this way.[8,46,80] "HMs may make the resident vulnerable to ridicule or crime when their homes are recognised as being occupied by someone who cannot defend themselves" (p. 64).[46]

- Personal stress: Some older persons were reluctant to have work completed due to the stress expected with disruption to the home and daily routines.[46]

Practical Barriers

- Financial problems: Unaffordability appeared to be the primary barrier,[8,16,18,24,78] coupled with substandard housing,[46] fragmented systems of funding and service delivery,[2] and the lack of advice on how to navigate these systems. Funding constraints can create inequitable access to HM services. Those least likely to access HMs include people who are older or living with disabilities and who come from less advantaged backgrounds.[16]

The HACC scheme "is limited in its criteria by the type of services it can provide and its geographical application, which can discriminate against Aboriginal people with disability living in remote communities" (p. 1).[16]

- Lack of knowledge / information: Many consumers were unaware of programs available and there was a general lack of information[2,8,16,24,42,46,78] in particular on eligibility criteria.[8,16,78] Language and cultural barriers also exacerbated difficulties in accessing information.[42,78]

- System failure: Poor coordination of services, lack of training for carers, health and building professionals on the benefits impact on uptake and quality of HM.[2,77] Evidently older persons have difficulty finding good, reliable and trustworthy contractors.[46,50,78] Access to OT was a major problem especially for those living in regional areas, and even for people who have been assessed as HACC-eligible. Lack of appropriate standardised assessment tools used by OTs in their HM practice[5] is a potential barrier to identifying and obtaining the most appropriate HM for an individual. "Failure to factor in meaning and personalisation can lead to clients to reject interventions (Bridge, 1999; Clemson, Cusick, & Fozzard, 1999)" (p. 4).[8] In studies not using a client-centred approach, adherence rates of as low as 40% have been identified. Health professionals adopted mainly a medical model approach to disability, failed to appreciate the unique needs of individuals with disabilities and their families.[35]

- Desirability, aesthetics, and ambience: Even when a resident recognises the benefits of HMs they can potentially be rejected due to their appearance, especially if the HM emphasises disability.[5,35] Ambience includes factors such as weather, noise, temperature, and lighting. Cumbersome items such as stair lifts, hydraulic lifts, and ramps can be rejected, as they have the potential to affect the meaning of 'home', and can result in a negative impact on a person's sense of privacy, autonomy and personal identity.[35,46,80] "Many [modifications] are likely to confront potential consumers with their disability because they are suggestive of hospitals or institutions" (p. 15).[8] In addition. many people were concerned HM would have an impact on the value of their home.[18,24,46]

- Tenure: Individuals less secure in their tenure of accommodation have been found to be less likely to access HM services.[8,16]

- Control and decision making: Lack of decision-making power has the potential to be a barrier to HM.[5,78] In one study, some people were "frustrated by service provider's restrictions and guidelines on the type, location and details of the modifications allowed" (p. 5).[5] Also limitations in codes and legislation,[36] such as Australian standards for public access, service provider's guidelines, or budgetary restrictions meant some participants were unable to restore their home to an acceptable standard, at times resulting in clients completing HMs deemed unsafe.[5] HMs services that were not delivered sensitively could disempower a client by not allowing them sufficient choice and control over the process.[46]

Physical Barriers

- Those occurring when there was a mismatch between the home environment and the physical capacity of residents, which reduced levels of independence and increased the need for personal assistance. Mismatches of up to 80% have been reported in studies of older adults (Gill, Williams, Robison, & Tinetti, 1999).[82]
- On average, the number of barriers in the home was counted as 4.7.[82] The physical or environmental barriers were mainly the entrances, such as stairs being the only route; indoor such as laundry, kitchen hobs with ordinary rings, no place to sit in bath / shower, shower stall with kerb / level difference more than 25mm; and outdoor such as letter box accessed via steps or different level, refuse rooms / bins, reached only by steps, path and surface not level.[82]

Psychological Enablers

- Social support: "Further research should determine the types of social support (e.g., psychological, physical, or practical) that are the most likely to increase the uptake of HM services" (p. 14).[8]
- Perception: McCullagh recommends beginning a conversation by asking the patient how he feels about these statements:
    - *"My disability is temporary.*
    - *HMs will make it obvious to visitors that I'm disabled.*
    - *HMs are unattractive.*
    - *Other people (i.e., family members, landlord, and neighbours will disapprove).*
    - *The modifications will be too costly" (p. 59).[53]*

Practical Enablers

- Financial: Aim to develop "equitable and consistent client contribution policies which take into account the many causes of financial and social disadvantage" (p. 3).[16] A planning framework addressing remote and regional service provision is needed.[42] Future research to identify the specific level of consumer knowledge of available schemes and services, and the most efficient ways to distribute the relevant information to the public.[8]
- Knowledge: Information and advice is an important element of the HM process and needs to also be available at the initial point of access.[16,18] Service providers are urged to increase the profile of HM services[2] through the use of mainstream media to deliver relevant information and the distribution of knowledge suited to various local populations via community centres with attention to preferred languages, images, and packaging.[8] "The type of help most appreciated from grant officers was in form filling, choosing

builders, and coordinating the work" (p. 5). A list of work to be carried out and knowledge about timeframes would be helpful to clients.[72] "Research should investigate what consumers know about available services and assistance and identify the most efficient ways to distribute the relevant information to potential consumers in various communities" (p. 17).[8]

- Aesthetics: It is clear that aesthetics need to be improved. HMs need to be well presented with an emphasis on added-value and cost / benefits.[5,8,18,36] "A more collaborative approach is required by OTs and HM service providers, allowing clients more choice and control in HM products, materials and design" (p. 8).[5] Apply careful consideration in recommendations of the effect of objects on users.[8]

Evidence suggests collaboration sectors is important when developing 'branding' housing systems, i.e., Life Time Homes and Smart homes in the UK and Europe. "Branding aims to create a higher perceived value for accessible housing to counter consumer resistance on the grounds of increased cost, poorer design aesthetics and reduced ability to on-sell properties because of the attached social stigma" (p. 8).[80] Some recommend considering landscape modifications as an alternative option for certain HM such as ramps and lifts, as they can be designed to blend with existing architecture, maintain or improve perceived house values, and mask perceptions of vulnerability as it does not flag the person living in there as having a disability.[10] Ramps and lifts can attract unwanted attention and in some cases attract crime.[10] There is a need to consider key aspects of meaning of home, as well as P–E–A transactions in the home of older people.[35,68,92] OTs need to understand "eligibility criteria, access standards, and the restrictions of their services that prevent them from considering all dimensions that contribute to a person's experience of home" (p. 8).[5] "Further research is required to establish whether the current standards are suitable for differing populations, and if not, further standards need to be developed for older adults" (p. 7).[5]

Physical Enablers

- Service providers need to understand how both accessibility and usability may impact on occupations within the home.[62]
- Discuss barriers with clients, provide choices, and present solutions with photos or drawings. Following installation, OTs supervise the client's daily practice until performance is deemed safe.[83]
- HM and HMM service providers should use standardised assessment tools to identify functional limitations and potential environmental barriers both indoors and outdoors, i.e., pathways and access to refuse bins and letterboxes.[60]
- Pro-actively review needs of service users to identify new barriers.[60]

Vulnerable Groups

Few papers discussed issues surrounding access and use of HMs in vulnerable groups and service delivery to remote and rural areas. Only two of the papers reviewed focused solely on these particular domains, but six discussed the area to some degree. The first was an exploratory study on issues in regional and remote areas in Australia, with data gathered from over 95,000 participants.[47] The second paper was an occasional paper addressing HMs in Aboriginal communities.[93] The key themes from these two papers included inequity in accessing HMs, insufficient knowledge, issues associated with rural housing, prevalence of certain health conditions, and the impact of culture on housing (e.g., overcrowding).

KEY HIGHLIGHTS

➢ There is no clear evidence on the best type of model of service provision for vulnerable groups and service delivery in remote and rural settings.

➢ HM use in Indigenous populations is inversely related to remoteness. However, lack of access to experienced OTs has resulted in poor access to home modification services.

➢ Health conditions unique to the Aboriginal population put those living in rural areas at greater risk, where home modifications could potentially reduce injuries and improve overall wellbeing.

➢ Telecommunications is useful in reducing time, distance, and cost of home assessments and follow up.

➢ As remoteness increase, so too does mortality rates as a result of injury and the likelihood of hospitalisation in those aged 65 years and over.

➢ There is a need for improved access and understanding of HM needs for vulnerable groups and the development of cultural competence in delivery of home modification services.

HMs were under-utilised by people in remote and rural communities, in particular older people and those of Aboriginal or Torres Strait Islander origin.[16,47,93] "Clients who are of Aboriginal or Torres Strait Islander origin, live rurally or regionally, or do not own their own homes access HACC HM services to a lesser extent than other HACC clients (Jones, DeJong, & Phillips, 2008; Jung & Millikan, 2009)" (p. 1).[16] In Indigenous groups, 1.2% of people use HM services; a figure significantly less than that of non-Indigenous people (given that Indigenous Australians comprise 2.5% of the total population).[41] "The proportion of Indigenous HM users increases along with the remoteness (Jung & Millikan, 2009)" (p. 8).[41]

Issues and Challenges

Policy challenges. Current policies may act as a barrier to HMs. For example, "a standard means test for clients entering the aged care system is inequitable towards Aboriginal and Torres Strait Islander people, as Aboriginal and Torres Strait Islander people enter the aged care system at a chronologically younger age than non-Indigenous people, therefore having

less time to accumulate wealth and assets" (p. 3).[16] Policies involved in the HACC HM scheme limit the geographical application of the program, often discriminating against Indigenous people with disabilities who live in remote communities.[16]

The increased cost associated with delivering services in remote areas poses another challenge for indigenous and CALD people due to "the increased cost of labour (both of builders and OTs), materials, and the distances required to travel to deliver jobs" (p. 19)[50]. These extra costs are not reflected in funding.

Lack of equity in accessing services. Lack of access to experienced OTs has resulted in poor access to HM services.[41,47,50] A paper reported "very remote areas experienced approximately four times less supply of OTs compared with major cities" (p. 19).[47] Factors contributed to a low retention rates of OTs included: "lack of professional development, support or recognition, poor pay and conditions, feelings of isolation and family-related factors" (p. 19).[47] The impacts of low staffing include lengthy waiting lists, delays in intervention, shorter appointments, and fewer routine follow ups after the HM.[47]

The prevalence of certain diseases and disabilities. The Australian Institute of Health and Welfare reported "increasing mortality from injury with increasing remoteness, especially in males, and higher hospitalisation rates for falls in people aged over 65 years" (p. 21).[47] Health conditions unique to the Aboriginal population put those living in rural areas at greater risk, where HMs could potentially reduce injuries and improve overall well-being.[93] For example, "Australia is the only developed country where trachoma is endemic" (p. 12); however, this occurs mainly in rural and remote Aboriginal communities where it is a major cause of visual impairment.[93] Further, it has been reported by the Australian Bureau of Statistics (ABS) that "hypertensive disease affects 22% of Aboriginal aged over 35 years and illnesses affecting circulatory systems are more likely in remote areas (14%) than non-remote areas (11%)" (p. 11).[93]

Insufficient knowledge / training. The lack of knowledge, skills, and resources of HM service providers and relevant organisations has been found to be a considerable barrier in both rural and minority communities.[16] For example, confusions or refusals by "Aboriginal Housing Office or the Lands Councils either they do not have the resources to engage HMs services or are unwilling to do them. This contributes to poor access to HM services by Aboriginal people, and often results in significant isolation and hardship" (p. 4).[16] Finding skilled, experienced, and trustworthy contractors was also reported to be a major problem.[47,50] "The role of the OT should be further integrated into a broad rural health system and recognise the unique perspective and skill set of the OT in the prescription of environmental modification to improve functional outcomes" (p. 20).[47]

Issues associated with rural housing. These tend to include:
- Issues in relation to the general conditions of homes included insufficient design,

inappropriate materials, poor building practices, and challenges of extreme climates.[47,93]

- Structural challenges were reported to be a major issue that requires policy response, with a reported "26% of all Aboriginal and Torres Strait Islander households living in dwellings with major structural problems…this rate rises to 34% in remote areas" (p. 8).[93]

- "Housing policy for Indigenous Australians has been shadowed by a history of misunderstanding and chronic under-funding [that] has led to inappropriately designed, under-specified and poorly maintained houses that have a significant negative effect on health and well-being, including overcrowding resulting from inadequate numbers and inappropriate styles of houses".(p. 4)[93]

- Due to problems with housing in rural settings, "some program providers reported a risk of 'over capitalising' when considering HM needs of some clients…[who may have] issues related to the general condition of the house e.g. homes may need full rewiring or re-plumbing" (p. 48).[41]

- It was reported that building standards were more relaxed in regional areas, making it more difficult for OTs to comply with Australian housing standards.[47]

- Inappropriate use of building materials was also a concern. For example, it was reported that materials designed for urban homes were being used in Indigenous rural communities, resulting in "continuing failure of certain building elements and components" (p. 24).[93]

- Other issues included the qualifications and experience of rural builders,[47,93] and the long waiting lists for public housing in areas where there are major housing shortages.[93]

Solutions for Vulnerable Groups

- There is no clear evidence on the best type of model of service provision for vulnerable groups and remote and rural settings. What is important is "to attempt to preserve or create an outcome that fits the needs of the user without de-identifying the environment" (p.16).[93]

- "As different Indigenous groups have varying practices and beliefs, as well as unique environmental situations and functional requirements, a one-size-fits all approach is not appropriate" (p. 16).[93]

- From the reviewed papers, the importance of improving both access and understanding of the need for HMs for eligible people was clear. Organisations (e.g., the Aboriginal housing agency, ADHC / HACC, and HM service providers) require support and resources to develop models that engage vulnerable groups.[16,50] Important factors include policy makers incorporating increased costs associated with the delivery of services in remote and rural areas[50] as well as the "development of cultural competence in delivery of HM services" (p. 5)[16].

- Wide ranging strategies are needed to solve some of the issues identified. The main priority is for policy makers and services providers, in consultation with the consumers, to forge shared goals that address issues, such as shortages in building and health

professionals.[47]

- Access to information is also an imperative, with a need for "changes of perception and attitudes toward HM among rural home owners" (e.g., more information about the value of HMs as well as falls prevention strategies and education, p.22).[47]
- Telecommunications has also been considered useful in particular aspects of the HM process such as reducing time, distance, and cost of home assessments and follow up. Skype partially helps with a reduction in the number of OTs needed, although telecommunications alone is not recommended.[31,47]
- Ageing in Place has been identified as being particularly important to Aboriginal Australians. One paper reported that elders have a significant role in preservation and dissemination of culture and this is eroded where aging in place is not possible.[93] "Mechanisms to delay or avoid these transitions to institutional care (e.g., HM) are, therefore, of great benefit to Aboriginal communities" (p. 17).[93]

Prevention

This section included 22 papers examining the role of HMs in falls and accident prevention. There is widespread evidence that appropriate use of HMs, AT and education and support can prevent or reduce the risk of accidents and falls, reduce hospital admissions, improve health and reduce carer strain and injury.[5,11,13,14,36,42,46,47,70,86,89,90,91] HMs "can prevent disability by altering the disability threshold and facilitating self-care (Verbrugge & Sevak, 2002)…widespread adoption of HMs may lead to a decrease in disability in later life (Liu & Lapane, 2009), and reduce functional decline (Mann, Ottenbacher, Fraas, Tomita, & Granger, 1999)" (p. 33).[11] It is reported that "a significant proportion of falls are due to environmental factors (Connell, 1996; Sattin, 1992) and HMs play a part in reducing the injuries older people experience at home (Ambrose, 2001)" (p. 31).[11] "The need to articulate the concept of wellness also reflects the significant shift in focus within health services over the previous 50-year period: that is, from 'treatment' to 'prevention'" (p. 16).[77]

In a study on visual impairment, the three most hazardous locations were kitchens, steps, and bathrooms. Participants expressed "much fear in regard to accidents on stairs, tripping on loose carpets, falling on slippery flooring, and stepping into glass doors. The greatest fear was about stairs and, for this reason, participants wished to live in homes without steps" (p. 280).[74] See Table A3.1.2 for the most important HMs as perceived by participants with visual impairment.

"Elderly people are most at risk of hurting themselves on stairs and more than 100,000 are treated for stair injuries every year" (p. 27).[66] "High-risk groups were people who had had a history of falling in the past year, who had been hospitalized for a fall, who showed functional decline, and who had severe visual impairment" (p. 967).[14] "Among the five chronic medical conditions, older adults living with hypertension or heart disease were 1.86 times more likely to modify their home compared to frail older adults without specific medical conditions" (p. 653).[49]

"The higher mortality rates from falls among rural older people compared with their metropolitan peers highlights the importance of falls prevention strategies and education particularly in rural areas" (p. 9).[47]

One review provided an overview on data from a Northern Health and Social Care Trust audit exploring the effectiveness of minor adaptation provision in private sector housing. "Eighty-seven per cent indicated that their independence was improved, with 78% able to complete certain functional tasks without assistance. Of these, 51% required assistance prior to the fitting of the adaptation. Seventy five per cent reported that the adaptation assisted the carer with their

management" (p.26). Participants reported they were no longer having falls and also reduced the fear of falling.[66]

The benefits of HMs in one qualitative study included improved safety, a lower risk of falls, reduced likelihood of hospital admission, and less strain on carers. This effect was even stronger for major HMs than minor, e.g., bathroom renovations and lifts.[36]

In one study where participants had been assessed by an OT and a range of HMs were installed, participants reported "the modifications often resulted in an enhanced sense of safety, which was highly valued by the participants. They expressed relief and a reduction in anxiety and fear. Some participants reported a decrease in injuries and falls" (p. 4).[5] "However, some participants described how their modifications resulted in unsafe situations, e.g., dangerous materials being used on step ramps which were slippery or likely to deteriorate with the weather" (p. 4).[5]

One UK study explored health outcomes of HMs for people with disabilities. "This study found that people with disabilities living in unadapted or badly adapted housing experienced pain, accidents, exacerbated illness, or feelings of depression. In contrast, well-designed adaptations were found to have a positive impact on the physical and mental health of the person with a disability (Heywood, 2004). Furthermore, these benefits were long-term and extended to improve the health of other members of the family as well (Heywood, 2004). This study confirms the findings of previous studies, which found reduction in pain resulting from minor HMs such as the installation of grab rails (Clemson & Martin, 1996; Edgington, 1984)" (p. 75).[46]

One mixed method study on health outcomes of HMs reported unsuitable housing caused back injuries and falls for carers; whereas, good HMs provided relief from pain, mostly caused by arthritis. Sixty two per cent who received minor HMs listed 'feeling safer from accidents', especially when bathing (e.g., reducing the fear of scalding). Reducing the psychological impact of deteriorating health, participants reported that "the painful experiences of total dependency, humiliation, isolation, loss of home and loss of control in the home were lifted" (p. 140).[37]

Multifactorial interventions play an important role in preventing falls for frail older adults. Four reviews reported on strong evidence that multifactorial "interventions play a role in successfully reducing the number of falls, limiting fear of falling, and preserving independence in community dwelling older adults. When physical activity and HMs are provided individually, the evidence that these interventions reduce falls and maintain and promote ADL and IADL performance is moderate" (p. 288).[13,14,77,89]

Studies that reported prevention and reduction in falls, and improvement in ADL and IADL performance with multifactorial interventions:
- Prevention programs in community dwelling older adults. Study interventions included hazard identification, structural changes to the home, and provision of AT. Authors found

the strongest results for a client-centred intervention plan that includes multifactorial programs that included a mix of exercise, education, vision and medical checks, HMs, and AT.[13]

- In Campbell et al's (2005)…study, the OT home assessment and intervention "was effective in reducing falls in people with severe visual impairment, whereas Exercise alone did not reduce falls. The combination of exercise and home assessment did reduce falls but to a lesser extent than home safety alone" (p. 968).[14]
- "In Nikolaus's (2003) study the interventions included HM, geriatric assessment, and training in the use of mobility and technical aids. The intervention group had 31% fewer falls than the control group. The intervention was most effective in a subgroup of participants who reported having had two or more falls during the year before recruitment into the study" (p. 10).[91]
- In a study by Day and colleagues (2002), "the percentage estimated reduction in annual fall rate attributed to home hazard management was not significant….However, there was a significant effect when the intervention included exercise….The strongest effect was observed when all three interventions; exercise, home hazard management, vision correction, were combined together" (p. 10).[91]

"To date there is little evidence that broadly targeted programs aimed at removing environmental hazards in the homes of community living older people reduce the incidence of falls (Gillespie, Gillespie, Cumming, Lamb, & Rower, 2001). More success has been achieved with tailored programs targeting the specific needs of people with increased risk of falls, such as the frail elderly (Cumming et al., 1999) and those who have fallen previously (Close et al., 1999; Nikolaus & Bach, 2003)" (p. 10).[46]

"Interventions perceived [by older persons] as overbearing or restrictive were not popular and advice to be constantly vigilant for fall hazards could be disempowering (Yardley 2005)" (p. 3). Older people favoured positive messages about benefits of interventions and the opportunity to choose strategies that suited them.[91] (For examples of preventative programs / projects, see Table A3.2.0).

Issues and Challenges

- "The HACC program provides a significant level of HMM services for older people at risk of premature entry to residential aged care. However, HMM services are a relatively small component of all HACC services, and there are considerable variations between jurisdictions in the level and distribution of HMM services available" (p. 37).[46]
- HACC funded HM "services, due to limitations in funding, tend to provide support only to older people who have already experienced a fall or an illness; they are not preventative" (p. 10).[42]

- One of the key issues identified is "access, information, location, and cost. What is needed is "a comprehensive system of information provision about HM that focuses on prevention and the full range of available options and pathways for people whose HM needs are eligible for government subsidisation" (p. 9).[81]
- According to Lewis and colleagues (1999), "in introducing new preventative services, care needs to be taken to judge the value of such services not only on quantifiable reductions in the expenditure on other services, but also by improved quality of life and enhanced independent living, as perceived by the older people themselves as well as service professionals" (p.17). [77]
- In health care there is a "predominant emphasis on physical impairment, and somewhat less attention has been paid to the sensory, cognitive, emotional, and social changes associated with ageing" (p. 11).[46]
- "Less is known about the housing and modification needs for people with visual, rather than physical impairments (Hanson, 2005; Hanson, Percival, & Osipovic, 2004)" (p. 270).[74]
- "Checklists and guidelines for HM for people with visual impairment…tend to be over-generalised since they stem primarily from expert opinion and customary practice and little empirical research is cited" (p. 271). There are currently no solutions for those who have difficulty reading small print size materials.[74]
- "Improvement of accessibility to HM results in the prevention of potential illness and the consequent reduction of health care cost; therefore, requiring greater recognition from policy makers" (p. 20).[47]

Prevention Solutions

- "In addition to services to support people who experience considerable functional incapacity, it may be useful for the Australian Government to consider working with States and Territories on preventative HM measures for older people who do not meet the eligibility criteria for HACC funded support, in order to prevent avoidable hospitalisations or declines in functional capacity" (p. 10).[42]
- Funders and service providers should ensure processes are in place and resources are available to provide the swift supply of AT and HM (i.e., health professional assessment without OT) as this will reduce the risk of injury and / or deteriorating health.[39]
- It is important to give consumers choice and control, tailoring preventative intervention to meet individual needs and wants.[90] "In light of the push to promote greater personalisation, including a strategic shift towards early intervention and prevention (Department of Health, 2008, 2010), the introduction of self-assessment has been advocated as one way of reaching out to people who do not normally come to the attention of social care services" (p. 30).[90]

- "Interventions to prevent falls need to be population specific as a one-size-fits-all approach will fail to deliver significant population-level falls and fracture reduction" (p. 968).[14]
- "Recommendations for brighter lighting levels should not be regarded as universally helpful for people with visual impairment" (p. 279).[74]
- Use of validated and comprehensive assessment tools that involve a full range of potential hazards and evaluate: "a person's fall history; functional capacity within the context of a person's home; patterns of usage of the home; protective and risk-taking behaviours; functional vision; physical and cognitive attributes that affect mobility and task performance; and fall risk situations (i.e., reaching, climbing, transferring)" (p. 969).[14]
- "Environmental interventions should be part of pre discharge planning for those at highest risk and post discharge follow up for those with a history of falls...raising the awareness of older people about their environment, how they negotiate it, and problem-solving solutions (Clemson, Cusick, & Fozzard, 1999)" (p. 969).[14]
- Government needs to further recognise the value of HMs, in general, in its preventative agenda. "Suitable housing needs to be part of strategic thinking in a whole range of arenas, and money from other sources needs to be diverted or added to existing resources" (p. 44).[36]
- "General practitioners need to know to whom to refer their patients and what standard of care they should expect from community services" (p. 969).[14]
- For uptake and compliance with HMs, one paper emphasised the importance of OTs to enable clients to exert control over environmental strategies to reduce risks. It is also important that the "meaning that a person attributes to their home, and how changes to areas of the home will impact on the person [is understood]….OTs need to know the person's perceived risk of falls; this relates to self-efficacy, locus of control, and also their knowledge of fall risks. Within the community setting, OT falls prevention practice should also include:
  - A focus on people with a history of falls.
  - Strategies to facilitate the HMs, i.e., follow up phone calls, extra HMs if needed.
  - Education to increase a person's understanding of their falls risk factors and their implications.
  - Investigate family members' and carers' perspectives and incorporate these strategies into the falls prevention strategies.
  - More research into compliance of HMs will support falls prevention recommendations.
  - The costs of environmental HMs. These are always an issue and need to be considered and discussed with all relevant parties including funding bodies" (p. 279-280).[89]

- According to MacKenzie, Byles, and Higginbottom (2002), "it is important to observe how a person interacts with his / her environment as some environmental modifications might even increase the risk of falls" (p.279).[89]
- Attention needs to be further directed to "how the environment can be made easier and safer for people with sensory impairments. [For example,] better lighting, enlarged fittings, amplification devices, auditory signals, and contrasting colours…(Auriemma, Faust, Sibrian, & Jimenez, 1999)" (p. 11).[46]
- Heating adaptations can directly address improving how people who are older or living with disabilities safely manage heating and air conditioning systems.[66]

Role of the Client in HMs

The role of the client in HMs is a critical element of providing client-focussed care that impacts strongly on the decision-making process. Twenty-seven papers were identified which explored the position of the client in the HMs process. These papers reported on the factors impacting on the decision making process, reasons for not modifying the home when a need has been identified, and perceptions of common problems reported with the HM process.

Therapists must seek to understand what clients value about their home and intended HMs, and be aware of aspects of the 'societal' dimension. This dimension might include eligibility criteria and access standards and restrictions, which may impede the assessor's perception of the client's experience of home.[5]

KEY HIGHLIGHTS

➢ Growing emphasis on the meaning of home.

➢ A common problem clients had with the HM process was in relation to the workforce, i.e., the disconnect between services, lack of suitably qualified workforce, lack of knowledge of referral pathways and benefits of HM, and a lack of soft technology skills.

➢ Greater involvement of older and disabled people throughout planning and implementation to increase perceptions of control.

➢ Client-targeted training in identifying and problem solving barriers in the home to empower clients to review their own wellness.

➢ The use of self-assessment empowers clients, enabling them to manage their own wellness.

➢ Develop alternative HM services to support consumers including databases for tradespeople, services to assist in downsizing/relocation, and private service provision for home maintenance.

➢ Consistent review processes to assess the impact of HM on consumer independence, safety, quality of life, and the need for further assistance.

➢ Develop satisfaction surveys for service users.

Decision Making in HMs

The majority of reviewed papers placed strong emphasis on the involvement of the client and their caregiver(s) by placing them at the centre of the decision making process for obtaining HMs. Involvement in decision making and consultation promoted positive outcomes, while the opposite had an adverse effect.[5] A survey of 2000 adults in Sweden found that of those who had obtained HMs, 65% had made the decision to do so themselves.[7] A metropolitan Australian sample indicated that there are six domains that influence decision making in the HM process:[6]

- personal (safety, privacy, identity, and freedom to perform activities);
- societal (quality standard and cost);
- physical (available space, quality of materials, and overall appearance);
- temporal (resale value of home and possible future health deterioration);
- social (impact on family and guests); and
- occupational (ability to perform usual activities in the home).

There is increasing emphasis on the meaning of home in decision making. Important aspects of the meaning of home checklist include:[38]

- "Primal security
- Privacy
- Control over decisions
- Freedom to act
- Reflection of self-achievement
- A place to foster relationships
- For children, a place of nurture, play, and growth
- A nodal point from which to go out and return
- Rootedness" (p. 536)

There was some concern about the decision making process and the balance between client autonomy and professional advising. Information offered to clients and their caregivers about HMs was insufficient and few potential recipients knew about the possibility of obtaining a HM, let alone the types of HMs available to them.[46,51,78] Even after ordering a HM, clients had little understanding of the process or what type of HM to expect.[72] By offering clients autonomy and responsibility over the decision making process, individuals can choose HMs that align with their existing conceptualisation of 'home', resulting in the integration rather than separation of these changes in their everyday lives.[45,77]

"The decision to have household modifications is driven by a number of factors including level of awareness, affordability, and beliefs of beneficiality (p. 345)."[52] Decision making in HMs appears to go well when clients have had prior experience with HMs, have seen an example of their proposed HM, or are well informed about the products and the process of installation.[72] "Family members have a major impact on decision-making in older adults' care plans" (p. 649). Housing

decisions are typically made by younger household members (Harvard University's Joint Center for Housing Studies, 2013) and family members, are secondary decision makers for HMs (American Association of Retired Persons, 2000).[49]

"A number of factors have been identified as being likely to influence the uptake of HMs. First, on the demand side: age, gender, health conditions, education, income, price of goods, use of other devices, race, and other demographic characteristics of the occupants have been found to affect the use of modifications (Kutty, 1999). In addition, on the supply side, factors such as type of tenure and structure of the dwelling are also likely to affect the use of modifications (Kutty, 1999)" (p. 61).[46] "As would be expected, people with functional impairment as measured by having a health condition, physical limitation, a recent fall, or self-report of poor health, also increases the likelihood of modifications (Gilderbloom & Markham, 1996; Kutty, 1999; Mathieson, Kronenfeld, & Keith, 2002)….The use of formal support also increase[s] the probability of undertaking modifications (Gosselin, Robitaille, Trickey, & Maltais, 1993; Kutty, 1999)" (p. 61).[46] In one study, "the strongest predictor of acceptance of free HMs was having a favourable attitude towards this strategy, especially if the person perceived that the modification might improve performance of daily activities (Gosselin et al., 1993)….. It has been proposed that people balance four factors when deciding whether to obtain HMs: perceived susceptibility, perceived severity, perceived efficacy, and perceived cost (disruption, social acceptability, and financial; Ohta & Ohta, 1997)" (p. 62-63).[46]

Through the decision making process, a number of papers also identified common reasons for not modifying the home when a need had been identified. From the perspective of the client, key reasons related to lack of knowledge or understanding, poor fit between the proposed HM and the home environment and / or the client's perception of home, financial constraints, lack of accessibility, and low perceived need. Specific reasons included:
- Being more positive or satisfied about their living situation, despite being recognised as an important strategy to remain in their home.[46]
- Being unprepared when the need arises and not knowing what to do, how to do it, how to pay for and maintain HMs, or what the benefits of HMs are.[46]
- When recommendations are perceived as unsuitable, too cumbersome, or the consumer has not received appropriate information in correct use of HMs.[46]
- Installation of HM is too disruptive.[46]
- The potential to affect the meaning of home, i.e., personal identity, privacy, and aesthetics.[46]
- Due to certain limitations in the societal dimension (e.g., public access codes, service provider restrictions) some participants were dissatisfied with the appearance of their homes.[5]
- "Adaptations being rejected due to their appearance, even if they are recognised as being of direct benefit to the disabled person (Nocon and Pleace 1997)….Furthermore

houses are frequently located together in clusters, the stigmatising effect and segregation from a community can be even greater (Nocon and Pleace 1997)" (p. 83).[35]

- Impact changes may have on the value of the home.[46]
- In a survey involving 2000 Swedish adults, reasons for not doing a HM included: 37% said they could not do it themselves, 36% were unable to afford it, 29% did not trust anyone to do the work, 25% did not know how to make changes, 23% did not have someone to do it, 23% did not know how to find a good contractor, and 12% were unable to get to a supply store.[7]
- Some people "may be reluctant to alter a cherished or familiar home or may fear the prospect of their own decline. In one study, respondents' explanations for not making suggested HMs included: failing to see any reason to make changes (49%), perceiving the home environment as safe (34%), and believing oneself not to be at risk for falls (17%). Only 1% indicated they could not afford to make modifications" (p. 59).[53]

Common Reported Problems with the HM Process

The literature reports a range of problems commonly reported about HM process.
- Processes of consultation and communication specifically prior to specification, omitting use of the client's expertise, not understanding the meaning of home, failing to recognise negative effects on family, and not identifying psychological factors, i.e., dignity and sense of control.[5,36,37,46,60,72]
- Poor quality workmanship and poor quality of service at all stages.[5,36,78]
- When the specification did not adequately meet the client's needs or details undermined effectiveness (common with showers).
- Coordination difficulties within HM services; lack of a person responsible for overseeing the process, older people and their families are often faced with coordinating different providers.[46,72] Lack of coordination between services and interruptions to service delivery due to staff availability and funding. Further delays caused by lengthy application processes. If a wait for a HM is too long the difficulty of completing the specific task increases.[46,60,65,70,78]
- Many people were confused and frustrated about funding and needs assessment processes and long waits for approval.[36,78] Grant limits were too low and pressure to accept the lowest quote resulted in equipment being installed which did not meet the person's needs.[36]
- Insufficient space because of a HM.[36]
- Grants officers reported in every case that "certain items of the mandatory provision were quite often omitted…heating, caring for someone else, access to the kitchen, items to do with sensory impairment….[and] right of access to the garden…[which was] a major cause of distress" (p. 39).[36]
- Lack of information and confusion on responsibility for funding.[2,36,78]
- Income and asset testing for grants mean that some families are unable to access any

adaptations.[36]

- Some participants in one study were surprised and distressed when there was no follow up. Clients believed follow up would have been important to address issues, such as equipment not being delivered or being delivered incorrectly; difficulties with using equipment or bad installation of equipment; HMs being left incomplete, unsafe, or unsuited to the client's needs; and identifying features that were not included that could have enhanced safety.[5,36,46]
- "For HM clients in Australia, there is little choice in grab rails and other modification products, restricting what can be achieved aesthetically" (p. 7).[5]
- Too many personnel visiting from different health care and community services are considered burdensome by clients, as was the lack of availability of key staff at crucial moments.[31,72]
- When moving home is a better option to modifying the home, some people are unable to afford it.[36]

Reported Solutions

The client and the service provider together must identify a range of possible solutions which best support and encourage the client's preferred routines and daily activities.[36,46,64]

- Greater involvement of people who are older or living with disabilities throughout planning and implementation to increase feelings of control.[47,72]
- The literature suggests a holistic approach to understanding need and demand for HM services.[46] Consider the meaning of home when assessing the HM and home maintenance needs of older people.[46] "Practitioners making assessments and recommendations for HMs should have a 'meaning of home' checklist…and should consider the suitability of the work proposed against the checklist, in consultation with the household concerned" (p. 546).[38]
- "It is particularly important for therapists to understand aspects of the societal dimension, such as eligibility criteria, access standards, and the restrictions of their services, as these may prevent them from considering the wider dimensions which contribute to their client's experience of home" (p. 8).[5]
- Consumer resistance to universal design homes can be overcome with consideration of aesthetic aspects of design.[80]
- "Use guidelines similar to the Clinical Practice Guidelines (CPG) for introducing aids and equipment, which allows the communication between formal caregiver and client to be structured to facilitate shared decision-making about assistive technology use" (p. 263).[75]
- "The ILC holds workshops for consumers and provides information on the ILC website to assist consumers carry out HMs themselves" (p. 36).[50]
- Consistent review processes to assess the impact of HM on consumer independence and the need for further assistance.

- "Develop alternative home maintenance services to support consumers including databases for tradespeople, services to assist in downsizing / relocation, and private service provision for home maintenance" (p. 40).[50]
- "Service delivery could be considerably improved if a directory of funding, modification services and information and referral centres and toll-free telephone services were available to consumers, policy makers and service providers alike (Duncan, 1998; Picking & Pain, 2003; Pynoos & Nishita, 2003). There is a need to develop a comprehensive, coordinated system for environmental interventions that is consumer responsive and sensitive to consumers' changing needs over time (Liebig & Sheets, 1998)" (p. 69).[46]
- Develop satisfaction surveys for service users. Survey questions should cover: "knowledge of how to comment or complain; whether a principal named contact and telephone number was identified; the quality and format of communication available; the positive impact of the work on other household members as well as satisfaction with service; staff and contractors involved across a range of measures; and information relating to service users' health and well-being" (p. 74).[40]
- "Clients should be provided with training to empower them to identify barriers in the home and implement their own solutions, thereby enabling them to manage their own wellness" (p. 2).[6]

Section 4 Conclusions and Recommendations

This scoping review presents an international summary on HMs, focusing specifically on the key components that contribute to best practice in the development and delivery of HMs from end-to-end process. We found many relevant articles, reports, and organisation and legislative specifications. It is expected that the broad range of search methods used enabled the greatest chance of obtaining relevant papers.

This chapter offers a summary of key findings and implications for practice, introduces a service model for HM service delivery based on best practice principles, and reviews a number of identified practice and research recommendations.

4.1 Summary of Findings and Implications for Practice

Across the 11 results categories, a number of themes were identified that encapsulate best practice for HM service delivery. Elements include harnessing a re-ablement approach, improving accessibility for consumers across a range of backgrounds, refining assessment and review methods, expanding training and education of all team members to create a skilled and supported workforce, and promoting ongoing service evaluation.

Re-ablement

The emergence of re-ablement approaches across the included papers represents a significant shift in thinking from disability, incapacity, frailty, and dependency to harnessing strengths, abilities, and capacity for independence through simple interventions designed to promote confidence and skills in carrying out everyday activities with minimal or no assistance. Rather than doing *for*, re-ablement approaches focus on functional adaptations that enable individuals to do *with* or even do *unaided*. The ultimate goal of this approach is for individuals to restore the ability to do things for themselves, remaining independent in their own home. The growing ageing population in Australia poses a significant financial and social burden to individuals, communities, and society. Promoting services aimed to reduce the need for hospitalisation, residential care admission, and full-time informal carers can significantly reduce costs and promote better quality of life and individual health outcomes. HM service delivery using a re-ablement approach promotes short-term intervention for long-term advantage, enabling clients to re-engage with aspects of the home or ADLs previously unavailable to them. Taking this approach to HMs does not necessarily require significant change to existing practices, but has been proven to increase client satisfaction, improve uptake and continued use of HMs through a better understanding of the P-E fit, and increase the likelihood that the client will remain living at home for as long as reasonably possible.

Accessibility

HM programs are currently expanding across Australia, yet there are still population pockets significantly disadvantaged by general health and social care deficits. With few 'at home' options, these individuals are significantly more likely to experience poorer health outcomes, higher rates of hospitalisation for falls and other injuries, and premature residential care admission, placing a considerable strain on health system infrastructure. Indigenous and CALD individuals and those living in rural or remote areas share the same potential for independent home-based living, conditional on systems and policies that adequately support them. Service delivery models and HM specific-policies, such as those described in this report, apply equally to these populations as they do to others; however, special attention is needed to ensure equitable HM access and service provision. To meet the changing demographic, changes are needed to funding allocations, screening processes, and flexibility of service provision. Broader access to HMs, regardless of geographical location, cultural or ethnic background, or socioeconomic status will ensure a greater proportion of Australia's population who are ageing or living with disability-related conditions can remain in their own homes and communities for longer. Much work is needed to implement systems for more equitable access (based on need, rather than suitability), improve transparency in decision making, shorten timeframes for referral and implementation of works, and streamline processes for responding to need.

Assessment and Review

Despite good intention, evidence suggests that installed HMs are not consistently adopted or regularly used to the extent that service providers might expect. Challenges identified by service users include issues with incorrect delivery of equipment, improper installation, or difficulties using the equipment. The greatest potential for change that will lead to reduced levels of dissatisfaction and disuse lies within assessment and review processes. Across the included studies, some degree of assessment was common (although often without standardised tools), yet follow-up was almost non-existent.

Comprehensive initial assessment following a uniform procedure using standardised instruments is essential for the correct choice of HM based on the client's unique circumstances (including their needs, existing weaknesses, and potential strengths) in combination with what their environment is capable of providing. A recommended assessment kit should facilitate data collection around client health, falls history, and routines around the home in addition to key challenges posed by the home environment and potential for elements of the home to undergo modification. Consideration of possible solutions should account for timeliness, needs of the person and others living in the home, cost effectiveness, and value for money. Although a process with such depth takes time, a high quality of service at this stage of the HM process increases the likelihood that the remaining stages will progress without issue, the HM will be utilised, and the client will achieve the desired outcomes.

Supporting the aims of assessment, HM follow-up is equally important to evaluate the quality of the installation, use of the HM as it was recommended, general levels of function (and any changes over time), and safety in performing activities. The reason for a lack of HM follow-up in many programs is unclear. Even with excellent assessment processes, HMs may not produce desired outcomes for a range of reasons – such as poor workmanship and changes in the health or function of the client – and only follow-up can identify this. Ongoing connection with clients is necessary to assess potential issues and respond to them before more significant health and functional declines occur. The mode of service delivery for follow-up and suggested timeframe should depend on the client's circumstances, but should be a mandatory and expected component of the HM process. Efficient follow-up not only improves outcomes for clients but also provides valuable data on HM usability and the effects of HMs on the lives of the users and their caregivers.

Education and Training

A well-educated and trained HM workforce is essential for appropriate referral, effective screening and assessment, efficient and safe implementation of equipment and technology, and accurate review and re-assessment following works completed. The need for ongoing professional development is as evident in this field as any other. Changes in prevalence of different ageing and disability-related conditions and the introduction of emergent technologies and equipment necessitates regular opportunities to upskill and maintain a working knowledge of the field in which one works. Recognising the need for general knowledge (e.g., disability awareness, HM processes) as well as discipline-specific knowledge provides opportunities for interprofessional collaboration where different teams within the HM workforce can learn about, from, and alongside each other. A well-educated and trained HM workforce is more likely to be one that follows key policies and procedures, provides a high standard of service, and maximises positive outcomes for clients.

Service Evaluation

Service evaluation forms the cornerstone of best practice for HM service delivery. A commitment to gathering feedback and regularly monitoring service outcomes recognises that community needs, and a program's ability to meet those needs, change over time. The benefits of service evaluation are twofold. Firstly, it enables assessment of whether performance targets relating to client outcomes are being met across the areas of increased safety and reduced falls, greater capacity for independent living, restored access to the home environment, and improved physical and mental health. Secondly, it promotes appraisal of existing systems and procedures around referral, screening and assessment, implementation of works, and follow-up to ensure that these practices are working for staff and consumers alike. Programs that implement regular service evaluation, integrating perspectives of staff and consumers, can have greater confidence in promoting their service as effective, justified, and targeted to community need.

4.2 Best Practice HM Service Delivery Model

The aforementioned elements of best practice need to be understood in the context of a range of current environmental factors in particular: policy, legislation, funding, and workforce. The Re-ablement Home Modification Service Delivery Model (Figure 2) has emerged from the findings of this review and illustrates a recommended best practice model for HMs in WA. This service delivery model recognises the importance of multiple pathways differentiating no service from non-complex and complex services.
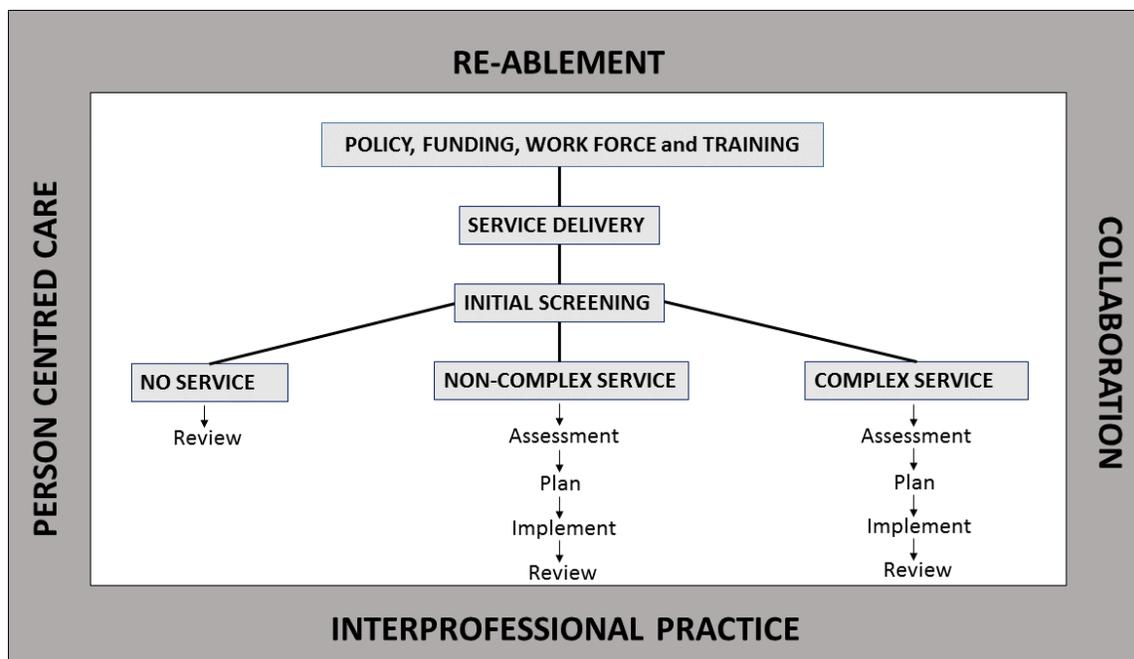

RE-ABLEMENT

PERSON CENTRED CARE

COLLABORATION

POLICY, FUNDING, WORK FORCE and TRAINING

SERVICE DELIVERY

INITIAL SCREENING

NO SERVICE	NON-COMPLEX SERVICE	COMPLEX SERVICE
Review	Assessment	Assessment
	Plan	Plan
	Implement	Implement
	Review	Review

INTERPROFESSIONAL PRACTICE

Figure 2. Re-ablement Home Modification Service Delivery Model.

Model Overview

This service delivery model was designed based on key findings of the review and aimed to incorporate components of best practice HM service delivery within the context of broader environmental factors that determine, define, and shape service delivery. Equitable access to best practice HM service delivery in WA can be achieved through effective screening of informed clients into pathways targeted for simple / non-complex and complex HMs. Within the complex and non-complex pathways, service delivery time frames are established to ensure efficient service provision. Early referral and intervention protocols and referrer education should also be considered for those conditions shown to commonly require HMs (e.g., diabetes, stroke, hip fracture, fall or joint replacement). Appropriate assessment (and skilled assessors) for each pathway focussed on client's function, home environment, and caregiver needs will enable development of a service plan in consultation with client and carer that is transparent to all stakeholders. Allocating the most appropriate workforce to implement the plan / HM installation

will ensure efficiency. For example, joint assessments by builders and OTs should be considered for complex HM services. Follow up evaluation and review, as deemed suitable for each service delivery pathway, is critical to ensure client outcomes are monitored, preventative strategies are implemented, caregiver help and social integration are monitored (where appropriate), and service evaluation is undertaken.

Rural / remote and vulnerable populations are able to follow the service delivery pathways but require further policy and support to ensure equitable HM access and service provision. To better understand how the scoping review findings can strengthen best practice in HMs, the key findings of the scoping review will be discussed in relation to aspects of the model.

Re-ablement

A re-ablement approach that focusses on the strengths of the individual and their carers / supports should be integral to the service delivery model. This would involve screening, assessment, and re-evaluation tools that are specifically designed with questions to elicit this information. Service delivery goals and intervention plans need to be established to harness this approach through focusing on ways in which the client can improve their independence and safety in performing ADLs, and reduce caregiver burden in the process. Future planning and evaluation of services again need to incorporate these criteria.

Collaboration

Collaboration, communication, and coordination between all stakeholders throughout the HM process are an essential component of the service delivery model. Collaboration will occur across all organisations with the consumers *and* their caregivers placed at the centre of all planning. MDTs with joint performance targets, assessments, visits and regular meetings (co-located or integrated) are recommended for HM service to provide a holistic, less siloed, and more cost effective service. Teams may include OTs, OTAs, and technicians working in partnership towards individual client goals. Disability forums and expert panels can be developed for ongoing assessment of and advocacy for disability-related issues, as well as to evaluate new equipment and technologies for persons who are older or living with disabilities. This approach moves away from the traditional siloed HM process by improving communication pathways between all parties, facilitating informed decision making and successful uptake of HMs. Careful planning of the location of the HM workforce and use of technology to support communication will assist in developing collaborative practice.

Interprofessional Practice

Developing a streamlined service delivery approach will promote role clarification and collaboration across the multi-disciplinary team and will unify all members of the HM workforce. Shared training and educational opportunities will promote authentic interprofessional practice

and encourage the shared transmission of knowledge amongst team members. Clients are given a single point of contact for their HM and the interprofessional team works collaboratively to establish a range of solutions, harnessing the skills and expertise of each team member. Team members share a common vision in service delivery which incorporates client goals, promotes transparency across people and processes, and is focused on delivering the most appropriate solution to meet the client's needs in a time and cost-efficient manner.

Person-Centred Care

A person-centred approach to service delivery will place the client (including their families and caregivers) at the centre of all assessment, decision making, and implementation processes. Through planning and implementation phases, special attention will be given to the client's meaning of 'home' (personal, societal, physical, temporal, social, and occupational) through specifically targeted interview questions and an extensive review of the HM environment during home visits. Through the concepts of wellness and re-ablement, clients will be empowered to manage their own wellness, maintain a sense of control over their environment, and remain an active contributor within the HM process. The goal of person-centred care will be to increase the likelihood of successful uptake and continued use of the HM through minimising common barriers and harnessing the knowledge, skills, and engagement of the consumer and their caregivers / supports.

Policy

The development of a coordinated, integrated nationally recognised HMs policy to guide the design and implementation of HM programs is an imperative. This policy would integrate the previously fragmented policy areas of ageing, health, community care, and housing to provide a central point of reference for clients and members of the HM workforce. It is anticipated that a single policy for HMs will minimise existing confusion, reduce barriers to accessing HMs, and create a better match between client needs and service provision. Policy change will be informed by both consumers and professionals based on a national core mission statement, will be amendable to modification in less traditional or advantaged contexts, and will be disseminated broadly to ensure all stakeholders are well informed about HM options and the pathways to seeking such assistance.

Funding

With limited funds resulting from an increasing demand for HM services in Australia, alternative funding options for HMs are necessary. Fast-track systems, shorter application forms, and greater use of self-assessment will accelerate high priority cases, minimising timescales while preserving integrity and value for money. Technology can be harnessed to better support time efficient practice throughout service delivery. Further, the use of more standard solutions and encouragement of universal design principles in new and renovated homes will simplify and

ultimately reduce the costs of HMs over time. Means tests for loan schemes can be better designed based on specific demographic groups to waiver case-by-case means testing, accelerating the delivery process and reducing costs. Information should be widely disseminated to inform the general public of the range of pathways to HM under Government subsidisation schemes. Should someone not meet eligibility, States and Territories may offer preventative HM measures to avoid further health decline.

Workforce and Training

An appropriately selected, skilled, and educated team is the recommended HM workforce. Complex HMs require specialised skills and training programs shared across organisations that incorporate compliance with all relevant eligibility / funding / legislation, philosophies of re-ablement and person-centred practice, and safety and quality standards. OTs have a central and specialised role in all HM delivery pathways, as do other team members (assistants, TAs, handypersons), and clarification of team member roles in direct service provision of complex and non-complex service delivery is required. Training, supervision, support structures, and service delivery guidelines are required for all team member roles within HM services for both complex and non-complex pathways.

4.3 Recommendations

Practice

Based on the findings of this review, a number of practice recommendations are made around the Implementation of the Service Delivery Model, Service Delivery Model expansion, policy development, dissemination of information, and ongoing evaluation of processes.

Implementation of Service Delivery Model

It is recommended that the Re-ablement Home Modification Service Delivery Model – incorporating identified service pathways – be utilised by current service providers, ensuring adherence to the end to end process for HM service delivery. As consumer involvement is central to re-ablement and person-centred practice, consumer involvement must be central to the implementation of the model by service providers. Key elements of this service delivery model include a single point of contact, initial screening, clear and streamlined pathway processes, professional communication and feedback, and collaboration within the HM team and across the sector. Given these elements, innovative technological solutions should be utilised to support these key requirements. Workforce recruitment, allocation, and development aligned to service delivery roles are essential for best practice service delivery. Within this model, specific service delivery guidelines with role clarification are required to ensure that the HM workforce is aligned and skilled to perform their service delivery roles. OTs, along with TAs, OTAs, handy persons, builders, and designers are integral to the Service Delivery Model, and

have varying roles in the service delivery pathways. All team members in the HM workforce should be equipped with the skills to perform their roles; as an example of further professional development, OTs may require further training for complex services. Collaboration within the HM team is essential for service delivery and strategies such as co-location and technology should be considered to facilitate this.

A person-environment-occupation (PEO) framework is integral to the service delivery model. The end to end process of service delivery needs to incorporate the P-E-O focus in all aspects, for example in the assessment, planning, intervention, and evaluation phases of service delivery. In regards to the person, and following the re-ablement approach, the service would focus on a strengths-based approach and involve the person and their carer / family. In regards to the environment, the person's meaning of home together with the physical home and his / her community are important to consider. HM services should be focused on improving and maintaining health and wellbeing through understanding the person's meaningful occupations and facilitating independence.

Further Model Expansion

This report represents the first stage in best practice HM development in WA. Progress to date includes collating and reviewing available evidence on best practice for HMs from the international literature, developing a set of core components that represent best practice principles and environmental factors that impact on service delivery, and refining these elements into a model of service delivery reported here. Further tasks include developing this model into a written guide that breaks down each of its respective components as they might apply to any given prospective HM client. Guidance should include elaboration of each of the three pathways, specifying the who, when, where, what, why, and how of each category. Through this development it is critical that these guidelines also pay attention to, and meet the needs of vulnerable clients and those located in rural and remote locations. Exemplar case studies could be developed for each pathway, illustrating 'common' clients and their likely journey through the HM process. Most importantly, this written guide should be developed in such a way that further amendments can be made over time, recognising that best practice for HM changes based on emerging technologies, practices, policies, and standards.

Policy Development

One of the most pervasive and significant findings to emerge from this review was that, to be effective, HM must move away from the fragmented policy areas of ageing, health, community care, and housing and move towards a coordinated, integrated nationally recognised policy unique to HMs. This suggestion recognises that best practice at the individual consumer-service level cannot occur if broader change does not occur at the higher policy level. The evidence offered here in this review may provide significant groundwork for such a policy; however, much work is needed to create a single HM policy that is informed by both consumers and

professionals and addresses many of the barriers and challenges introduced in this review. It is recommended that an expert panel be established representing clients (consumers, their families, and caregivers), referrers (e.g., RAS), assessors (e.g., OTs / TAs), implementers (e.g., builders, tradespersons), and reviewers (e.g., OTs / OTAs) in order to create an integrated policy that represents all people and stages of the HM process within a specific Australian context. Evidence may also be drawn from similar policies developed in other countries that have proven to be effective. Care should be taken to incorporate context-specific challenges such as the large proportion of people affected by ageing or disability-related conditions residing in remote and rural Australia, and the large proportion of vulnerable persons including those in Indigenous or CALD communities as well as those living in low socioeconomic conditions. Once established, this policy may be published alongside or integrated with the aforementioned Re-ablement Home Modification Service Delivery Guide.

Dissemination

To see any change in current Australian HM practices, this revised policy and service delivery guide must be disseminated broadly. Specific targets include groups who control and manage funding, groups who refer individuals affected by ageing or disability-related conditions for support, groups who manage HM programs, and groups who are employed or contracted by these programs. There are a growing number of HM programs in Australia which could be connected through a shared framework with a national core mission statement and collective goals. This information should be made available both electronically and in paper-based format to ensure accessibility and ease of use. Wide dissemination will also promote ongoing contribution and feedback by professionals and consumers to advocate for and shape policy change for HMs in a way not previously seen.

Ongoing Evaluation

A significant finding of this review is that definitions of best practice change significantly over time and are influenced by a range of different factors. Recent years have seen a shift from highly segregated ageing and disability policies / procedures. We have also seen changes in residential design, equipment and technologies designed to aid basic ADLs, increased awareness of the desire of individuals to remain living at home, the spread of populations in remote and rural areas, and the proportion of people recognising a need for and asking for support in their living environments. Delivering best practice therefore denotes constantly redefining the meaning of best practice, exploring current issues and challenges, and discovering new and innovative ways of delivering effective services within these parameters. Ongoing evaluation is essential to ensure that 'best practice' truly remains best practice and that policies and procedures continue to accurately target community need.

Research

A key finding of this scoping review was that further research is needed to explore the experiences and opinions of consumers and staff alike, address current issues and challenges, and continue to develop innovative and effective solutions to further the growth of these services in the Australia-wide community. Suggestions for areas of research are summarised across the domains of consumer, environment, and financial.

Consumer

- Older adult's resistance to HMs, as there is a considerable lack of information in this important area particularly within Australia.[8]
- In terms of barriers, whether psychological or practical resistance has a stronger predictive effect on the consumer behaviour and whether psychological resistance is more common among potential consumers with psychological disabilities.[8]
- "Characterisation of the post modification impairment status to yield important information about health status changes over time and the influence of HMs on changing impairment status" (p. 38).[82]
- AT users' awareness / attitudes to understand decision making, to integrate AT into their lives, and to incorporate experiences in the prescription process.[44]
- The use of a predictive tool by joint teams to identify high-risk individuals for support and home checks.[18]
- "Whether the perceived benefits of HM strategies differ according to the cause of visual impairment, so that advice can be appropriately targeted" (p. 281).[74]
- "Research is needed to determine whether environmental fall strategies can be adapted for people with Parkinson's disease, stroke, or cognitive impairment, three high-risk groups that we know experience a much higher incidence of falls" (p. 969).[14]
- The current research base for HM and bariatric clients, as there was nothing in this literature review on this subject. It would be particularly important to review aspects of prescription practices, tools for clinical reasoning, and knowledge of bariatric aids and equipment.
- The special needs of environmental HMs of the minority groups residing in Australia. Research needs to include "diverse racial and ethnic groups, housing conditions, and socioeconomic levels, and older people with different levels of competencies" (p. 635).[34]
- Compare rural and remote areas and indoor / outdoor environments for differences in falls prevention.
- There has also been no research to compare the fall prevention effects of HMs between rural and urban areas or between in / outdoor spaces in rural areas. Furthermore, there has been no quantitative assessment of the accessibility of rural HM needs in Australia, and no study exploring the rural-urban differences in actual conditions of HMs.

- Research to "develop consumer-based design guidelines that can be modified on an individual basis" (p. 303).[43]

Environment

- Greater focus on the P-E fit concept, measuring subjective and objective elements of the home environment using quantitative and qualitative methodologies.[92] The activity component of the P-E-A transaction is crucial and lacking research, in particular to understand how activity performance and usability are related.[28]
- "Further interventions to reduce hazards in the home should be evaluated by adequately designed randomised controlled trials measuring injury outcomes….Researchers should also consider using factorial designs to allow the evaluation of individual components of multifactorial interventions" (p. 2).[91]
- "Research is needed to examine the perceived environment via constructs such as usability…housing-related control…or other constructs such as readiness to modify the home or personal control" (p. 364).[92]
- The development of a model that compares environmental changes with measurable aspects of agency and belonging.[12]

Financial

- "Controlled, longitudinal studies with cost analysis and additional assessments reflecting the personal characteristics of the individual, caregiver support, and other environmental characteristics to inform policy makers about the value of interventions that include HMs" (p. 38).[82]
- Research exploring the effectiveness of HM and maintenance services and economic outcomes. This might involve an audit service to identify what services are provided in the region in order to understand and compare services with other regions in Australia.[60]
- "Further research with multi-component interventions targeted at a variety of levels of dependency, and differing levels of need, utilising an ASM approach is required to determine the threshold at which such services are no longer viable or effective" (p.45).[77]
- Research into the role that volunteer programs and the informal sector can hold in HMM service provision.[46]

Reviewed Papers

1. Adams, S., & Ellison, M. (2006). *Small things matter: The key role of handyperson services.* Nottingham, UK: Care & Repair England.

2. Ainsworth, E., & de Jonge, D. (2011). *An occupational therapist's guide to home modification practice.* New Jersey, USA: Slack Inc.

3. Allied Health Workforce Advice and Coordination Unit. (2011). *Allied health clinical governance framework in Queensland Health.* Brisbane, QLD: Author.

4. American Occupational Therapy Association. (2014). *Complex environmental modifications. Position paper draft for external review.* Retrieved from http://www.aota.org/-/media/Corporate/Files/Practice/Researcher/Complex_Environmental_Modifications_review_draft.pdf

5. Aplin, T. (2014). Understanding home modifications impact on clients and their family's experience of home: A qualitative study. *Australian Occupational Therapy Journal, 60*(2), 101-109. http://dx.doi.org/10.1111/1440-1630.12022

6. Aplin, T., de Jonge, D., & Gustafsson, L. (2013). Understanding the dimensions of home that impact on home modification decision making. *Australian Occupational Therapy Journal, 60*(2), 101-109. http://dx.doi.org/10.1111/1440-1630.12022

7. Bayer, A., & Harper, L. (2000). *Fixing to stay: A national survey of housing and home modication issues.* Washington, DC: American Association of Retired Persons.

8. Bridge, C., Phibbs, P., Gohar, N., & Chaudhary, K. (2007). *Evidence based research identifying barriers to home modifications.* NSW: University of New South Wales.

9. Cabrera, C., & Chase, C. (2008). Measuring outcomes in home modifications: Making a difference. *Home & Community Health Special Interest Section Quarterly, 15*(3), 1-4. Retrieved from http://pdfoiojv.org/k-30571832.html

10. Carnemolla, P., & Bridge, C. (2014). *Landscape modification: An alternative to residential access ramps and lifts* (1st ed.). Sydney, NSW: University of New South Wales.

11. Carnemolla, P., & Bridge, C. (2014). *Home modifications and their impact on waged care substitution.* Sydney, NSW: University of New South Wales.

12. Carnemolla, P., & Bridge, C. (2014, June). *The potential of a home modification strategy – a universal design approach to existing housing.* Paper presented at the UD2014 Unviersal Design Conference, Lund, Sweden. Abstract retrieved from http://ud2014.se/

13. Chase, C. A., Mann, K., Wasek, S., & Arbesman, M. (2012). Systematic review of the effect of home modification and fall prevention programs on falls and the performance of community-dwelling older adults. *American Journal of Occupational Therapy, 66*, 284-291. http://dx.doi.org/10.5014/ajot.2012.005017

14. Clemson, L., Mackenzie, L., Ballinger, C., Close, J. C. T., & Cumming, R. G. (2008). Environmental interventions to prevent falls in community-dwelling older people. A meta-analysis of randomized trials. *Journal of Aging and Health, 20*(8), 954-971. http://dx.doi.org/10.1177/0898264308324672

15. Collingbourne, L., Elkin, A., & Archer, P. (2013). *Accessible homes: Helping older and disabled people achieve independence in their homes. A guide for local partnerships.* UK: The Housing Consultancy Partnership.

16. Council of Social Service of NSW (2011). *National Council of Social Service (NCOSS) submission to the NSW review of HACC funded home modification services.* Surry Hills, NSW: NCOSS.

17. Croucher, K., Lowson, K., & Fountain, M. (2012). *National evaluation of the handyperson programme.* London, UK: Department for Communities and Local Government.

18. Department for Communities and Local Government, Department of Health, & Department for Work and Pensions. (2008). *Lifetime homes, lifetime neighbourhoods. A national strategy for housing in an ageing society.* London, UK: Department for Communities and Local Government.

19. Department for Communities and Social Inclusion. (2014). *Housing design guidelines for sustainable housing & liveable neighbourhoods.* Retrieved from http://dcsi.sa.gov.au/__data/assets/pdf_file/0007/6388/Design-Guide-4_1.pdf

20. Department for Social Development, & Department of Health, Social Services and Public Safety. (2014). *Interdepartmental review of housing adaptations services: Adaptation design communications toolkit.* Retrieved from http://www.nihe.gov.uk/adaptations_design_communications_toolkit.pdf

21. Department of Family and Community Services NSW. (2012). *NSW service type guidelines for Home and Community Care (HACC) home modification* (Version 2). NSW: NSW Government, Family & Community Services Ageing, Disability & Home Care.

22. Department of Health. (2011). *WA health policy: Provision of aids, equipment and home modifications*. Retrieved from http://www.health.wa.gov.au/CircularsNew/attachments/619.pdf

23. Department for Veterans Affairs. (2014). *Rehabilitation Appliances Program (RAP) national guidelines July 2014.* Retrieved from http://www.dva.gov.au/service_providers/rap/Documents/RAPNationalGuidelines.pdf

24. Easthope, H., & van den Nouwelant, R. (2013). *Home modifications in strata properties: Final report.* Sydney, NSW: University of New South Wales.

25. Evans, H. (2013). *Final report: Research study on scoping a registry of accessible and adaptable homes in British Columbia.* Retrieved from http://www.refbc.com/sites/default/files/REIBC-ResearchStudy-ScopingARegistryOfAccessibleAndAdaptableHousing.pdf

26. Fänge, A., & Iwarsson, S. (1999). Physical housing environment: Development of a self-assessment instrument. *Canadian Journal of Occupational Therapy*, *66*(5), 250-260. http://dx.doi.org/10.1177/000841749906600507

27. Fänge, A., & Iwarsson, S. (2005). Changes in accessibility and usability in housing: An exploration of the housing adaptation process. *Occupational Therapy International*, *12*(1), 44-59. http://dx.doi.org/10.1002/oti.14

28. Fänge, A., & Iwarsson, S. (2005). Changes in ADL dependence and aspects of usability following housing adaptation - A longitudinal perspective. *American Journal of Occupational Therapy*, *59*(3), 296-304. http://dx.doi.org/10.5014/ajot.59.3.296

29. Fänge, A., & Iwarsson, S. (2007). Challenges in the development of strategies for housing adaptation evaluations. *Scandinavian Journal of Occupational Therapy*, *14*(3), 140-149. http://dx.doi.org/10.1080/11038120600840150

30. Fänge, A. M., Lindberg, K., & Iwarsson, S. (2013). Housing adaptations from the perspectives of Swedish occupational therapists. *Scandinavian Journal of Occupational Therapy*, *20*(3), 228-240. http://dx.doi.org/10.3109/11038128.2012.737368

31. Fishpool, J., & Bridge, C. (2012). *Follow-up efficacy post environmental modifications: A guide for clinical practice.* Sydney, NSW: University of New South Wales.

32. Ford, L. (2006). *Environmental modification competency standards for occupational therapists.* Newington, NSW: Australian Association of Occupational Therapists NSW.

33. Foundations: The National Body for Home Improvement Agency and Handyperson Services. (2014). *Housing health & care integration toolkit.* Glossop, UK: Housing Lin.

34. Gitlin, L. N. (2003). Conducting research on home environments: Lessons learned and new directions. *The Gerontologist*, *43*(5), 628-637. http://dx.doi.org/10.1093/geront/43.5.628

35. Hawkins, R., & Stewart, S. (2002). Changing rooms: The impact of adaptations on the meaning of home for a disabled person and the role of occupational therapists in the process. *The British Journal of Occupational Therapy*, *65*(2), 81-87. http://dx.doi.org/10.1177/030802260206500206

36. Heywood, F. (2001). *Money well spent. The effectiveness and value of housing adaptations* [Press release]. Retrieved from http://www.jrf.org.uk/system/files/jr100-effectiveness-housing-adaptations.pdf

37. Heywood, F. (2004). The health outcomes of housing adaptations. *Disability & Society*, *19*(2), 129-143. http://dx.doi.org/10.1080/0968759042000181767

38. Heywood, F. (2005). Adaptation: Altering the house to restore the home. *Housing Studies*, *20*(4), 531-547. http://dx.doi.org/10.1080/02673030500114409

39. Heywood, F., Grisbrooke, J., Sheehan, K., & Simons Powell, M. (2006). *Minor adaptations without delay - A practical guide and technical specifications for housing associations.* London: College of Occupational Therapists.

40. Home Adaptations Consortium UK. (2013). *Home adaptations for disabled people: A detailed guide to related legislation, guidance and good practice.* Nottingham, UK: Care & Repair England.

41. Home and Community Care. (2011). *Final report: Evaluation of the QLD HACC major home modification program.* Retrieved from http://web.archive.org/web/20120813082345/http://www.communities.qld.gov.au/resources/disability/support-services/our-services/hacc/documents/community-care-manual-book.pdf

42. Home and Community Care. (2013). *NSW HACC issues forum: Advice to the home support advisory group.* Retrieved from http://www.ncoss.org.au/resources/DNF/130409-Advice-to-Home-Support-Advisory-Group.pdf

43. Hutchings, B. L., Olsen, R. V., & Moulton, H. J. (2008). Environmental evaluations and modifications to support aging at home with a developmental disability. *Journal of Housing for the Elderly, 22*(4), 286-310. http://dx.doi.org/10.1080/02763890802458445

44. Ivanoff, S. D., Iwarsson, S., & Sonn, U. (2006). Occupational therapy research on assistive technology and physical environmental issues: A literature review. *Canadian Journal of Occupational Therapy, 73*(2), 109-119. http://dx.doi.org/10.1177/000841740607300203

45. Johansson, K., Borell, L., & Lilja, M. (2009). Older persons' navigation through the service system towards home modification resources. *Scandinavian Journal of Occupational Therapy, 16*(4), 227-237. http://dx.doi.org/10.3109/11038120802684307

46. Jones, A., De Jonge, D., & Phillips, R. (2008). *The impact of home maintenance and modification services on health, community care and housing outcomes in later life.* Retrieved from http://www.ahuri.edu.au/publications/p20335/

47. Jung, Y. M., & Millikan, L. (2009). *Rural home modification: Overview and policy issues in rural and regional Australia.* Sydney, NSW: University of New South Wales.

48. Keall, M. D., Pierse, N., Howden-Chapman, P., Cunningham, C., Cunningham, M., Guria, J., & Baker, M. G. (2014). Home modifications to reduce injuries from falls in the Home Injury Prevention Intervention (HIPI) study: A cluster-randomised controlled trial. *The Lancet, 385*(9964), 231-238. http://dx.doi.org/10.1016/S0140-6736(14)61006-0

49. Kim, H., Ahn, Y. H., Steinhoff, A., & Lee, K. H. (2014). Home modification by older adults and their informal caregivers. *Archives of Gerontology and Geriatrics, 59*(3), 648-656. http://dx.doi.org/10.1016/j.archger.2014.07.012

50. KPMG. (2014). *Review of home modification and home maintenance service types under the Commonwealth HACC Program: Final report.* Retrieved from http://www.dss.gov.au/our-responsibilities/ageing-and-aged-care/aged-care-reform/reforms-by-topic/commonwealth-home-support-programme/commonwealth-home-support-programme-service-group-five

51. Lindahl, L. (2004). *The value and benefits of home modification services for older people. Views of the user, the caregiver, and the next of kin.* Cambridge, UK: University of Cambridge.

52. Liu, S. Y., & Lapane, K. L. (2009). Residential modifications and decline in physical function among community-dwelling older adults. *The Gerontologist*, *49*(3), 344-354. http://dx.doi.org/10.1093/geront/gnp03

53. McCullagh, M. C. (2006). Home modification: How to help patients make their homes safer and more accessible as their abilities change. *American Journal of Nursing*, *106*(10), 54-64. Retrieved from http://www.experts.umich.edu/pubDetail.asp?t=&id=33749448187&

54. Ministry of Health. (2014a). *Equipment and modifications: Competency framework.* Retrieved from http://www.nsfl.health.govt.nz/apps/nsfl.nsf/pagesmh/519

55. Ministry of Health. (2014b). *Equipment and modifications: Re-credentialing requirements.* Retrieved from http://www.nsfl.health.govt.nz/apps/nsfl.nsf/pagesmh/519

56. Ministry of Health. (2014c). *Equipment and modification services: Service specifications* Retrieved from http://www.nsfl.health.govt.nz/apps/nsfl.nsf/pagesmh/519

57. Ministry of Health. (2014d). *Equipment and modification services: Housing modifications manual.* Retrieved from http://www.nsfl.health.govt.nz/apps/nsfl.nsf/pagesmh/519

58. Ministry of Health. (2014e). *Equipment and modification services: Housing modification schedules.* Retrieved from http://www.nsfl.health.govt.nz/apps/nsfl.nsf/pagesmh/519

59. Ministry of Health and Housing NZ. (2013). *Housing modifications for disabled people living in Housing NZ houses.* Retrieved from http://www.disabilityfunding.co.nz/__data/assets/pdf_file/0011/61949/Information-Sheet.pdf-MOH-and-HNZC-October-2013.pdf

60. Molineux, M., Rosenwax, L., & Harmsen, J. (2010). *A home without barriers: The Western Australia HACC home modifications and home maintenance study*. Perth, Australia: Curtin University.

61. National Institute for Health and Care Excellence. (2013). *Quality standard for supporting people to live well with dementia (NICE quality standard 30).* Retrieved from http://www.nice.org.uk/guidance/qs30/resources/guidance-quality-standard-for-supporting-people-to-live-well-with-dementia-pdf

62. Niva, B., & Skär, L. (2006). A pilot study of the activity patterns of five elderly persons after a housing adaptation. *Occupational Therapy International*, *13*(1), 21-34. http://dx.doi.org/10.1002/oti.21

63. Northern Health and Social Care Trust. (2009). *Policy on the provision of minor works and adaptations in privately owned/rented property*. Retrieved from http://www.northerntrust.hscni.net/

64. Northern Ireland Housing Executive. (n.d.) *Inclusive design through home adaptations: A good practical guide.* Belfast, Northern Ireland: Author.

65. Northern Ireland Housing Executive. (n.d.) *Joint fundamental review of the housing adaptations service.* Belfast, Northern Ireland: Author.

66. Northern Ireland Housing Executive. (2014). *Interdepartmental review of housing adaptations services: Evidence base report*. Retrieved from http://www.nihe.gov.uk/interdepartmental_review_housing_adaptations.pdf

67. NSW HMMS State Council. (2012). *Home modification and maintenance services: Enhancing people's lives by assisting them to remain in their homes longer. Executive officer's report and strategic plan 2012*. NSW: NSW HMMS State Council.

68. Oswald, F., Wahl, H.-W., Schilling, O., Nygren, C., Fänge, A., Sixsmith, A., . . . Iwarsson, S. (2007). Relationships between housing and healthy aging in very old age. *The Gerontologist*, *47*(1), 96-107. http://dx.doi.org/10.1093/geront/47.1.96

69. Petersson, I., Fisher, A. G., Hemmingsson, H., & Lilja, M. (2007). The Client-Clinician Assessment Protocol (C-CAP): Evaluation of its psychometric properties for use with people aging with disabilities in need of home modifications. *OTJR: Occupation, Participation and Health*, *27*(4), 140-148. http://dx.doi.org/10.1177/153944920702700404

70. Petersson, I., Kottorp, A., Bergstrom, J., & Lilja, M. (2009). Longitudinal changes in everyday life after home modifications for people aging with disabilities. *Scandinavian Journal of Occupational Therapy*, *16*(2), 78-87. http://dx.doi.org/10.1080/11038120802409747

71. Petersson, I., Lilja, M., Hammel, J., & Kottorp, A. (2008). Impact of home modification services on ability in everyday life for people ageing with disabilities. *Journal of Rehabilitation Medicine*, *40*(4), 253-260. http://dx.doi.org/10.2340/16501977-0160

72. Picking, C., & Pain, H. (2003). Home adaptations: User perspectives on the role of professionals. *The British Journal of Occupational Therapy*, *66*(1), 2-8. http://dx.doi.org/10.1177/030802260306600102

73. Renda, M. (2012). Home modifications: An introduction to practice considerations. *OT Practice*, *17*(15), 1-8. Retrieved from http://www.scribd.com/doc/108842598/OT-Practice-August-20-Issue#scribd

74. Riazi, A., Boon, M. Y., Bridge, C., & Dain, S. J. (2012). Home modification guidelines as recommended by visually impaired people. *Journal of Assistive Technologies*, *6*(4), 270-284. http://dx.doi.org/10.1108/17549451211285762

75. Roelands, M., Van Oost, P., Stevens, V., Depoorter, A., & Buysse, A. (2004). Clinical practice guidelines to improve shared decision-making about assistive device use in home care: A pilot intervention study. *Patient Education and Counseling*, *55*(2), 252-264. http://dx.doi.org/10.1016/j.pec.2003.10.002

76. Rousseau, J., Potvin, L., Dutil, É., & Falta, P. (2013). Home Assessment of Person-Environment Interaction (HoPE): Content validation process. *Occupational Therapy in Health Care*, *27*(4), 289-307. http://dx.doi.org/10.3109/07380577.2013.843114

77. Ryburn, B., Wells, Y., & Foreman, P. (2008). *The active service model: A conceptual and empirical review of recent Australian and International literature (1996-2007).* Melbourne, Victoria: La Trobe University.

78. Saville-Smith, K., James, B., Fraser, R., Ryan, B., & Travaglia, S. (2007). *Housing and disability: Future proofing New Zealand's housing stock for an inclusive society.* Auckland, NZ: CHRANZ.

79. SCOPE Access Home Modifications. (n.d.). *A way to stay. Home modification assessment & planning tool.* Retrieved from http://www.homemods.info/publications-by-others/home-modification/a-way-to-stay-home-modification-assessment-and-planning-tool#main-content

80. Scotts, M., Saville-Smith, K., & James, B. (2007). *International trends in accessible housing for people with disabilities: A selected review of policies and programmes in Europe, North America, United Kingdom, Japan and Australia.* Auckland, NZ: Centre for Housing Research Aotearoa New Zealand.

81. Sorensen, G. (2012, October). *Home modifications: A national perspective.* Paper presented at the NSW Home Modification and Maintenance Services State Council Inaugural

National Conference, NSW. Abstract retrieved from
http://www.nswhmms.org.au/sites/default/files/national_stream_report_-
_october_2012.pdf

82. Stark, S. (2004). Removing environmental barriers in the homes of older adults with
disabilities improves occupational performance. *OTJR: Occupation, Participation and
Health*, *24*(1), 32-40. http://dx.doi.org/10.1177/153944920402400105

83. Stark, S., Landsbaum, A., Palmer, J. L., Somerville, E. K., & Morris, J. C. (2009). Client-
centred home modifications improve daily activity performance of older adults.
Canadian Journal of Occupational Therapy, *76*, 235-245. Retrieved from
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2857667/

84. State-Wide Equipment Program. (2013). *SWEP prescriber registration and credentialing
framework*. Retrieved from http://www.swep.bhs.org.au/

85. Szanton, S., Roth, J., Nkimbeng, M., Savage, J., & Klimmek, R. (2014). Improving unsafe
environments to support aging independence with limited resources. *Nursing Clinics of
North America*, *49*, 133-145. http://dx.doi.org/10.1016/j.cnur.2014.02.002

86. Szanton, S. L., Thorpe, R. J., Boyd, C., Tanner, E. K., Leff, B., Agree, E., . . . Gitlin, L. N.
(2011). Community aging in place, advancing better living for elders: A bio-behavioral-
environmental intervention to improve function and health-related quality of life in
disabled older adults. *Journal of the American Geriatrics Society*, *59*(12), 2314-2320.
http://dx.doi.org/10.1111/j.1532-5415.2011.03698.x

87. Szanton, S., Wolff, J. W., Leff, B., Thorpe, R. J., Tanner, E. K. , Boyd, C., . . . Gitlin, L. N..
(2014). CAPABLE trial: A randomized controlled trial of nurse, occupational therapist
and handyman to reduce disability among older adults: Rationale and design.
Contemporary Clinical Trials, *38*, 102-112. http://dx.doi.org/10.1016/j.cct.2014.03.005

88. The American Occupational Therapy Association. (2013). *Certification requirements
specialty certification overview*. Retrieved from http://www.aota.org/-
/media/Corporate/Files/EducationCareers/CE/SCEM-Overview.pdf

89. Tse, T. (2005). The environment and falls prevention: Do environmental modifications make
a difference? *Australian Occupational Therapy Journal*, *52*(4), 271-281.
http://dx.doi.org/10.1111/j.1440-1630.2005.00525.x

90. Tucker, S., Hughes, J., Brand, C., Clarkson, P., Wenborn, J., McDonogh, R., . . . Challis, D.
(2011). Providing community equipment and adaptations in adult social care: Lessons

from an evaluation of the use of self-assessment in five English local authorities. *The British Journal of Occupational Therapy*, *74*(3), 119-128. http://dx.doi.org/10.4276/030802211x12996065859201

91. Turner, S., Arthur, G., Lyons, R., Weightman, A., Mann, M., Jones, S., . . . Lannon, S. (2006). Modification of the home environment for the reduction of injuries. *Cochrane Database of Systematic Reviews, 2*, 1-63. http://dx.doi.org/10.1002/14651858.cd003600.pub2

92. Wahl, H. W., Fänge, A., Oswald, F., Gitlin, L. N., & Iwarsson, S. (2009). The home environment and disability-related outcomes in aging individuals: What is the empirical evidence? *Gerontologist*, *49*(3), 355-367. http://dx.doi.org/10.1093/geront/gnp056

93. Walls, R., Millikan, L., Bridge, C., & Davy, L. (2013). *Occasional paper: Home modifications in Aboriginal housing.* Sydney, NSW: University of New South Wales.

94. Wigfield, K. W., Burtney, E., & Buddery, D. (2013). Assisted living technology in social care: Workforce development implications. *Journal of Assistive Technologies*, *7*(4), 204-218. http://dx.doi.org/10.1108/JAT-01-2013-0001

95. Wilson, D. J., Mitchell, J. M., Kemp, B. J., Adkins, R. H., & Mann, W. (2009). Effects of assistive technology on functional decline in people aging with a disability. *Assistive Technology*, *21*(4), 208-217. http://dx.doi.org/10.1080/10400430903246068

96. Winchcombe, M., & Ballinger, C. (2005). *A competence framework for trusted assessors.* London, UK: Assist UK.

References

Active Service Model. (n.d.). Retrieved February 19, 2016, from
https://www2.health.vic.gov.au/ageing-and-aged-care/home-and-community-care/hacc-quality-and-service-development/active-service-model

Ambrose, P. (2001). Living conditions and health promotion strategies. *Journal of the Royal Society of Health*, *121*(1), 9-15. http://dx.doi.org/10.1177/146642400112100105

American Association of Retired Persons. (2000). *Fixing to stay: A national survey on housing and home modification issues*. Washington, DC: Author.

American Occupational Therapy Association. (2010a). Occupational therapy code of ethics and ethics standards. *American Journal of Occupational Therapy*, *64*, S17-S26. http://dx.doi.org/10.5014/ajot.2010.64S17

American Occupational Therapy Association. (2010b). Standards of practice for occupational therapy. *American Journal of Occupational Therapy*, *64*, S106-S111. http://dx.doi.org/10.5014/ajot.2010.64S106

Auriemma, D., Faust, S., Sibrian, K., & Jimenez, J. (1999). Home modifications for the elderly: Implications for the occupational therapist. *Physical and Occupational Therapy in Geriatrics*, *16*(2/4), 135–144. http://dx.doi.org/10.1080/j148v16n03_08

Australian Department of Health and Ageing. (2006). *Home and community care program minimum data set 2004/05 annual bulletin*. Canberra: Department of Health and Ageing.

Australian Department of Health and Ageing. (2007). *Home and community care*. Retrieved from
http://www.agedcareaustralia.gov.au/internet/agedcare/publishing.nsf/Content/HACC

Australian Government, Department of Social Services. (2015). *Commonwealth home support programme – Programme manual 2015*. Retrieved from
https://www.dss.gov.au/sites/default/files/documents/06_2015/chsp_programme_manual.pdf

Australian Government, Department of Social Services. (2015). *Living well at home: CHSP good practice guide*. Retrieved from
https://www.dss.gov.au/sites/default/files/documents/06_2015/good_practice_guide_version_web_accessible_pdf.pdf

Campbell, A. J., Robertson, M. C., La Grow, S. J., Kerse, N. M., Sanderson, G. F., Jacobs, R. J., ... & Hale, L. A. (2005). Randomised controlled trial of prevention of falls in people aged >75 with severe visual impairment: The VIP trial. *British Medical Journal*, *331*, 817-825. http://dx.doi.org/10.1136/bmj.38601.447731.55

Clapham, D. (2005). *Housing pathways in later life*. In D. Clapham (Ed.), *The meaning of housing* (pp. 213–237). Bristol, UK: The Policy Press.

Clemson, L. (1997). *Home fall hazards. A guide to identifying fall hazards in the homes of elderly people and an accompaniment to the assessment tool, the Westmead Home Safety Assessment*. West Brunswick, Australia: Co-ordinates Publications.

Clemson, L., Cusick, A., & Fozzard, C. (1999). Managing risk and exerting control: Determining follow through with falls prevention. *Disability and Rehabilitation*, *13*(12), 531-541. http://dx.doi.org/10.1080/096382899297189

Clemson, L., & Martin, R. (1996). Usage and effectiveness of rail, bathing and toileting aids. *Occupational Therapy in Health Care*, *9*, 41–58. http://dx.doi.org/10.1080/j003v10n01_04

Close, J., Ellis, M., Hooper, R., Glucksman, E., Jackson, S., & Swift, C. (1999). Prevention of falls in the elderly trial (PROFET): A randomised controlled trial. *Lancet*, *353*(9147), 93–97. http://dx.doi.org/10.1186/isrctn56623436

Connell, B. (1996). Role of the environment in falls prevention. *Clinics in Geriatric Medicine*, *12*(4), 859-80. Retrieved from http://www.europepmc.org

Cowell, F., Bridge, C., & Mathews, S. (2006). *Home modification information needs of occupational therapists practicing in New South Wales*. Sydney: Home Modification Information Clearinghouse, University of Sydney.

Cumming, R. G., Thomas, M., Szonyi, G., Salkeld, G., O'Neill, E., Westbury, C., & Frampton, G. (1999). Home visits by an occupational therapist for assessment and modification of environmental hazards: A randomized trial of falls prevention. *Journal of American Geriatric Society*, *47*(12), 1397–1402. http://dx.doi.org/10.1111/j.1532-5415.1999.tb01556.x

Day, L., Fildes, B., Gordon, I., Fitzharris, M., Flamer, H., & Lord, S. (2002). Randomised factorial trial of falls prevention among older people living in their own homes. *British Medical Journal*, *325*,128–31. http://dx.doi.org/10.1136/bmj.325.7356.128

Department of Health. (2008). *High quality care for all: NHS next stage review final report*. London: Department of Health.

Department of Health. (2010). *Equity and excellence: Liberating the NHS*. London: Department of Health.

Duncan, R. (1998). Blueprint for action: The national home modifications action coalition. *Technology and Disability*, *8*(1–2), 85–89. http://dx.doi.org/10.3233/TAD-1998-81-207

Edgington, A. (1984). Survey of major adaptations. *British Journal of Occupational Therapy*, *47*(2), 46–49. http://dx.doi.org/10.1177/030802268404700209

Gilderbloom, J. I., & Markham, J. P. (1996). Housing modification needs of the disabled elderly: What really matters? *Environment and Behaviour*, *28*(4), 512–535. http://dx.doi.org/10.1177/0013916596284005

Gill, T. M., Williams, C. S., Robison, J. T., & Tinetti, M. E. (1999). A population-based study of environmental hazards in the homes of older persons. *American Journal of Public Health*, *89*, 553-556. http://dx.doi.org/10.2105/ajph.89.4.553

Gillespie, L. D., Gillespie, W. J., Cumming, R. G., Lamb, S. H., & Rower, B. H. (2001). *Interventions for preventing falls in the elderly*. Oxford: The Cochrane Library.

Gitlin, L. N., Corcoran, M. A., Winter, L., Boyce, A., & Hauck, W. W. (2001). A randomized, controlled trial of a home environmental intervention to enhance self-efficacy and reduce upset in family caregivers of persons with dementia. *The Gerontologist*, *41*, 15–30. http://dx.doi.org/10.1093/geront/41.1.4

Gosselin, C., Robitaille, Y., Trickey, F., & Maltais, D. (1993). Factors predicting the implementation of home modifications among elderly people with loss of independence. *Physical and Occupational Therapy in Geriatrics*, *12*(1), 15–27. http://dx.doi.org/10.1300/j148v12n01_02

Hanson, J. (2005). *The housing and support needs of adults aged 18-55 with impaired vision: A good practice guide*. Retrieved from www.bartlett.ucl.ac.uk/research/space/housingfutures/ypiv.htm

Hanson, J., Percival, J., & Osipovic, D. (2004). London user needs study: The housing and support needs of younger people with a visual impairment. Retrieved from www.bartlett.ucl.ac.uk/research/space/housingfutures/ypiv.htm

Hartling, L., Bond, K., Harvey, K., Santaguida, P. L., Viswanathan, M., & Dryden, D. M. (2010). *Developing and testing a tool for the classification of study designs in systematic reviews of interventions and exposures* (AHRQ Publication No. 11-EHC-007). Retrieved from http://www.effectivehealthcare.ahrq.gov

Harvard University's Joint Center for Housing Studies. (2013). *The US housing stock: Ready for renewal: Improving America's housing 2013.* Retrieved from http://www.jchs.harvard.edu/sites/jchs.harvard.edu/files/harvard_jchs_re-modeling_report_2013.pdf

Heywood, F. (2004). The health outcomes of housing adaptations. *Disability and Society, 19*(2), 129–143. http://dx.doi.org/10.1080/0968759042000181767

Heywood, F., Oldman, C., & Means, R. (2002). *Housing and home in later life.* Buckingham, UK: Open University Press.

Home Adaptations Consortium. (2013). *Home adaptations for disabled people. A detailed guide to related legislation, guidance and good practice.* Nottingham, England: Care & Repair.

Klein, S. I., Rosage, L., & Shaw, G. (1999). The role of occupational therapists in home modification programs at an area agency on aging. *Physical and Occupational Therapy in Geriatrics, 16*(3–4), 19–37. http://dx.doi.org/10.1300/j148v16n03_02

Kutty, N. K. (1999). Demand for home modifications: A household production function approach. *Applied Economics, 31*(10), 1273. http://dx.doi.org/10.15396/eres1998_195

Layton, N., Wilson, E., & Andrews, A. (2014). *Pathways to non-complex assistive technology for HACC clients in WA.* Perth, WA: Independent Living Centre of WA.

Lewin, G., De San Miguel, K., Knuiman, M., Alan, J., Boldy, D., Hendrie, D., & Vandermeulen, S. (2013). A randomised controlled trial of the Home Independence Program, an Australian restorative home-care programme for older adults. *Health and Social Care in the Community, 21*(1), 69-78. http://dx.doi.org/10.1111/j.1365-2524.2012.01088.x

Lewis, H., Fletcher, P., Hardy, B., Milne, A., & Waddington, E. (1999). *Promoting wellbeing.* Leeds, UK: Anchor Research/Nuffield Institute for Health.

Liebig, P. S., & Sheets, D. J. (1998). Ageism, disability and access to environmental interventions. *Technology and Disability*, *8*(1), 69–84. http://dx.doi.org/10.3233/TAD-1998-81-206

Liu, S., & Lapane, K. (2009). Residential modifications and decline in physical function among community-dwelling older adults. *The Gerontologist*, *49*(3), 344-354. http://dx.doi.org/10.1093/geront/gnp033

Livable Housing Australia. (2012). *Livable housing design guidelines* (2nd Ed.). Sydney, NSW: Author.

Mackenzie, L., Byles, J., & Higginbotham, N. (2002). Reliability of the home falls and accidents screening tool (HOME FAST) for identifying older people at increased risk of falls. *Disability and Rehabilitation*, *24*, 266–274. http://dx.doi.org/10.1080/09638280110087089

Mann, W. C., Hurren, D., Tomita, M., Bengali, M., & Steinfeld, E. (1994). Environmental problems in home of elders with disabilities. *Occupational Therapy Journal of Research*, *14*(3),191–211. http://dx.doi.org/10.1177/153944929401400307

Mann, W. C., Ottenbacher, K. J., Fraas, L., Tomita, M., & Granger, C. V. (1999). Effectiveness of assistive technology and environmental interventions in maintaining independence and reducing home care costs for the frail elderly: A randomized controlled trial. *Archives of Family Medicine*, *8*, 210–217. http://dx.doi.org/10.1001/archfami.8.3.210

Mathieson, K., Kronenfeld, J., & Keith, V. (2002). Maintaining functional independence in elderly adults: The roles of health status and financial resources in predicting home modifications and use of mobility equipment. *Gerontologist*, *42*(1), 24. http://dx.doi.org/10.1093/geront/42.1.24

Ministry of Health. (2006). *ASPIRE: Assessment of Services Promoting Independence & Recovery in Elders.* Auckland, New Zealand: University of Auckland.

National Disability Insurance Scheme. (n.d.). Retrieved February 19, 2016, from http://www.ndis.gov.au/

NHS Information Centre for Health and Social Care. (2008). *Personal social services survey of adults receiving community equipment and minor adaptations in England, 2007-2008.* Leeds: NHS Information Centre.

Nikolaus, T., & Bach, M. (2003). Preventing falls in community dwelling frail older people using a home intervention team (HIT): Results from the randomized Falls-HIT trial. *Journal of the American Geriatrics Society, 51*(3), 300–5. http://dx.doi.org/10.1046/j.1532-5415.2003.51102.x

Nocon, A., & Pleace, N. (1997). 'Until disabled people get consulted...': The role of occupational therapy in meeting housing needs. *British Journal of Occupational Therapy*, *60*(3), 115–122. http://dx.doi.org/10.1177/030802269706000305

O'Connell, H. (2013). *Challenging community care with wellness - An implementation overview of the WA HACC program's wellness approach.* Retrieved from https://www.communitywest.com.au/resources/files-and-downloads-home/wellness/wellness-publications/261-challenging-community-care-with-wellness-communitywest/file

Ohta, R. J., & Ohta, B. M. (1997). The elderly consumer's decision to accept or reject home adaptations: Issues and perspectives. In S. Lanspery and J. Hyde (Eds.), *Staying put: adapting the places instead of the people* (pp. 79–90). Amityville, NY: Baywood Publishing Company Inc.

Online Medical Dictionary. (n.d.). Retrieved February 19, 2016, from http://encyclopedia.thefreedictionary.com/social+model+of+disability

Ontario (2013). *Healthy homes renovation tax credit*. Retrieved from http://www.ontario.ca/taxes-and-benefits/healthy-homes-renovation-tax-credit

Peterson, L., & Clemson, L. (2008). Understanding the role of occupational therapy in fall prevention for community dwelling older adults. *OT Practice*, *13*(3), CE1-CE8. Retrieved from http://media.proquest.com.dbgw.lis.curtin.edu.au/

Picking, C., & Pain, H. (2003). Home adaptations: User perspectives on the role of professionals. *British Journal of Occupational Therapy*, *66*(1), 2–8. http://dx.doi.org/10.1177/030802260306600102

Pynoos, J. (1993) Toward a national policy on home modification. *Technology and Disability*, *2*(4), 1–8. http://dx.doi.org/10.3233/TAD-1993-2403

Pynoos, J. (2001). *Meeting the needs of older people to age in place: Findings and recommendations for action*. San Diego, CA: The National Resource Centre for Supportive Housing and Home Modification.

Pynoos, J. (2004). On the forefront of the ever-changing field of home modification. *Rehab Management*, *17*(3), 34–35, 50. Retrieved from http://europepmc.org/abstract/med/15067923

Pynoos, J., & Nishita, C. M. (2003). The cost and financing of home modifications in the United States. *Journal of Disability Policy Studies*, *14*(2), 68-73. http://dx.doi.org/10.1177/10442073030140020201

Pynoos, J., Tabbarah, M., Angelelli, J., & Demiere, M. (1998) Improving the delivery of home modifications. *Technology and Disability*, *8*, 3–14. http://dx.doi.org/10.3233/TAD-1998-81-202

Rousseau, J., Potvin, L., Dutil, É. & Falta, P. (2002). A critical review of assessment tools related to home adaptation issues. *Occupational Therapy in Health Care*, *14*(3/4), 93–104. http://dx.doi.org/10.1300/J003v14n03 06

Sanford, J., Follette, S. M., & Jones, M. L. (1997). An analysis of the effects of ramp slope on people with mobility impairments. *Assistive Technology*, *9*, 22–33. http://dx.doi.org/10.1080/10400435.1997.10132293

Sattin, R. (1992). Falls among older persons: A public health perspective. *Annual Review of Public Health*, *13*(1), 489-508. http://dx.doi.org/10.1146/annurev.publhealth.13.1.489

Steinfeld, E., Levine, D., & Shea, S. (1998). Home modifications and the fair housing law. *Technology and Disability*, *8*, 15–35. http://dx.doi.org/10.3233/TAD-1998-81-203

Tanner, B., Tilse, C., & de Jonge, D. (2008). Restoring and sustaining home: The impact of home modifications on the meaning of home for older people. *Journal for Housing for the Elderly*, *22*(3), 195-215. http://dx.doi.org/10.1080/02763890802232048

Verbrugge, L., & Sevak, P. (2002). Use, type, and efficacy of assistance for disability. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 57*(6), 366-379. http://dx.doi.org/10.1093/geronb/57.6.s366

Yardley, L., & Todd, C. (2005). *Encouraging positive attitudes to falls prevention in later life.* London: Help the Aged.

Appendix

Table A1

Description of Terms

Title	Principles / Purpose
Policy / Reforms	
Commonwealth Home Support Programme (CHSP)	On 1 July 2015 the Australian Government launched the Commonwealth Home Support Programme. The CHSP is part of the broader changes to aged care that will offer frail older people and their carers more choice, easier access, and better care. The CHSP consolidates a range of existing programs to create a streamlined source of support services for frail older people and their carers including the Commonwealth HACC Program, the National Respite for Carers Program, the Day Therapy Centres Program, and the Assistance with Care and Housing for the Aged Program. The Commonwealth Home Support Programme will form the entry-level tier of support in an increasingly responsive integrated and client centred aged care service system. The programme will deliver a relatively small amount of support to a large number of frail, older people to help them remain living at home and in the community for as long as they choose, thereby enhancing well-being and quality of life. The CHSP benefits eligible people and carers through: • Streamlined access to entry-level support services; • A standardised national assessment process and entry point through My Aged Care; • Increased focus on restorative approach including wellness and re-enablement; • Promoting equity and sustainability through a national fees guideline; • A reduction in red tape for service providers through more streamlined funding arrangements.

| | The CHSP does not currently apply to HACC services in Western Australia or Victoria, where the HACC Program continues to operate as a jointly-funded Commonwealth-State program.

(Australian Government, Department of Social Services, 2015) |
|---|---|
| **National Disability Insurance Scheme (NDIS)** | The National Disability Insurance Scheme (NDIS) is a national system of disability support focused on providing real choice and flexibility to people with disability, through the provision of personalised funding. The scheme is being trialled in selected sites and will be progressively rolled out across Australia.

The NDIS is one of the largest reforms in Australia's history and will provide choice and flexibility to people with disability when it comes to choosing where and how they access support. The NDIS supports people with a permanent and significant disability that affects their ability to take part in everyday activities.

The National Disability Insurance Agency NDIA is an independent statutory agency responsible for the implementation of the scheme. They provide:
• Personalised information and referral.
• Support to access community services and activities.
• Individualised plans and supports.
• A focus on early intervention.
• Funded supports.

(National Disability Insurance Scheme, n.d.) |
| **Ageing in Place** | The concept 'Ageing in place' is a central principle of ageing policy widely used in community care in Australia. The goal of ageing in place is to support older people as they age to remain in their own homes or residence of choice for as long as possible. 'Ageing in place' reduces the need to move from one's present residence in order to secure necessary support services in response to changing needs. It also applies to older people living in low care to reduce the need for relocation to higher care. Technology and HMs are important enablers for ageing in place. |
| **Livable Housing Australia Guidelines** | Livable Housing Australia aim to make all newly built homes accessible thereby minimising the need for extensive HMs at later life stages. |

	• Livable Housing Australia (LHA) is a partnership between community and consumer groups, government and industry.
	• LHA champions the mainstream adoption of livable housing design principles in all new homes built in Australia.
	• LHA arose from the Kirribilli Dialogue on Universal Housing Design, which established nationally agreed guidelines on designing and building livable homes.
	• LHA is responsible for the ongoing development, dissemination, and revision of Australia's Livable Housing Design Guidelines.
	(Livable Housing Australia, 2012)
Approaches / Model	
Person-centred approach	Person-centred care puts the person, their experiences, preferences, values and needs at the centre of the caring process. A care plan is developed in partnership with the client, their carers, and the health professional(s).
Consumer-directed care (CDC)	Consumer (or self) directed care allows people to have greater control over their own lives by supporting them, to the extent that they are capable and wish to do so, to make choices about the types of care services they access and the delivery of those services, including who will deliver the services and when.
Person-Environment Conceptual Model (P-E)	The Person Environment model is a framework that guides clinical reasoning in analysis and understanding of the interdependent interaction of the person, the environment, and the occupation and therefore can form a foundation for application in practice. Interventions using the P-E model aim to combine environmental factors and personal abilities in order to achieve optimum levels of function.
Person-Environment-Occupation Model (P-E-O)	The PEO model is an extension of the P-E concept; occupation performance, environment, and person are interdependent. It is the assumption that the environment, rather than the person is easier to change.[9]
Person-Environment-Activity Model (P-E-A)	A variation on the P-E-O. In this model the person, their environment, and the activity are the three components of usability. Activity is what distinguishes usability from accessibility.[27,28]
The Active Service Model (ASM)	The Active Service Model (ASM) is part of a wider initiative to build capacity in Victorian Home and Community Care (HACC) services and make them

	more person centred. The approach focuses on people's strengths, not their deficits, and assumes everyone has some capacity to improve their own health and wellbeing.
	ASM aims to help people live in the community as independently and autonomously as possible. Being independent means people can manage their daily activities, including social and community participation. Being autonomous means people can make their own decisions.
	(Active Service Model, n.d.)
Re-ablement/Enablement	Re-ablement involves time-limited interventions that are targeted towards a person's specific goal or desired outcome to adapt to some functional loss, or regain confidence and capacity to resume activities. Re-ablement aims to assist people to reach their goals and maximise their independence and autonomy. Supports could include training in a new skill or relearning a lost skill, modification to a person's home environment, or having access to equipment or assistive technology.
	Re-ablement focuses on prevention and helping people 'to do' rather than 'doing to or for'. Under the Commonwealth Home Support Programme (CHSP) re-ablement is targeted to clients who are motivated to continue to undertake activities of daily living for whom time-limited supports can achieve an increase in independence. In the CHSP, re-ablement is embedded within the assessment, referral, and service pathway. RAS will identify opportunities for clients to be as independent as is practical, potentially reducing the need for ongoing and/or higher levels of service delivery.
	(Australian Government, Department of Social Services, 2015)
Wellness Approach (Western Australia)	Wellness is an approach that involves assessment, planning, and delivery of supports that build on the strengths, capacity, and goals of individuals, and encourages actions that promote a level of independence in daily living tasks, as well as reducing risks to living safely at home.
	Wellness, as a philosophy, is based on the premise that, even with frailty, chronic illness or disability, people generally have the desire and capacity to

	make gains in their physical, social, and emotional wellbeing and to live as autonomously and independently as possible. The wellness philosophy underpins all activities under the Commonwealth Home Support Programme. (Australian Government, Department of Social Services, 2015)
The social model of disability	The social model of disability identifies systemic barriers, negative attitudes, and exclusion by society (purposely or inadvertently) that mean society is the main contributory factor in disabling people. While physical, sensory, intellectual, or psychological variations may cause individual functional limitation or impairments, these do not have to lead to disability unless society fails to take account of and include people regardless of their individual differences. The social model recognises that a person's home environment can restrict access to vital social relationships, leading to poor mental health. (Online Medical Dictionary, n.d.)

Table A2

Effective Economic and Funding Practices

Category, First Author, Year of Publication, Organisation	Country	Purpose / Evidence
1.0 Cost Effective Practice Examples		
'Home Access Secure' (HAS) services & loans	QLD Australia	HAS services include home maintenance, home security, falls prevention and safety at home, and minor HMs to older people who are ineligible or unable to access HACC or DVA funded HMM services. Home loans assist low income home owners to modify their homes, which can be supplemented with a grant of up to $10,000. Client satisfaction is high and services are in significant demand.[46]
Small Adaptations Grant (SAG)	UK	SAG is used for installation of stairlifts and ramps and uses a simplified and streamlined application process. In 2008/2009, the average time from receipt of referral to completion of works was eight weeks.[40]
Middlesbrough integrated approach of Housing and Social Care	UK	One stop service for the provision of HMs. Key features include: offers of alternative accommodation if HMs are too disruptive, mobile working which has improved waiting times for HMs (i.e., sending referrals from the client's home), and a nationally recognised handyperson service for minor HMs. A new system for procuring showers allows more flexibility and value for money. Outcomes include improved wellbeing, independent living, and easier access to appropriate services.[40]
South Staffordshire Council & Spirita Care & Repair – Simplified Processes	UK	Reduced wait times and costs resulting from HM processing times of 20 days from referral to finished installation for stairlifts and eight weeks for a level access shower. Other measures include: a block of funding for HMs to Spirita, and no means test or tenure condition for simple items (i.e., stairlifts, level access showers, and ramps). Other features include: one joint visit made by the OT and caseworker, a simple two-sided application form and electronic drawing is processed on site, an application is emailed and approval given within 24hrs, rolling contractor list work to a schedule of rates.[40]
St. Helens Fast Track System	UK	A four-level method of assessment enables fast track provision of minor HM's through handyperson services. A flexible ' fast track' grant (DFG) is available when the total cost is less than £2,000 (also available to landlords who provide 50% funding towards the cost of HMs), means testing is not required. This approach has led to a significant reduction in the time taken to grant approval resulted in a higher level of customer care and satisfaction.[15,40]

The Lincolnshire Home Improvement Agency(LHIA)	UK	The LHIA's role includes managing referrals and supporting individuals throughout the HM process. The partnership developed formal targets and operational protocols which helps avoid duplication of services. The LHIA represents the service user's preferred options. The LHIA uses links with other agencies in order to obtain additional funding or services for service users. Workforce include OTs, grants staff, and every client is assigned a caseworker.[40]
Sorenson (2012)	South Australia	HM service for older people, the workforce consist of OTs, contractors, and administration. Fitting HMs is a once only payment and capped at $20 for older peoples. On average, end to end processes took less than three weeks. Complex HM took on average just over three months. In 2011/12, around 3,200 minor HMs were completed, it took on average 17 days to complete work and an average cost of $512. For major HMs, 110 HMs were completed, taking an average of 100 days with an average cost of $10,600.[81]
Handyperson Services	Croucher (2012) UK	A longitudinal study using the Handyperson toolkit calculated the average cost savings of using a handyperson from a falls prevention service. Findings demonstrated significant savings in prevention of: falls £33,129; admission to sheltered accommodation £20,886; social services usage £2,028. Reductions in power bills totalled £2,912 and total savings approximated £58,955.[17]
Trusted Assessor	UK	Since 2004, the Approved Assessor Training programme has enabled many professionals from health, social care, housing services, and other related organisations in the UK to administer simple end to end HM processes with positive outcomes.[96]
NSW Community Options Projects Rapid Response	NSW, Australia	The aim of Rapid Response funds is to reduce wait times for HMs for people with progressive illnesses such as Motor Neurone Disease and Multiple Sclerosis.[16]
'Accessible homes' service, Bristol	UK	This service provides HM solutions by adopting 'Lean Systems Thinking.' Average end-to-end times have reduced from 71 to 30 weeks. "Employing a rehousing OT enabled 20 households to move rather than pursue costly major adaptation of their existing homes within the first six months. The Council expects to save £609k over six years" (p.8).[15]
Wales – Rapid Response	UK	A HM service provider partnership providing a Rapid Response scheme for older and disabled persons has proven to be effective in saving national health care dollars. Service users report improvements in quality of life.[18]
Sub-regional Framework Contract – Procured rates	England, UK	This framework allows local professionals access to procured rates for common types of HM work. This enable contractors to plan time for urgent situations. This has significantly reduced the average wait time for a contractor to be allocated (now 10 days) and works are completed within four weeks.[40]
Northampton Care and Repair's handyperson	UK	This service guarantees the installation of minor HMs on the same day as requested, facilitating earlier discharges from hospital. The service costs the state around AUD$3,800

		per month and helps discharge 20 people from hospital. One day in hospital for 20 people in the UK costs approximately AUD$14,000. The service also deals with other issues, e.g., falls prevention.[18]
South Worcestershire Community Re-ablement team	UK	The team consists of a social worker, an occupational therapist, physiotherapists, a therapy assistant, and six re-ablement assistants. Almost half of all referrals engage in this re-ablement program. The Modified Crichton Royal Scale was used to measure level of dependency. The shift in scores after the program was found to be significantly different for physical, mental, and social abilities. Outcomes included a savings where residential or home care was reduced or avoided.[77]
Heywood, (2001) Minor HMs	UK	The majority (77%) of participants in this study reported that minor HMs produced a positive health outcome. Participants also considered minor HM to be: cost effective, very helpful, with no abandonment, and no negative side effects. Less than 2% of people were dissatisfied with their HMs.[36]
McCullagh, (2006) Falls prevention	USA	In an RCT of 530 older adults by Salkeld and colleagues (2000), HMs were found to reduce the rate of falls resulting in significant cost savings. Specifically, savings included $2,853 per fall prevented for all participants, and $119 per fall prevented with participants with a previous history of falls.[53]
Better Outcomes, Lower Costs scheme (2008)	UK	Following hospital discharge, 51% of older adults moved out of their home and into residential care because their home was no longer practical and 90% said they could not have a bath. Many family members reported the state of the home was the reason for admission to hospital.[18]
Accidents at home	UK	In the UK, the health care cost of a fracture, including 12 months ongoing health care, is almost five times the cost of a standard HM (AUD$12,000), and >100x more than a handrail.[66]
Visual impairment	UK – Northern Ireland	Visual impairment is a major cause of injury in the UK. Swedish research indicates home improvements and equipment for people who are visually impaired has resulted in major savings in the sector.[66]
Northern Ireland Housing Executive (2014)	UK – Northern Ireland	One study demonstrated that the cost of home care for a person who is wheelchair dependent and has complex needs is significantly more expensive (AUD$800,000 over ten years) than providing equipment and HMs which can allow the person to stay at home or delay admission to a residential setting. Estimated savings are AUD$50,000 per person.[66]
Lindahl (2004)	Sweden	Equipment and HMs are only a fraction of the total cost of a year of rehabilitation for a person who has had a stroke.[51]

HMs/AT over institutional care	USA	i) In the US, care home facilities cost an average of approximately AUD$110,000 per year. Seventy five percent of older adults reported that HMs have enabled them to stay put for at least another 10 years or longer. ii) The average cost for residential care facilities in the US is USD$3450 per month, averaging around $40,000–70,000 a year. In contrast, after HMs costing a median of $4000, 75% of older adults expected to remain living in their homes for 10+ more years than would otherwise have been possible.[49]
LifeTec	QLD, Australia	The use of ICT has sped up HM processes and improved service delivery, reduced travel expenses, improved communication and collaboration, and facilitated access to skilled OTs.[46]
Effective deployment of resources to meet client needs.	UK	A bath seat and grab rail for £18 could genuinely address bathing difficulties rather than provision of a £3,000 level access shower and shower seating. This can rise to £25,000 where an extension is required to accommodate a dual bath and shower facility.[66]
2.0 Accessible Housing Register (AHR)		AHRs are an alternative to HMs, the aim is to match accessible homes with older and disabled persons' needs
Cardiff, AHR	UK	During 2002 to 2005, suitable homes were found for 300 disabled people, saving an estimated AUD$2 million in grants.[18]
The Walsall Adapted Housing Service (WAHS)	UK	Volunteers, social landlords, and the Council link modified accommodation with people needing accessible homes. In four years, the service has let 145 homes, saving approximately AUD$4 million. In addition, the project has reduced waiting lists for HM grants and sped up hospital discharges.[15,40]
Glasgow City Council	UK	This organisation helps people with disabilities understand their rights, complete funding and grant applications, and find alternative housing. The organisation offers technical advice, makes repair, and arranges HMs.[65]
Physical disability and community housing sector	NZ	In NZ, many accommodation agencies and real estate agents provide assistance with home maintenance and repairs, HMs, and rental support services for older and disabled people.[21,78]
Free web-based services	USA	A free, web-based programme for accessible accommodation is available in the USA. In some states, it is law to make accessible housing information public. One AHR was developed for people with mental illness.[80]
3.0 Referral Management		
OT Direct, Hampshire	UK	'OT Direct' is a centralised referral agency for all OT referrals. Trained advisors and an OT operate the call centre. The team administers a screening assessment, provides support

		and information, and deals with basic AT and HM needs. More complex cases are referred to an area office for a full OT assessment.[96]
Western Australian Assessment Framework (WAAF)	WA, Australia	The WAAF provides a common access point for HMM service types for older people who are HACC WA eligible. Screening and assessment processes need to be consistent, evidenced based, and include consideration of an individual's preferences, and the potential for re-ablement.[50]
Community Care Access Point	NSW	A well-established single referral point for elder care and other services in the Hunter region. With regular involvement with aged care services and providers in the area, helps ensure timely and effective services, and accurate information about capacity.[42]
4.0 Incentivisation		
Home loans incentives for Universal Design	Japan	Japan heavily incentivises developers who use accessible design features, e.g., subsidised home loan interest rates and more flexible mortgages. This has encouraged many private sector developers to change their designs to include accessibility features.[80]
'Lifecycle Housing'	Norway	The Norwegian Housing Bank offers low cost, entry level loans designed to increase the number of homes built to universal design standard. The incentives include enhanced loans from the bank, which overall, finances 50% of all new Norwegian housing. From 1996 to 2005 a one percent lower interest rate was offered.[80]
The Kogarth Process	Australia	The Kogarth process in NSW is based on a sustainable housing code developed by the South East Queensland Region of Councils. Developers are exempt from certain conditions if 50% of new homes are built to accessible or adaptable standards in any new development in approved zones.[80]
Loan schemes for accessible design features	Canada	Lower cost home loans are available to builders of accessible design housing through the Canadian Mortgage and Housing Corporation. Schemes also help low income people from various tenures to modify, renovate & accommodate - secondary self-contained units. Flex Homes, was introduced as a step towards generalising the uptake and marketing of universal design housing.[80]
Reimbursements for HM expenses	Ontario, Canada	Income tax credits and reimbursements are given for HM and renovation expenses. Eligibility is simple: a person must be aged over 65 or be housing an older adult. There are no income restrictions.[49]
Reward good work	Northern Ireland	NIHE and the Housing Rights service recommend rewarding contractors for speedy response times and good quality work, balanced with penalties for poor work. They also provide incentives for people to move from adapted properties when adaptations are no longer required.[65]
5.0 Services Specialising in Financial Support		

West Midlands, 'Kickstart' assist financing repairs	UK	'Kickstart' assist people who need help financing repairs to older homes. This includes housing advice, access to reliable building services and opportunities to relocate, and options for homeowners including assistance in paying for improvements or maintenance. Repairs to older properties are financed by an equity loan to assist those who cannot access a loan on the commercial market.[18]
'FirstStop' National Service	UK	Offers advice for moving and other housing and care options in later life which can complement local face to face provision. Local Councils (e.g., Bristol City Council) offer 'move on' financial assistance rather than adapting the original property. Help is given with moving to social housing.[40]
Fold 'Staying put' & 'Gable' Schemes	UK	NIHE schemes that support older and disabled people who either own or rent their homes and want to remain living there. Services include advice or practical assistance: to repair, improve or modify homes, help with grant or loan processes, and assistance with selecting and organising tradespeople.[64]
The Disabled Facilities Grant (DFG)	UK	The DFG is available to disabled people who own or rent a property to help pay for HMs. All DFG applicants are subject to means testing.[18]
Home Improvement Agencies (HIA)	UK	Community-based HIAs provide information, support, and funding for essential HMs. Local authorities administer the overall funding which includes a national home repair and modification programme.[80]
Care & Repair	England, UK	Care and Repair co-ordinates the national housing programme which is targeted at older people who are finding their current housing hard to manage and may need to move. HIAs offer a wide range home based services, i.e., HMs, moving homes, handyperson services for minor repairs, assistance with grant processes, volunteer gardening services, managing tradespeople, advocacy, falls prevention, daily living support, and home safety checks.[80]
Departments for Housing & Urban Development and Agriculture	USA	Financial support options for older and disabled people, low income and rural populations. Options include: reverse mortgages at a low interest rate; reduced income tax credits; HMs prescribed by a medical practitioner; and funding to enable home remodelling contractors to offer income adjusted costs for HMs. California provides interest free loans and up to $800 grants for minor home repairs for eligible people.[49]
The Canadian Mortgage and Housing Corporation (CMHC)	Canada	A range of HM programs in Canada support low income elderly or disabled people. The main programs include financial assistance for homeowners and landlords to: modify homes for low-income tenants with disabilities; modify or develop existing properties to accommodate a secondary self-contained unit; pay for renovations.[80]
HomeBuy - Low Cost Home Ownership	UK	Target assistance for older people to move into better or manageable housing, and accessing capital.[18]

Shared Ownership for the Elderly (SHOE) - Housing Corporation	UK	SHOE assist people aged 55 years and older and own 100% of their home to move to a property that they own a share of. The maximum share that can be bought is 75%, no rent is payable on the remaining share. Organisations offering a SHOE charge a fee to cover maintenance and repairs.[18]
6.0 Key Components of Cost Effective Models		
Heywood (2001)	UK	According to study participants, factors that enabled high satisfaction levels include: access to grants for HM and heating; trained personnel to support manage the process; client involvement in policy areas; building regulations that make it easy to make modifications; upskilling of OT and housing professionals in HM assessing, specifying and securing beneficial HMs; and good relationships with tradespeople.[36]
Ryburn (2008)	WA, Australia	Elements considered cost effective in Silverchain's 'HIP' & 'PEP' programmes for people aged 65 years and over include: a comprehensive assessment from an inter-disciplinary team; evidence-based interventions to optimise functioning in ADLs (i.e., AT, task analysis, exercises for strength and balance); Educating clients and/or family about self-management, healthy ageing, use of medications, and strategies to prevent illness/injuries; promoting independence; and local resources and social supports available. Outcomes at one year post intervention included: a reduced need or no need for home care services for a greater proportion of clients, improved ADLs and mobility, reduced falls, and higher morale.[77]
Saville-Smith (2007)	NZ	To improve access to HMs, participants in one study recommended: easy to understand and better access to information on funding for HMs and provide this information in a range of languages; a 'one stop shop' for disability information; improve knowledge of service providers (including OTs, needs assessors, builders, architects) about funding systems and housing needs for people with a disability; reduce wait times for HM services; widespread adoption of universal design for new residential housing; establish a registry of modified homes; equitable access to funding systems; increase the limit (NZ$7,900) before asset testing applies; funding should allow for life cycle changes to accommodate changing situations; and finally, participants specifically asked to be treated with respect.[78]
Szanton (2011, 2014)	USA	The CAPABLE project is a client directed model, addressing both medical and functional issues using an interdisciplinary team approach, and incorporating home repair into health care. It is adapted from 'ABLE', a home based program involving OT and physiotherapy input, and its interventions include AT and other compensatory strategies. ABLE cost only USD$1222 per participant in 2006, and outcomes included improved performance in self-cares and delayed mortality. At USD$13,179 per additional year of life saved ABLE was

		judged extremely cost-effective. Researchers hypothesised that adding a nurse and a handyperson would increase the effects of the ABLE program. Preliminary data suggests CAPABLE is cost effective and improves ADL performance and quality of life. CAPABLE has the potential to leverage US health care spending that, depending on outcomes from 2015 trials, could be rolled out nationally.[86]
Ryburn (2008)	Australia	Outcomes for clients receiving home care using a restorative approach has shown to significantly lower the likelihood of being admitted to hospital or residential care than those receiving care as usual.[77]

Table A3

The Use of Home Modifications to Prevent Accidents / Illness

Category	Country	Studies / Programs / Pilots
1.0 Most Common HMs used in Prevention		
1.1 Common HMs to reduce accidents and compliance	Australia	i) Raised toilet seats, non-slip mats, and grab rails are the most often recommended for bathroom environments. In general environments, removal of floor mats is most often recommended (Cummings et al., 1999; Nikolaud & Bach, 2003). ii) Shower seats, emergency alarms, grab rails, and non-slip mats are reported to have the highest compliance. Raised toilet seats and removal of rugs/carpets / obstacles in walkways have the lowest compliance (Cummings et al., 1999; Nikolaud & Bach, 2003).
1.2 HM for AMD visual impairment	Australia	Reading fine-material modifications for electronic device / appliances, hand rails, non-slip matting, colour contrasting safety stair nosing, single lever taps, slip resistant flooring, lift chairs, and pathway lighting motion sensors are reported as the most important functional HMs.[74]
1.3 Most common HMs	UK	Most commonly used HMs include: hand rails (grab/stair/external) and ramps / step alternatives [36]. Reported outcomes of HMs included: feeling safer from risk of accidents (62%); performing self-care tasks of bathing/ toileting (39-49%); requiring less assistance from others (36%); running your home (31%); going out of the home (24%); and continuing with own interests (12%)[36]
	NZ	In one study the provider's responses indicated the most common HM sought by disabled or older people is a house with a wet area shower. Other modifications commonly sought included: access to the home and toilet, widening hall/doorways, and grab rails.[78]
	USA	In a survey of almost 2000 people, 75% of participants believed HMs would allow them to live in their homes for 10 years or longer. The most common functional problem was difficulty with stairs. Sixty-three per cent installed night lights and 50% installed non-slip strips in the bath or shower.[7]
1.4 Basic HMs	NZ	A national study of older adults at risk of physical decline (of which 40% lived alone) received standard HMs as a part of their intervention. At two years post intervention, participants with HMs were less likely to experience further functional decline than the control group.[54]
2.0 Preventive Programs / Projects		

2.1 Effective preventive programs	Australia	i) Adults over 70 years of age experiencing ADL difficulties received multi-interventions, including HMs, strategies, energy conservation, safety, fall prevention, balance, and muscle training. At six months post intervention, the greatest improvements were in bathing and toileting, self-efficacy, and the use of strategies. Twelve months post intervention demonstrated continued benefits and lower mortality rates for the intervention group.[77]
	USA	ii) Older adults recently discharged from hospital received 'Restorative Care.' Post intervention they performed personal-care, mobility, and domestic tasks better than the control, and demonstrated reduced risk of an early readmission to hospital.[77]
2.2 DVA preventative programs	Australia	i) Home Front 'Home Front's' objective is to identify hazards at home and provide support, e.g., financial assistance for HMs for those who are eligible.[46] ii) Veterans Home Care Program (VHCP) VHCP is a national programme providing low level care tasks for eligible people living at home. They provide personal care, domestic assistance, and home/ garden maintenance.[46]
2.3 Nottingham PAD (Preventative Adaptations for older people)	UK	PAD is a partnership scheme between housing and social departments and the NHS Trust. This preventative scheme employs technicians to do minor works and other tasks to improve a client's safety. Technicians receive training by OTs enabling them to carry out risk assessments and perform minor HMs. Their role includes installing rails, removing thresholds, and installing smoke alarms. Staff reported outcomes included: increased client confidence to remain living independently, fewer hospital admissions from falls, faster hospital discharges, and a reduced need for complex HM.[39]
2.4 Multi-component intervention & falls prevention	USA	i) Older persons living at home who were at risk of falling received an assessment to identify hazards at home. Interventions included minor HMs and equipment and an exercise program to improve balance, mobility, and transfer skills. At one year post intervention, significantly fewer people fell than those in the control group.[53] ii) Older persons recently discharged home from hospital received an OT home assessment. Basic modifications and equipment were provided. Of those who had a history of falling, more than one third experienced a reduction in falls. The effectiveness of the intervention is attributed not only to the HMs but also to the recommended behavioural changes.[53]

2.5 Commonly hazardous areas	Australia	i) Design features commonly found in many suburban Australian homes (e.g., stairs, narrow halls and doorways, difficult to access bathrooms and toilets) can contribute to early admission to residential care for many older persons.[46] ii) A USA study identified over half of older people had bathrooms with at least two hazards, most common were loose rugs and obstructed walkways. Few people had grab rails, including those with a history of functional difficulties.[46] iii) Older people aged over 60 years receiving home care services had at least four difficulties within the home. The most common problems experienced were in: the kitchen (69.5%), the bathroom (50.4%), access to the house (33%), and appliances, electrical outlets/switches, lighting and stairs (22-28%; Mann et al., 1994). iv) One fifth of Australians over 75 years believed changes around their home would make it easier to live in or increase their independence. The key areas they wanted changing were: assistance with general maintenance, (21.3%) installing rails (21.3%), access to the home (14.9%), and structural changes (12.8%).[46]
2.6 Fall Prevention Strategies	USA	i) The absence of grab rails in bathrooms or unsecured mats were found in almost all older Australians homes where potential falls had been identified as an issue. On average each home had 10 hazards.[53] ii) Commonly recommended HMs by OTs for older people include removing loose mats, relocating electrical cords, and installing bathroom and stair rails.[53]
2.7 Care and Repair Prevention training	UK	National award winning service Healthy Homes Assessment Training covers the health implications of poor housing and provides solutions to housing needs. Topics covered include: HMs for disabled people, falls prevention, accidents in the home, issues with fuel poverty and damp homes, repair and safety services.[39]
2.8 Prevention and Home maintenance	VIC, Australia	A low maintenance garden project used a re-ablement and preventative approach for clients living in rural areas requiring gardening assistance. The aim is to provide a one-off make over so that the new garden is easier to maintain and reduces the need for further assistance. Benefits of using this approach include: improved client function and independence, motivation and self-confidence, and physical activity. It also allows clients to continue with an activity they enjoy.[50]
2.9 Handyperson Services (HS) role in prevention	UK	UK service providers highlight the importance of the preventative nature of HMs. They may be the first person to identify a client's unknown and unmet needs, and they can be used to monitor changing needs. Handyperson services are varied but predominantly

| | | preventative, their role includes: removing falls hazards (43%), security measures (30%), plumbing problems (20%), electrical work (18%), gardening, putting up curtains, and work on guttering (10-12%).[17] Service users consider small jobs completed by handypersons as very important. HS assist with timely hospital discharges.[17] |

Table A4

Workforce

Title	Country	Description / Findings
1.0 Credentialing		
1.1 Specialty Certification in Environmental Modification for OT and OTAs	US	American Occupational Therapy Association's (AOTA) Scope of Practice stipulates OTs working as HM practitioners are responsible for the evaluation, intervention, outcome, and discharge of the client. Practitioners providing complex HMs require specialized knowledge and skills. OTAs may participate in assessments, using standardised tools, with which they have demonstrated competency, and participate in interventions with a supervising OT (AOTA, 2010c).
1.2 Rehabilitation Appliances Program (RAP) Guidelines	Australia	RAP guidelines assist assessors, providers, and suppliers when determining eligibility and prescribing RAP approved HMs and AT items.[23]
1.3 Trusted assessors (TA) Competence Framework	UK	When simple AT and HMs do not require direct OT input, TAs trained with specific competencies can be employed under OT guidance. The TA framework is designed for people working in a range of health, housing, and social care settings to become competent in minor HM solutions. Under this model core components are: person, activity, environment, and equipment/product. One service using the framework developed a specialised OT Help Desk, which improved overall performance. Twenty-five OTAs using the framework work directly with many services users who would have waited too long for an OT assessment.[96]
1.4 The State-Wide Equipment Program (SWEP) Prescriber Registration and Credentialing Framework	VIC, Australia	The SWEP framework enables professionals in allied health and nursing to develop skills in assessment and prescription of aids and equipment. The framework recognises the complex interaction between AT, the client, and their support person/s. Equipment is categorised by complexity, recognising even basic AT may require higher level of assessment for people with complex needs.[84]
1.5 Disability Support Services – Equipment and Modifications Competency Framework	NZ	Areas of competency are categorised as: 1) client centred needs assessment; 2) assessment of a client's home, includes understanding: the parameters and specifications, NZ building standards, and scope of AT usage; 3) propose HM plans including critiquing tradespersons drawings.; 4) types of HM for complex situations and identifying behavioural needs; and 5) review – needs must be met for 2-3 years.[54]
2.0 Minor HM Assessments Without Direct OT Input		

2.1 Handyperson Services working as trusted assessors	UK	Case study pilots: i) The Alzheimer's Society worked with 'handypersons' to provide a regular gardening service for people with dementia, the purpose was to provide some meaningful activity, exercise and company. Handypersons were provided with training to understand dementia and horticultural skills. As a result there were increased numbers of people using the service regularly, and many were prepared to contribute to the cost of the service.[17] ii) Handyperson services were used to work as trusted assessors in a Smart Home as a part of developing preventive services. Services users could try equipment, and have them installed, usually by the same person they had met in the Smart House. As a result waiting lists for OT assessment reduced from 12-6 months, and 6-4 weeks for a senior therapist, and seven days for an OTA. OTs were able to focus on more complex cases.[17] iii) Bristol Care and Repair: Minor Adaptations Repair Agency employ handypersons, who are covered by public liability insurance and are skilled tradespeople who like working with older clients. A range of tasks includes fitting minor HM without an OT assessment when appropriate. Complex case are referred back for an OT assessment.[39]
2.2 Examples of good practice outcomes from minor works without OTs	UK	i) Community Assistants (CAs) can order HM/AT items (e.g., grab rails and lever taps) for up to £150 for each tenant. Work is completed in 5-20 working days. The CAs receive formal training in disability awareness and the social model of disability. Outcomes include reduced wait times and there have been no claims made against any CA recommending a HM.[39]
	UK	ii) 'FAST' is a preventative, minor HM scheme which doesn't require an OT assessment. Referrals are sent to the general social services help-desk, and trained staff do a screen of the client's home, their supports, mental health, and diagnosis. Every case is discussed with OT Manager. OTs intervention time cut down from two hours to approximately five minutes and saves around 900 OT HVs a year. There are few reported incidences of clients needing more help.[39]
2.3 Training components delivered by OTs	UK	The following are components of training programs from several UK councils offered by OTs to housing staff: • Assessing for and positioning of grab-rails and other small items; • How to spot when a referral for full assessment is needed; • When to refer on and how to identify additional support; • Risk assessment and fitting minor HMs;

		• A register of people trained in assessing and supplying minor HMs without OT, and registration lapses if a person has not been carrying out assessments; • A unique PIN for ordering equipment is allocated to trained staff.[39]
3.0 Forming Alliances		
3.1 HM service providers in Australia would benefit by forming alliances with…	Australia	Community Care Consortium; NCOSS; Aged and Community Services Association NSW, ACT and Australia; Home Modification Information Clearing House; AHURI; Independent Living Centre, NSW; Livable Housing Australia; COTA; NDS; National Aged Care Alliance; Futures Alliance.[67]
4.0 Innovative Multi-disciplinary Programs		
4.1 ASPIRE	NZ	An evaluation of the efficacy of home based 'ageing-in-place' programs was undertaken. The project involved a multidisciplinary team and intensive home support program that targeted clients with complex needs and high dependency. Services included: case management and two MDT restorative teams that offer time-limited rehabilitation before offering home care provision. Findings revealed (compared to usual care): a 28% reduction in the risk of mortality, a 33% reduction in the risk of entry to residential care, and no rise in caregiver stress, despite people with complex needs continuing to live at home.[77]
4.2 Programs/teams using an Active Service Approach	UK	Leicestershire Home Assessment and Re-enablement Team • OT, senior home care assistant, six home carers, a home care manager, and a programmer. • Interventions include: home-based care packages for 4-6 weeks, focussing on daily living skills. • The emphasis is on a social care model rather than a medical model of re-enablement • Outcomes - reduced or no ongoing need for home care services for most clients.[77]
	USA	Connecticut Restorative Home Care Agency • Nursing, physiotherapy, OT, and home health aide. • Intervention - exercise; behavioural changes; environmental adjustments and AT; counselling and support; education of patient and family; and medication adjustments. • Outcomes - improved self-care and home management skills and mobility; greater likelihood of remaining at home; and reduced likelihood of visiting an emergency department.[77]

	Western Australia	Silver Chain Home Independence Project (HIP) and Personal Enablement Project (PEP) (see table 2:8)
4.3 Working together with volunteers	UK	In Cumbria, health, social care, and housing work together to find solutions to individual needs, this approach prevents high-cost interventions at a later stage. In Carlisle, a pilot project aims to identify older people at risk in the community. Services and funding are co-ordinated in order to reduce the risks. A community neighbour co-ordinator manages volunteers to work with individuals, identifying and helping to resolve any safety and well-being problems.[15]
4.4 Manchester Equipment and Adaptations Service (MEAS)	UK	Innovation in joint working: MEAS involves social services, housing, and health agencies. A central service screens all referrals and redirects HM/AT requests to the MEAS assessment service administration, where 'demand led items' (e.g., grab rails), are sent directly to the installation service staff for actioning. Staffing includes: main grade assessors who deal with assessment for AT, minor HMs, stair lifts; senior assessors who deal with more major HMs (e.g., level access showers and extensions); qualified OTs who focus on complex major work; and Physiotherapists. The system enables prompt delivery of HMs, with minimum administration.[39]
4.5 The Department of Veterans' Affairs (DVA)	Australia	The DVA funds and administers a number of HMM services for eligible veterans. These include a home maintenance helpline, a programme for assistance with home and garden maintenance, a falls prevention service, loans for HMs, and a rehabilitation appliances program. Tradespeople are required to meet a number of standards including trade qualifications, professional indemnity, and public liability insurance.[46]
4.6 'Community First'	NZ	A multidisciplinary team using a restorative approach provides intense home based support for people with high or complex needs.
4.7 Outcomes from multi-disciplinary approach	Australia	One literature review evaluated home based multi-component interventions by multidisciplinary teams with the primary aim of maximising functional independence of older persons, with various levels of dependency, and diagnostic groups. Teams comprised of allied health professionals, domestic assistance, and home carers. Outcomes included: no longer requiring assistance or reduced level of service, increased independence, improved ADLs, better mobility, reduced falls, higher morale, increased ability to travel, reduced anxiety, higher self-efficacy, lower fear of falling, increased access to social support networks, reduced likelihood of A & E visit, increased likelihood of remaining at home, sustained benefits, lower mortality rates, decreased home care packages, reduced carer burden, and early discharges from hospital.[77]
4.8 Housing Outreach Clinics Enable	NZ	The aim of the service is to respond in a timely manner to the complexities of a person with a disability and their families living in remote areas. Scheduled clinics and on-site

NZ/Ministry of Health		visits are held in key centres to provide support, education, and advice to assessors and other relevant parties.[57]
5.0 Examples of Good Practice Training Initiatives		
5.1 HACC Workforce training for OTs and builders	QLD, Australia	The following are several components from HACC Queensland training initiatives: • HACC collaborate with universities to provide placements and information sessions for OT students; • Building a sample bathroom for training purposes; • Online national networks provide support for OTs involved in major HMs; • HM Information forums; • Development of an information kit for OTs which includes: program background, eligibility, benefits, descriptions of work provided, basic building tips (e.g., finding wall studs), a report template specific to major HM, and a selection of diagrams; • Regular meetings between builders and OTs to building codes and resolve any issues; • Joint meetings with client, OT, builder and co-ordinator to discuss needs and options.[41]
5.2 Key areas for technical awareness training	Northern Ireland, UK	The NIHE state key areas for technical training include: • Housing design standards relating to the needs of people with disabilities; • Visual communications techniques - sketch drawing, reading plans, using digital technology; • Team work when specifying HM to include the user; • Interagency communications to ensure the client's needs are best met.[65]

Table A5

Toolbox

Title	Country	Type of Service / Website Link / Reference
Australian HM Services		
Organisations / government departments providing HM support & information	Australia	Websites that provide HM information regarding design, products, and methods for Australia:[10,21,22,23,24,46,77,78,79] • ADHC and the NSW Home Modification and Maintenance State Council provides specialist OT training in HM http://www.nswhmms.org.au/node/3036 • Alzheimer's Association www.alzheimers.org.au • Archicentre www.archicentre.com.au • Australian Building Codes Board for information about the National Construction Code, education, products, and product certification www.abcb.gov.au • Australian Government funded packages: CACPs, EACH, and EACH-D www.health.wa.gov.au/HACC • Australian Human Rights Commission provides advice, support and information that promotes and protects human rights in Australia https://www.humanrights.gov.au. A resource guide for people with a disability, it provides design, construction and technical specifications for improved access https://www.humanrights.gov.au/our-work/disability-rights/publications/good-bad-and-ugly-design-and-construction-access • Australian Standards www.saiglobal.com • City Futures Research Centre for access to research on urban planning, housing, health and well-being, design, development, and social policy http://www.be.unsw.edu.au/research-centres-and-clusters/city-futures • Community Care Access Point which provides applications of HACC funded home modification services in NSW and e-referral of eligible clients www.hsnet.nsw.gov.au • Department of Ageing and Disability NSW for modifications www.housing.nsw.gov.au/ • Department of Communities' online design and development information for major home modification www.housing.qld.gov.au/partnerships/ • Department of Families and Communities SA, for Independent Living Centre equipment programs, HACC, and modifications http://www.australia.gov.au/information-and-services/family-and-community

| | | • Department of Health and Ageing for housing information, home based care, community packages, HACC services and guidelines, education, and prevention www.health.gov.au/
• Department of Housing for community programs, funding, and loans www.housing.gov.au
• Department of Housing and Works, WA housing options information www.dhw.wa.gov.au/
• Department of Human Services for home renovation services, aids and equipment programs, home finance information, and HACC program www.dhs.gov.au
• Department of Veteran Affairs for home and community care for veterans and their carers http://www.dva.gov.au/health-and-wellbeing/home-and-care
• Fair trading NSW website - professional development information for builders, checking contractor's licence details, consumer rights on repairs, refunds and replacements if goods and services do not meet guarantees, and changes in Strata Scheme Management Act www.fairtrading.nsw.gov.au
• Home Modifications Clearing House www.homemods.info
• Independent Living Centres www.ilcaustralia.org.au
• Independent Living Centre NSW www.ilcnsw.asn.au
• Lifetec www.lifetec.org.au
• Livable Housing Australia www.livablehousingaustralia.org.au
• My Aged Care provides information about aged care services and what consumers need to do to receive them http://www.myagedcare.gov.au or phone 1800 200 422
• NSW HMMS State Council www.nswhmms.org.au
• OT Australia www.otaus.com.au
• Queensland Smart Home Initiative for information on assistive technologies www.qshi.org.au/
• Rehabilitation Appliances Program (RAP) National Guidelines (2014) for home modifications: http://www.dva.gov.au/service_providers/rap/Documents/RAPNationalGuidelines.pdf 23 pp36-43
• Royal Australian Institute of Architects (RAIA) for their national training programme and education courses www.architecture.com.au/
• Service Evaluation Model providing information about attempts to develop re-ablement programs in England, New Zealand, and Australia http://www.health.vic.gov.au/hacc/downloads/pdf/asm_literature_review.pdf |

		• WA Community Aids and Equipment Program (CAEP) www.disability.wa.gov.au
International HM services		
Service schedules & common HM issues	NZ	Ministry of Health NZ equipment and modification website outline HM roles and responsibilities, service schedules, minimum standards for material and workmanship applicable to HM work. Common issues to be aware of - e.g., water pressure, repairs and maintenance, changes to plans, income/asset testing and guidelines for common minor and major HMs.[58] http://www.nsfl.health.govt.nz/apps/nsfl.nsf/pagesmh/519
Service Resources	NZ	Learning and development resources for assessors; toolkit for service accreditation; clinical reasoning guideline; power point training module.[57] http://www.disabilityfunding.co.nz
Regulatory Access Standards	International	Regulatory requirements for disability access in Australia, UK, Canada, United States, Japan, European Union, Norway & Israel.[80] http://repository.digitalnz.org/system/uploads/record/attachment/361/housing_and_disability__future_proofing_new_zealand_s_housing_stock_for_an_inclusive_society_-_working_paper_2_.pdf
HM organisations	UK	Websites that provide HM information regarding design, products, and methods for the UK:[1,15,18,40,61,66] • Age Concern for information and advice on services to support independent living for older persons http://www.ageuk.org.uk/ • Alzheimer's Association for researchers, professionals, carers and people living with Alzheimer's http://www.alzheimers.org.uk/ [66] • Building Regulations http://buildingregulations.co.uk/ • Building regulations, policy and practice in housing design for disabled people, supported by reviews of British Standards www.bsigroup.com/en/Standards-and-Publications/Committee-Members/Construction-committee-members-area/Overview-of-BS-8300/ • Care and Repair England is a national charitable organisation that supports people to age well at home http://careandrepair-england.org.uk/ • Department for Communities and Local Government https://www.gov.uk/government/organisations/department-for-communities-and-local-government • Department for Social Development for Elderly Housing – housing association guide and design standards https://www.dsdni.gov.uk/elderly-housing • Department of Health https://www.gov.uk/government/organisations/department-of-health

- Department of Housing https://www.gov.uk/government/topics/housing
- First Stop, Housing Care provide information and advice for older people living in England http://www.firststopcareadvice.org.uk/
- Foundations is the national body for Home Improvement Agency and Handypersons Services http://www.foundations.uk.com/about-foundations/
- Habinteg Housing UK provide accessible housing http://www.habinteg.org.uk/
- HACT is an agency that promotes ideas and innovation across the housing sector http://www.hact.org.uk/
- Health, Social Services and Public Safety Department aims to support people to live independent lives, preferably in their own homes. Access to information, publications, and e-consultations http://www.dhsspsni.gov.uk/ec-community-care
- Houseproud and Home Improvement Trust is a non-profit partnership that provides support to vulnerable older people to adapt, repair, or maintain their homes http://www.houseproud.org.uk/
- Housing Care provides information for older people http://www.housingcare.org/index.aspx
- Independent Age provide advice and information on finance, housing, and social domains http://www.independentage.org/
- Joseph Rowntree Foundation for housing research, policy, and practice influencing social changes https://www.jrf.org.uk/housing
- National Housing Federations for major housing issues, information, publications, and events (e.g., conferences and webinars) http://www.housing.org.uk/
- National Institute for Health and Care Excellence provides links to key resources and practical tools for carers and service providers http://www.nice.org.uk/guidance/qs30
- Northern Ireland Housing Executive website for advice, information on housing, funding, and online services http://www.nihe.gov.uk/
- Parkinson's UK offer support and advice for people with Parkinson's and their carers http://www.parkinsons.org.uk/
- The Dementia Centre UK provides information, education, housing design for carers, professionals, and building developers http://dementia.stir.ac.uk/
- The Home Adaptations Consortium is made up of representatives from a wide range of UK national organisations with the primary purpose of providing quality HMs for people who have a disability https://homeadaptationsconsortium.wordpress.com/

		• The Housing Consultancy Partnership assist in the development of services and systems for housing organisations including government, housing authorities, and housing associations http://www.thcp.org/accessible-homes-toolkit • The Kings Fund is an independent charity that aims to improve health and health care through research, health promotion, and sharing knowledge http://www.kingsfund.org.uk/ • The Manual Handling Operations; Disabled Persons Act, carers payments, Health and Social Care Reform Act, housing legislation, Human Rights Act http://www.legislation.gov.uk • The Royal National Institute of Blind People (RNIB) offer support, advice and information including AT and HMs http://www.rnib.org.uk/ • The Royal Society for the Prevention of Accidents for resources, training courses, advice and information for staying safe at home http://www.rospa.com/home-safety/
World Health Organisation (WHO)	International	WHO International Classification of Functioning, Disability and Health.[10] http://www.who.int/classifications/icf/en/
Chartered Institute of Housing (CIH)	International	The CIH is an independent organisation for housing and professional standards http://www.cih.org/
Design and Products		
1.2 Design guidelines	Northern Ireland, UK	Adaptations Design communication toolkit includes: • A range of minor HMs, which can be provided without full assessment; • Evidence based HM design standards for all housing tenures; • Design formats that will help disabled people visualise and discuss proposed HMs; • Standardised OT formats for HM recommendations, financial governance, specifications, and follow up communications to housing providers; • Electronic formatting that will help to facilitate inter and intra-agency communications.[20]
Design solutions	Northern Ireland, UK	Four case studies include: assistive/smart technology, extensions, internal HM and off site manufacturing; data sheets cover: site considerations, external works, circulation spaces, and environmental controls.[64]
Design & risk identification	UK	Housing Health & Care Integration Toolkit shows how handypersons and HIA service interventions can reduce hazards around the home and aligns them to specific outcomes in UK health care frameworks.[33]
Design guidelines to manage behaviours	NSW Australia	Design guidelines to manage the behaviours of people with cognitive impairments and conceptual design guidelines for creating an effective environment for people with dementia.[93]

Design equipment	Northern Ireland	AutoCAD training and equipment can speed up the drawing procedures.[65]
Accessible Design	NZ	For information on universal and accessible design.[57] http://www.lifemark.co.nz/homeowners.aspx
Design information for assessors	NZ	For design/technical information, relevant aspects of Ministry of Health Equipment Management Service funding, and clinical considerations.[57] http://www.disabilityfunding.co.nz/ems-assessors/resources/housing-modifications/design-information
Lifetime Homes Standards	UK	Specifications and dimensions of 'Lifetime Homes' as applied in Northern Ireland.[65]
Design guidelines	South Australia	Housing design guidelines for sustainable housing and liveable neighbourhoods.[19] http://dcsi.sa.gov.au/__data/assets/pdf_file/0007/6388/Design-Guide-4_1.pdf
Remote & minority design tool	Australia	'The Checklist' is for designers, planners, and health professionals working with ageing or disabled Aboriginal people, particularly living in remote areas.[93]
Checklist for Universal design	Canada	A 19-point checklist for universal home design and certification system for homeowners, developers, and HM organisations.[25] http://www.saferhomesociety.com/index.php/saferhome-standards/19-point-standards
Livable Housing Guideline	Australia	Offers Livable Housing Australia design guidelines and principles for elderly and people with special needs, in addition to information about becoming a registered building assessor. http://www.masterbuilders.com.au/Livable-Housing-Guidelines
Landscape Modification	Australia	Guidelines on landscape modification as an alternative to ramps and lifts.[10]
Workforce		
Criteria for selecting builders	UK	A detailed guide to related legislation, guidance, and good practice. Includes: performance indicators, a HM service review checklist, criteria for establishing a list of builders, and guidance on applying legislation.[40]
Training	NSW, Australia	To increase expertise of OTs and licensed builders in HM and for disabled and older people NCOSS suggests schemes similar to the NSW Health HECS reimbursement scheme and the Teach for Australia scheme.[16]
Credentialing	QLD, Australia	Credentialing manual for registered and non-registered professions, includes: criteria for employment; credentialing and scope; clinical effectiveness, and decision making.[3]
Competency Standards	NSW, Australia	A set of competency standards for occupational therapists.[32]
Guide to minor HM without OT	UK	This guide provides a recommendations for the provision or fitting specified minor HMs without direct OT input.[39]

Competence Framework for Trusted Assessors	UK	A national guide to developing competencies for health professionals who provide equipment to disabled people and their carers. See chapter 15 for useful resources.[96]
Training for OTs, builders & consumers	Australia	Occupational Therapy Australia, http://www.otaus.com.au/ and the New South Wales Home Modifications and Home Maintenance State Council http://www.nswhmms.org.au/node/3217. ILC NSW runs training for OTs and builders on access and universal design principles. They also hold workshops for consumers and provide website information on how to carry out HMs themselves. Various HM training and professional development takes place at other ILCs throughout Australia.[50]
Worksafe Australia	Australia	Includes a volunteer assistance package for community organisations; guide to work, health and safety regulations; and workers' compensation arrangements across Australia. www.safeworkaustralia.gov.au/
WorkCover, NSW	NSW, Australia	Provides material for working safely.[21] http://www.workcover.nsw.gov.au/
Volunteering	Australia	Provides volunteer management and community resources.[21] http://www.volunteering.com.au/
Building Professional Association	Australia	Building Professionals Board.[24] http://bpb.nsw.gov.au/
OT professional associations	Australia	Legislative Registration Board - Australian Health Practitioner Regulation Agency.[3] www.occuptherapyboard.qld.gov.au Professional Body - OT Australia (Australian Association of Occupational Therapists).[3] www.ausot.com.au
	US	American Occupational Therapy Association. http://www.aota.org/
	Britain	British Association of Occupational Therapists and College for Occupational Therapists. https://www.cot.org.uk
	Canada	Canadian Association of Occupational Therapists. https://www.caot.ca
	NZ	Occupational Therapy New Zealand. www.otnz.co.nz Occupational Therapy Board of New Zealand. www.otboard.org.nz

Handyperson Financial Benefits Toolkit	UK	The Handyperson Financial Benefits Toolkit has been designed for handyperson services to estimate social benefits of their services.[17] http://www.communities.gov.uk/publications/housing/financialbenefitstoolkit
Therapy Tools		
Follow up tool	NSW	The HMinfo Home Modification Follow-up Tool can be used as a prompt for therapists over the phone or face to face. The tool is not influenced by the clients' disability or functional level. Validity and reliability of this tool requires further research.[31]
Self-Assessment	UK	Department of Health, Partnerships for Older People Projects (POPP) is a preventative scheme, their self-assessment 'Promoting Independence' toolkit can be accessed at:[18] www.changeagentteam.org.uk/index.cfm?pid=597
Self-Assessment	Australia	A Way to Stay: Home modification Assessment & Planning Tool developed by SCOPE Access HMs is designed to be used by the consumer &/or with the therapist and builder during planning, assessment and quoting stages.[79] http://www.scopehomeaccess.com.au/product/a-way-to-stay/
Visual impairment guidelines	Australia	A set of HM guidelines informed by visually impaired people, but not standardised.[74]